Recycling Targets and Intensive Diversion in Lancashire.

Main Report

Ecologika

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Executive Summary

Scope

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- the implications of waste growth for recycling targets (Chapter 6)
- Lancashire's existing levels of diversion and the quantity of materials available for diversion (Chapter 7)
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- an outline of the systems and finance required to reach high levels (Chapter 9 and the two borough case studies)

Diversion targets and waste planning

2. Recycling targets have come to occupy a central place in contemporary waste planning, principally because they serve to define the size of residual waste for which disposal arrangements have to be made. Waste planners at national and local level have proceeded to identify a potential level of recycling (usually between 30% and 40%), which, when coupled with the requirement to shift away from landfill, serves as the basis for determining the volume of waste which has to be treated by some method other than landfill.

3. The result has been so called 'integrated' plans, usually with a 30:60:30 split between recycling, incineration, and landfill, (in the national case 33:34:43, and in Lancashire's Draft Strategy, 32:68:20), with the totals exceeding 100% because of residues of incinerator ash. The controversy that has arisen around such plans has not been about the increase in recycling or the decrease in landfill (on the desirability of both of which there has been common agreement), but has focussed on the middle 30%-70%, and specifically on proposals for incineration.

4. In recent years there has been border warfare over this middle ground, with recycling targets forming one of the principal borders. Those arguing for incineration have tended to make lower estimates of 'practicable' levels of recycling and composting, and higher estimates of future growth rates, pointing out that increases in the rates of recycling have had difficulty in keeping up with the rate of waste growth. Those opposing incineration have cited evidence of high rates of diversion and low or declining rates of waste growth overseas, arguing that the switch from landfill can be accommodated by diversion. This in turn has led to controversy (and consultants reports) on the measurement, regulatory context and replicability of overseas best practice, and what can be reasonably be expected to occur in the UK. Trenches have been dug and redug on either side.

5. This report seeks to move the focus of concern away from fixed targets. It argues that the reason why the settlement of a target ceiling for recycling has assumed such importance is that the waste plans propose methods of residual waste treatment which are capital intensive and which need long term contracts and guarantees of waste inputs to ensure their viability. The size of likely residual waste flows over two decades is therefore of critical concern. As with all such large scale plant, planners have to wrestle with the problem of how to reduce uncertainty and distribute the risk.

6. To some extent this has been a problem that has always faced waste planners. But in the past it has been more manageable in that waste expanded in line with economic growth and the main form of disposal, landfill, was flexible and worked on shorter time scales. Now this has changed. On the one hand alternative waste treatment methods such as incineration have time horizons which are double those of landfill. On the other all the parameters governing the waste industry have been subject to the most far reaching change that has occurred for a century. Waste growth, its composition, its regulation, its public acceptability, its financing and its links to the rest of the economy are all being turned upside down. Such radical change has confronted many industries – waste in this sense is a latecomer. The response of industry – from autos to textiles, and from food to electricity - has been to move away from large inflexible plants and dedicated machinery that can both find themselves stranded by rapidly changing markets or regulatory circumstance, and instead develop a flexible supply side which can react promptly to change.

7. In the case of waste, this means shifting the focus of planning away from trying to fix long term waste growth figures or levels of recycling, and rather to concentrate on:

- the necessity and operational requirements of the shift from mixed waste to source separated materials

- the development of a flexible residual disposal capacity which can respond to the progress (or lack of progress) of the diversion initiatives, at the same time meeting environmental goals, and gaining public consent.

8. From this point of view a policy and contractual arrangement centred round incineration would be misplaced because it an inflexible option at a time when there is a

premium on flexibility. On all sides incinerators are confronted by uncertainty: on future waste arisings and the size of the residual, on health risks, on regulatory requirements and therefore costs, on public liability, and on issues of technological obsolescence. Those countries which sought to move away from landfill by building incinerators in the late 1980s and early 1990s (notably the US and Germany) suffered not only an unexpected level of public opposition, but have experienced major changes in all these variables over the past decade with the result that incinerators have had to be upgraded, have found themselves stranded economically and politically, and have had to import waste from neighbouring states.

9. In this report we recommend that the boundary between diversion and disposal is redefined in three ways:

- the boundary should not be fixed within a twenty year time frame but be regularly reviewed and revised according to the progress of diversion

- the boundary should not demarcate two exclusive zones of waste management, but rather each element of waste management should be planned to support the aims of the other. Diversion should be planned so as to eliminate the hazards associated with disposal, and disposal should be planned so that it complements rather than competes with the long term goal of maximising diversion.

- the boundary should be redrawn so that it distinguishes different streams each of which can be diverted and disposed of in ways that are environmentally optimal. The key planning and operational distinction becomes no longer diversion as against disposal, but rather the distinction between material streams, and a unified policy of diversion and disposal within each.

10. From one point of view this reduces the significance of recycling targets and ceilings. It suggests that the argument about them can never be settled a priori, but only in practice. From another it suggests that targets should become one part of a new waste management information system that has the following features:

- it is disaggregated by material; waste composition is the foundation stone of the new secondary materials economy

- it provides real time information on changes in the composition, volume, and rate of diversion of waste of the main waste streams

- it tracks waste arisings and diversion by household and workplace

11. Targets in such a feedback system have a distinct function, not as a determining end point but as a succession of staging posts set when the immediate way ahead is clear. The goal in diversion as in the reduction of hazards in disposal should be seen in terms of continuous improvement.

Assessing achievable rates of recycling and composting

12. The report examines the model and assumptions used by the Government, and in modified form by Lancashire, to assess targets. It suggests that there are no long term limits on the proportion of households that can be included in a system of source separation and diversion, anymore than there were limits for the households served by the traditional weekly collection.

13. Nor are there limits on the recoverability of waste (in this respect our assumptions based on the waste composition analysis, of 85% medium term recoverability are close to the 78% assumed by Lancashire, with both being significantly higher than the 60% assumed by the Government's Away with Waste).

14. The key issue is the capture rate, which is heavily dependent on the design and operation of the three stream system. We assume a 65%-75% target for the medium term, which is lower than the upper Lancashire estimate of 81%, but higher than the medium Lancashire estimate of 51%. When added to 85% recoverability and a borough wide service, this generates a diversion rate of 60%, compared to the draft Lancashire working target of 32%, the revised one of 36%, and the revised long term ceiling of 56%.

15. Our conclusion is that the revised target of 36% underestimates the level of diversion which can be achieved in the short and medium term, as reflected in rates of 40%-60% recorded by UK authorities which have introduced three stream systems.

16. We suggest that a different methodology is required for analysing CA site waste, where diversion rates are already at over 50% for six of Lancashire's twenty six sites, rising to 57% on the Abbey Lane site in West Lancs. Elsewhere Hampshire and Dorset CA sites have been reconfigured as recycling centres rather than bulky waste transfer stations, and are now reaching diversion rates of 70%-80%.

17. If Lancashire reached the best practice levels that have been achieved abroad, then levels of 60% plus are feasible in the medium term.

The implications of waste growth for recycling targets.

18. We argue that for the new waste economy, waste growth cannot be adequately analysed as an aggregate, nor should policy be based on overall levels of waste. Different elements of growth have different potentials for diversion and require different forms of treatment.

19. We analyse the waste growth data for Lancashire, identifying the rapid increase in the rate following the introduction of the landfill tax. The data suggest that the growth is founded on two factors: the shift of trade waste into the uncharged for streams, and the growth of CA site waste, some of which reflects the shift of trade waste.

20. What emerges from this analysis, is that much of the CA site waste is open to recycling, not least because of the forthcoming EU Directive on Electronic and Electronic Goods, and on cardboard packaging, and much of it is unsuitable as a feedstock for thermal treatment. Similarly trade waste predominantly consists of organic and paper/cardboard waste, and is susceptible to recycling. Two strategies suggest themselves: either greater control of the leakage of trade waste into the household streams; or a change in the incentive structure and development of recycling services which would encourage traders to source separate their waste in exchange for lower charges. What is not recommended is to base major investment in long run treatment facilities on these sources of waste, the first of which is targetted for reduction by the EU, and the second of which is volatile and not directly subject to municipal control.

Current recycling in Lancashire and available materials.

21. The report then analyses the existing level of recycling achieved in Lancashire, considering the types of data necessary for the new diversion planning:

- data on existing **recycling rates** in aggregate and by material. As a key Government and Lancashire indicator, data on recycling rates needs to be consolidated district by district, and County wide, on a quarterly basis so that progress can be tracked and prompt action taken. Currently the recycling data for 1999/2000 are not fully consolidated or submitted by districts on a common basis. In 1999/2000 Lancashire's municipal recycling rate stood at 5% of dustbin waste, 44% of CA site waste, with an aggregate of 15% overall. On the narrower DETR definition for household recycling , which omits home composting and rubble, the aggregate level achieved fell to 8% of household waste.

- data on **available materials in the waste.** Lancashire has carried out one of the most extensive surveys of dustbin waste composition by district of any County in the UK; but it lacks similar studies on the other components of the municipal waste stream (CA sites, special collections, street sweepings and trade and institutional waste). Such studies need to be regularly updated to monitor volumes and composition of waste flows over time. As it is the existing data, which is evaluated in terms of a UK derived waste composition model, allows an estimate of the different quantities of material currently in the dustbin waste. It indicates that 85% is immediately recyclable, 75% is biodegradable including 45% organics and 21% paper, and that the 15% residual is also open to targetted diversion schemes.

- data on the **sources of waste.** A review of available data suggests that 60% of municipal waste is dustbin waste, 24% is household bulky waste, 12% is trade and institutional waste, and 4% is street sweepings.

Lancashire Draft Strategy: clarifying goals and extending the impact

22. The report supports the central recycling and composting element of the Draft Strategy. The Strategy proposes to introduce a three stream system of collection of dustbin waste by 2005/6, with additional policies promoting home composting and other forms of waste minimisation, as well as establishing a professional marketing consortia. Measures of this kind have been central to the achievement of high diversion elsewhere.

23. At the same time there are two ways in which the Strategy could be extended in order to increase the effectiveness and impact of its policies:

(a) making the goals of the strategy more explicit. Currently in explaining the factors governing its proposals, the strategy refers to waste minimisation, recycling and composting and the support they have received during the period of consultation, as well as to the legal requirements of the EU's Landfill Directive and the targets in the Government's waste strategy. But in planning how diversion is introduced, and in gaining a public consensus for the major changes proposed, it is important to clarify the longer terms goals that lie behind the proposals. We suggests four principal considerations that appear to be implicit in the Plan:

- reducing the hazards and pollution associated with the handling and disposal of waste, particularly for those working in and living neat waste treatment or disposal facilities.

- minimising the impact of waste on global warming through reductions in methane emissions and cuts in CO2

- increasing the productivity of natural resources, in order to conserve existing non renewable resources, and reduce the environmental impact of primary material extraction

- developing new green industry and local employment on the basis of the recovery of secondary materials through recycling

The EU and the Government targets and associated regulations have been driven by the environmental concerns, but it is important for Lancashire to make these four goals the central criteria and justification of its policy rather than targets laid down elsewhere.

(b) elaborating and extending the Strategy's proposals so that their link to these criteria is clarified and their impact increased.

24. Four strategic policies are identified:

- *the primacy of organic diversion*, in order to reduce their impact on residual waste going to landfill, because organics are the major material in household waste and can

be readily diverted, because the compost produced is an enricher and improver of soil. Further, removing organics from the residual household bin, makes it possible to switch from weekly to fortnightly collections.

- *the diversion of other bio-degradables* through intensive recycling, notably all grades of paper and card, textiles and wood.

- *the removal of hazardous household waste* from the residual stream

- *recycling the other main household materials*, cans, metals, glass, plastics and consumer durables within the budget constraints.

25. These are implicit in the policy of introducing a three stream system, but it would be valuable to make them explicit for two reasons. As a set of policies they aim to 'clean' the residual waste stream, allowing for a shift from weekly to fortnightly collections, and sharply reducing the hazards and pollution associated with landfill. Secondly, the collection and processing infrastructure required can also be used as a bridgehead to encourage diversion in other streams, notably in trade and industrial waste which should be included within the scope of local authority led waste policy.

Achievable rates and feasible targets

26. The report emphasises three points in considering targets for Lancashire:

- **disaggregation.** Composite targets should be built up from more detailed ones for each component of the waste stream. Diversion involves an economy of detail, in contrast to the aggregates which were sufficient in a period of mass waste.

- **all waste streams.** While household waste should be the primary initial focus, both in dustbin waste and bulky waste delivered to CA sites, other waste streams should also be targetted, notably trade and institutional waste, and special collections.

- **short term milestones within a process of continuous improvement** rather than long term ceilings

Reaching the targets

27. It suggests that the levels of 60% recycling and composting are achievable in the medium term and illustrates what would be required to get to this level by two case studies, one of Preston as an urban area, and one of Ribble Valley as a rural one. Even if Lancashire only matched the levels currently reached elsewhere in the UK for dry recycling (22%), organics composting (34%) and CA site recycling (70%-80%) the County would still reach 53% diversion of household waste, plus potential further diversion from special collections, street sweeping and trade waste that has leaked into the domestic dustbin stream. This is a measure of the scope for rapid diversion which currently exists.

Conditions for achievement

28. To implement the Lancashire strategy and achieve levels of this sort requires four things:

(a) transitional finance. An estimate was made for the two case study boroughs using conservative assumptions in order to give a high ceiling for the costs of introducing a three stream system. In both instances the incremental net cost over the first five years of the programmes was 80% of 1999/2000 expenditure, which would imply some £10 million p.a. for Lancashire's collection authorities as a whole.

This figure of £50 million over 5 years is in line with similar detailed estimates made for Essex, a county with almost the same number of households as Lancashire, and with benchmark figures from the waste industry. But in each of these cases there are multiple savings that can be made as the programmes are established. These include savings in residual rounds particularly with the introduction of fortnightly schedules, the use of split vehicles in rural areas (which would have significantly reduced the Ribble Valley costs), increased collector productivity as capture rates increase, and increases in material prices as new processing capacity comes on stream.

When fully established, overseas evidence suggests that overall waste management costs with intensive diversion will be equal to or less than the disposal centred options. In the ILSR study of high diversion municipalities in the US, 9 of the 14 for which there was comparable data recorded the same or decreased net system costs, with 4 of the remaining 5 showing increases in their waste budgets only because disposal tipping fees had risen. For 13 out of 14 recycling and composting turned out to be the lost cost option. Canadian experience has been similar (in one case the overall budget savings were over 30%). Continuous reduction of net system costs until they equal current waste budgets should be the medium term benchmark target for Lancashire. The only issue is how to fund the transition.

Fortunately over the past year the prospects for external support for transitional funding have improved. A number of new sources of diversion finance have been announced by the Government, and there has been increasing pressure on existing sources such as landfill tax offsets and the issue and sale of PRNs to increase the finance going to collectors of recyclates.

b) a material sales consortium (as outlined in the Lancashire Strategy), employing professional marketing and market development expertise, to work on the demand side of recycling.

c) a zero waste agency (or best value unit) with established recycling and composting expertise to work on the supply side by providing a source of advice to boroughs in designing and operating the new programmes, and acting as an informed channel for external funds.

d) an interim disposal contract for a maximum of seven years to provide time for diversion to become established, for the hazards of the residual waste stream to be reduced, and for the new treatment technologies currently emerging to be fully tested and evaluated. A 25 year contract and the building of one or more incinerators in the County would divert attention from the task of achieving high diversion which is the primary goal in the Strategy, and would be in danger of introducing a demand for waste which would limit the further development of diversion over the 25 year period.

I

Introduction

Chapter 1

The significance of recycling targets

1. Waste diversion refers to policies and programmes for the minimisation, recycling and composting of waste in order to divert it from disposal. The targetted levels of diversion have become a central issue in waste policy for three main reasons:

- their implications for the planning of residual waste management
- their part in national strategies and programmes required to increase recycling
- their role as operational tools for the management of diversion programmes

Diversion targets and residual waste

2. In the past, when municipal waste was primarily managed through disposal to landfill, traditional forms of waste planning centred on estimating landfill needs based the projected future growth of waste over the period necessary to bring new landfill space into operation. The recent pressure to increase waste diversion and reduce disposal to landfill have posed two new problems for waste planners. First, alternative means of treating residual waste are in general more capital intensive, have longer lead times and require longer contract periods for their amortisation than landfill. This means that waste growth has to be estimated over much longer periods, typically upto 20 years.

Second, in order to estimate the quantity of waste for disposal, assumptions have had to be made about waste diversion. The likely levels of municipal waste diversion – particularly of recycling and composting – are primarily dependent on local authority action, so planners found themselves having to estimate the long run diversion capability of their authorities. The method adopted has been to estimate 'reasonable' targets, which when coupled with waste growth forecasts, allow estimates to be made of the waste still requiring disposal. Diversion targets have thus come to be widely used to define the size of the 'residual waste' problem.

3. In Lancashire's case, The Draft Municipal Waste Management Strategy for Lancashire (MWMSL) assumes that municipal waste arisings will have a zero growth rate as the result of a waste reduction programme. For planning purposes the waste to be managed is kept constant at current levels. The Plan then estimates that it will be possible to compost and recycle 32% of all municipal waste by 2010 and 51% by 2020. This would leave 68% of Lancashire's waste still to be disposed of in 2010, and 49% by 2020, either by landfill (which the Strategy proposes to cut by 80% by 2010), or by some other treatment method. In the Strategy, the assumed rates of increase of waste arisings, of waste minimisation and of recycling and composting determine the amount of residual waste that has to be managed and planned for. Much, therefore, hangs on the rates assumed.

Government diversion targets

4. Diversion targets have also become central to European and national waste planning. Since the Lancashire Draft Strategy appeared, the UK Government has produced its own Waste Strategy, which sets statutory recycling/composting targets that aim to double rates by 2005 and reach a minimum of 30% by 2010. The DETR has recently registered Lancashire's recycling rate in 1998/9 at 10% and set a target for the County of 20% by 2003/4 and 30% by 2005/6. This means that Lancashire will be required to approach its 2010 target level as set out in MWMSL by 2005.

Targets and the planning and implementation of diversion.

5. Finally, diversion targets are operationally significant for local authorities for the development and implementation of their recycling and composting plans. Some collection authorities have used recycling targets in contracts, requiring the contractor to meet these targets, with penalties paid for shortfalls, and/or have introduced employee incentives linked to the achievement of targets. Recycling rates are also now being used as a prime measure of waste management performance within the context of Best Value, reinforcing the significance of recycling targets in an authority's planning process.

Scope of the study

6. This is the context for the current study. Lancashire County Council (acting on behalf of the Lancashire Municipal Waste Management Steering Group) have asked Ecologika:

> "to review the basis for recycling and composting targets proposed within the Draft Strategy and make practical proposals as to how they may be improved upon".

7. The report discusses the issue in three parts:

- the role of recycling and composting targets in modern waste planning
- the basis for establishing recycling and composting targets, and an assessment of Draft Strategy levels
- the implications of waste growth for recycling and composting targets
- current and potential diversion in Lancashire

II

The Role and Treatment of Targets

Chapter 2

Targets and Waste Planning

Considerations effecting targets

1. Establishing recycling and composting targets needs to take into account a number of factors:

- the objectives which should be reflected in the targets
- the technical feasibility of recycling and composting
- the operational effectiveness of collection and processing
- the current and future regulatory environment
- financing requirements and the availability of funding
- the time-scale over which targets are set

2. Much of the debate around targets has focussed on the technical and operational issues, on how much it is reasonable to assume can be diverted from the household waste stream. This will be the focus of the second part of the report. But these detailed issues raise prior questions of definition, categorisation, goals and the links between diversion and other parts of the waste management system which are the necessary starting point for a review of Lancashire's waste targets.

3. This chapter discusses four issues:

- targets and objectives
- targets and disposal strategy
- targets and waste planning under uncertainty
- operational targets in flexible waste management systems

1. Targets and objectives: substance and form

4. The central place given to targets in UK waste policy has commonly led (fortunately less so in the case of Lancashire) to the targets themselves becoming separated from the overall policy goals. Debate comes to centre on classifications – what should or should not be included in the definition of recycling or composting – rather than whether any

particular practice furthers the policy objectives. Should incinerator ash used in construction count as recycling? Is home composting reduction or recycling? What about rubble recovered from CA sites, or abandoned vehicles?

5. The thing that gets quickly lost in such arguments about classification is the question of value, and the extent to which any particular practice contributes to the achievement of strategic goals. If one of the aims is to increase the productivity of resources, then it is not enough to say whether or not a particular residual material should be classed as recycling. The issue is how much of the material's value is retained (or increased) through a recycling process. For example a distinction needs to be made between recycled glass used as a substitute for aggregate in road building (low value) and its use as a filtration medium (high value), or between contaminated compost used as a cover for landfill and high quality compost used as a peat substitute. What this implies is that there is a hierarchy within recycling and composting just as there is between different waste management methods. If these are not recognised there is a danger that the idea of recycling and its associated targets will lose its qualitative content.

6. A strategy for recycling – and an estimate of achievement – should be framed in terms of broad policy objectives and not just the achievement of a numerical target. In their turn, targets should be set within wider objectives rather than simply meeting the formal requirements as set down by Whitehall or Brussels. It is an issue of keeping the connection between form (the target) and substance (the strategic goals).

7. The MWMSL could be strengthened in this respect by making more explicit the environmental objectives that guide its plan. There are two reasons for this:

- they are a key part of explaining to Lancashire households and firms the reason for the major changes in waste management that have to take place

- they provide criteria for formulating both strategy and particular targets, and for assessing proposed means for achieving them.

Reference to the three Rs, or to national and European policies, are relevant. But it is important that Lancashire is seen as a leader with its own environmental and economic objectives and not merely a local agent of policies determined elsewhere.

Objectives and priorities

8. As far as environmental objectives are concerned, there have been three drivers for change in current systems of waste management:

> (i) the need to reduce hazards and pollution associated with existing methods of waste disposal, particularly for those working at and/or living in the vicinity of waste treatment or disposal facilities

(ii) the pressure to minimise the impact of waste on global warming, through the reduction of methane emissions and cuts in CO2

(iii) the potential to increase the productivity of both renewable and non renewable resources

9. There are in addition two economic targets

(iv) the maximising of the value of recovered materials both to increase material revenues and economise on primary resources

(v) the promotion of green industry, job creation, import substitution and urban regeneration centred around the expansion of the secondary materials economy.

10. The questions posed by such objectives to national as well as local waste policy are how to:

- remove potentially hazardous or polluting material from treatment/disposal facilities as rapidly as possible
- maximise the economic and environmental value of recovered material
- organise the new waste management system in such a way as to take advantage of the potential economic benefits.

11. The environmental imperatives remain dominant. They give an urgency to the matter which sits at odds with attempts by some countries and authorities to slow down the process of transition. If the environmental goals are well founded, then all due haste needs to be used to try and reach them.

Priorities

12. From the perspective of recycling targets for Lancashire, the need to reduce hazards from existing methods of disposal suggest that priority should be given to:

- diverting bio-degradable waste from landfill rather than reducing landfill as such. It should be remembered that landfill may be a suitable means of disposing of some residual items in the waste stream such as glass, and rubble, and the MWMSL should be revised, in line with the Government's waste strategy, to refer to an 80% reduction in the bio-degradable element. This would in turn mean establishing targets for diverting organics, paper, textiles, and nappies.
- minimising the amount of household hazardous waste that has to be disposed of (this is a small tonnage and therefore contributes only minimally to

aggregate recycling targets, but is central to the broader objectives and would be understood by the public as such)

- maximising the diversion of those materials which lead to the greatest reductions in greenhouse gas emissions when recycled rather than landfilled or incinerated (aluminium cans and foil offer the greatest savings according to the US EPA, followed by newspaper, PET plastic and cardboard).

13. These priorities then need to be assessed financially. Some materials may be left to a second phase because of their cost (as in plastics) or their more modest environmental impact (for example the kerbside collection of glass). The resulting package also has to be judged against Government targets, for such targets cannot be ignored. But the targets do not determine the strategy. Rather it is the strategy based on criteria commanding a broad public consensus that should determine the targets.

14. To conclude, recycling and composting targets should:

- reflect the County's wider environmental objectives

- be directed at those materials whose diversion will reduce the hazards and pollution associated with mixed waste landfills, and contribute most to the reduction of greenhouse gases

- contain a qualitative as well as a quantitative dimension, aiming to optimise the value of recovered material (upcycling) and not simply meet Government targets within existing classifications

2. Targets and integrated waste management

15. There has been a tendency in local and national planning for disembodied targets for recycling to be established as a boundary to the residual problem, and for strategies for the residual to be developed without relationship to policies on diversion. What is often referred to as 'integrated waste management' is too often 'disintegrated', with a danger that the tail of disposal comes to wag the dog of diversion.

16. Locating targets in the context of broad environmental and economic goals as outlined above provides the basis for a substantive integration of recycling with other parts of waste management, as each develops over time. The connections run both ways. On the one hand, targetting polluting and hazardous materials for diversion reduces the landfill problem by detoxifying the residual waste stream. On the other disposal strategies need to be designed to take account of the conditions for success of recycling and composting programmes and their patterns of development.

17. This latter point is important for setting targets, since the strategy and methods for disposal will in part determine the 'realism' of the targets. The issue arises most immediately with respect to the relationship between incineration and recycling.

Incinerator projects have become the centrepiece of 25 year waste disposal contracts, in some cases crowding out recycling (as in the case of Cleveland and SELCHP), in others offering recycling that is a form of salvage from the mixed waste stream (such as low quality metal recovered from incinerator ash or indeed the ash itself).

18. Crowding out is one point of tension. Incinerators have an interest in securing the rights over waste in general (through minimum tonnage requirements or the structure of gate fee pricing by incinerators) and over particular waste streams (notably paper and plastic) which potentially conflict with recycling. But there has also been a deeper tension between the organisational methods and cultures of a traditional form of mixed waste treatment on the one hand and a new waste system based on source separated streams on the other.

19. It is not surprising that almost all those Councils in the UK that have core contracts with incinerators have had DETR-based recycling rates of between 3%-6% in 1998/9, and that many of the Councils with high rates have in part been driven by a concern to avoid incineration and as a result have put their prime political and technical energy into the diversion alternative. This is also the case with many high diversion municipalities abroad.

20. The few contrary cases, where countries or regions have substantial incineration alongside high recycling (such as Holland, Switzerland, parts of Germany, Denmark and Sweden) share one thing in common. They inherited a generation of municipal incinerators which it was uneconomic to decommission, and have developed their diversion strategies subject to this constraint (targetting organics, glass, industrial, commercial, as well as construction and demolition waste).

21. The tensions with recycling are not inherent in incinerators per se. Most recycled paper mills operate CHP incinerators for end of life fibres and discarded ink. But in this case paper recycling remains the determining activity of the plant, not the supply of material to the incinerator. The problems arise with mixed waste municipal incinerators and the failure to establish diversion as the dominant part of the package.

22. In summary, the realism of targets for recycling in part depends on the wider waste management system of which it is a part. Diversion and disposal are not independent. An apparently modest recycling target may well be too high if the focus of waste contracts is on capital intensive disposal facilities. Given the challenges faced in establishing a new 'secondary materials' recovery system, it will always be easier for waste managers to dispatch waste to a mixed waste treatment plant. The existence of a plant requiring guaranteed volumes of waste builds in an interest – managerial, institutional and financial – at odds with waste minimisation and recycling.

3. Diversion targets, time scale and uncertainty.

23. A further way in which disposal and diversion are linked is in the required planning time scale. If capital intensive treatment processes require longer planning periods, this

increases the degree of uncertainty faced by planners. There is uncertainty about the trends in waste arisings, in fiscal and regulative conditions, and in the impact of new technology and new materials on waste. The challenge to modern waste management is how to plan for uncertainty.

24. Many of the arguments that now surround national and local waste planning have arisen because people have been looking for certainty where there can be none. Take the issue of waste growth for example. Whereas in the past there has been a close correlation between the growth in waste and the growth of the economy, this connection is now in question. Per capita waste arisings in the United States, having risen uninterruptedly since the war, plateaued in the 1990s as new systems of waste management came in. In Germany waste arisings actually fell by 37% between 1990 and 1996. In these countries there has been a decoupling of the growth of waste and of the economy, rendering traditional methods of forecasting unreliable.

25. There is similar uncertainty about levels of diversion. Successful diversion depends on a whole range of factors – not least the capacity of waste officers to introduce effective systems and overcome the problems specific to each case. There is no single best practice model which can be replicated, since every local authority is distinct and most authorities contain wide differences within them. Rather there are better practice models on whose experience others can draw, as they adapt them to particular local circumstances. The future of diversion in this sense is open-ended. Whatever the technical feasibility of recycling and composting, regulative, operational, and financial factors cannot but introduce uncertainty into the achievement of targets, with the uncertainty becoming greater the longer the time scale.

Uncertainty and waste planning

26. The problem facing local authorities is how in practice to make waste plans and manage waste in the face of such uncertainty. UK waste planning has followed a traditional model. Waste plans are drawn up (as are municipal disposal contracts) on a twenty year plus basis to meet the requirements of large scale, purpose built treatment facilities. But those drafting the plans (and making the contracts) have the problem that they are working in an industry undergoing the most rapid change experienced in a century, when technology, regulation, and the relation of waste to other economic sectors are all continually shifting. The problem for the old model of planning is how to get some stability amidst this flux – to establish fixed points and firm trends, to estimate the likely course of regulative development and sketch out scenarios to provide some boundaries for decision making. This is why the question of recycling targets has assumed such importance.

27. But this model no longer works. To try and forecast how much waste there will be in twenty years, what its composition, chemical content and recyclability will be, and what regulative structures will govern its management – all these are subjects for futurologists rather than the slide rule. We need only consider what has happened in the past decade. A European waste planner in 1990 would have had the EU's 1989 Waste Directive to hand,

and would be aware of the proposed upgrading of incinerators. But there was little firm evidence at the time of the potential for extensive recycling and composting (in Germany, as in the US, recycling levels were similar to those now ruling in the UK), of the possibilities of a new 'secondary materials' economy developing, or of the widespread extension of Producer Responsibility. Waste was rising with growth. The paper companies in North America as in Europe were proving reluctant to switch from virgin to recycled materials. Even in 1993 there were still only three electronic recycling companies in Germany. By 1996 there were 200.

28. At the time, on both sides of the Atlantic, there were two approaches being canvassed to waste management . The first was to build a new generation of incinerators which would meet increased environmental standards, the second to develop a recycling based economy. The first was the policy pursued in many states in the US, in Canada, and a number of regions in Europe. But the waste planners did not foresee that incinerators would face massive public opposition, that regulations would be further tightened, that new technology would within a few years make recycled newsprint production 35% cheaper than virgin based production in the main economies of Europe, and that a new wave of eco-design would begin to take root. Technology, public opinion and industrial regulation changed in tandem with each other, so that by the end of decade states, regions and even national governments found themselves recycling and composting 40%-50% of their municipal waste.

29. As in other industries, the large capital investments made on the basis of past trends, found themselves either stranded, or a block on further development. In Germany the shortage of waste that emerged by the late 1990s because of the impact of recycling, meant that municipal incinerators had to import waste. The same happened in Switzerland. In the US, faced with the major changes in the economics and politics of waste, the number of incinerators fell from 170 in the early 1990s to 120 in 1999, with even new plants such as the Robbins incinerator in Illinois being forced to close.

30. The point at issue is not the environmental assessment of the alternatives, save as it bears on the regime of regulation. Rather it is the exposure of large-scale investments to the impact of change. Significantly, such investments cannot be built on the basis of long term waste contracts with the private sector, since market regulated firms cannot afford the risk entailed in a guarantee of waste flows over a 20 year period. That is why incinerators and other large scale treatment infrastructure have had to be constructed primarily on the basis of long term municipal contracts, with the public sector taking the main risks of new regulations or a shortfall in the flow of waste.

4. Flexible production systems and cybernetic planning

31. Planning in a time of profound change and uncertainty is a problem shared by all major industry. In the period of mass production, the scale of large, purpose built investments meant that firms spent substantial time and money on market forecasting, product testing and launch marketing in order to limit the uncertainty. But the pace of change both in markets and technology meant that these methods were increasingly

inadequate. Large investments often found themselves stranded technically and economically (as in the electricity industry).

32. From the mid 1980s a new (post Fordist) model emerged. Small, flexible, retailer centred supply chains generated multiple products for the market, dropped those which failed and produced in volume those that succeeded. They switched the emphasis from trying to accurately forecast and control the market, to developing a capacity to innovate and respond to the market, to see what worked in practice rather than according to the planners' forecasts. Emphasis was put on general purpose machinery, on multiple sources of innovation, and on the speed of response.

33. In terms of their information strategy, firms switched from long term forecasting, to real time market feedback. Planners became interpreters of change rather than setters of targets. By the mid 1990s the new paradigm was in place in the leading sectors of manufacturing as in services. A mechanistic model of planning had been replaced by a cybernetic one.

34. To avoid these problems in waste management, and to minimise the public exposure to risk, an approach based on the new industrial paradigm is called for. Alongside the environmental re-orientation in the sector, there needs to be a switch to new methods of managing waste. They should have the following characteristics:

- ***flexibility*** through the use of plant and equipment which can respond to fluctuations in material flows, can be easily adapted or upgraded, and if necessary can be switched to alternative uses.

- ***reversibility,*** through choosing technologies whose costs of decommissioning are not so high as to lock an authority into a system that has become economically or technically outmoded.

- ***diversity*** by creating a structure that allows for a number of ways of managing parts of the new system as well as a range of actors with a capacity to innovate.

35. Such systems involve a parallel change in waste planning. It remains important to have long-term goals, but the emphasis should shift from precise long-term forecasts to:

- short and medium term objectives in pursuit of those goals
- increased flexibility in the methods of managing waste
- new tracking systems for monitoring the changes in waste and the effectiveness of policies

36. The last of these is of particular relevance to the subject of this report. At present waste information has been severely limited, determined largely by the requirements of financial charging. The new systems are based on optimising materials management. They include the real time gathering and monitoring of:

- waste arisings by source of generation
- particular material flows
- participation and capture rates by household
- contamination and waste rates
- material market information and potential

37. A management information system (MIS) of this kind would provide the flow of information necessary for medium term planning. It would also provide the basis for innovative methods of charging and discounts. What electronic point of sale (EPOS) technology was to the revolution in retailing, electronic point of waste delivery (EPWD) technology is to the transformation of waste management.

Operational targets and continuous improvement

38. Such information intensive approaches to production give a new role to targets. There is a change in emphasis from the achievement of an abstract target, around which an institutional politics develops (with those having to meet the target arguing it down and finding formal rather than substantive ways of meeting it) to the concept of continuous improvement. Western managers first coming into contact with Japanese manufacturing were struck by the fact that goals were on the one hand general and ambitious – 'zero defects', 'zero waste' – and on the other closely tied to existing rather than desired levels of achievement. In establishing a new process, there was less concern at deciding on a precise long term level, than of settling on a starting point and then focussing all operational and technical energy on continuously improving on it. It required operators to monitor and analyse with the help of managers, rather than managers setting a target which they tried to get the operators to enforce. It was an inductive rather than deductive approach to target setting.

39. For waste and recycling, this would mean working from existing levels of diversion and considering how to continuously improve them rather than attempting to determine with precision the feasible levels of recycling and composting. Later we consider benchmarks for capture rates for kerbside recycling. The important point is to have real time data on capture rates and a means for operators and managers to review them with a view to the continuous improvement. This is an example of the new waste management paradigm. Arguments about the applicability of capture rates achieved in particular jurisdictions abroad are examples of the old.

40. One of the conclusions of this discussion is that general recycling targets have tended to bear too much weight in the formulation of Waste Strategies. This is true of Lancashire as of many other disposal authorities. It stems from trying to use recycling targets as a means of determining the quantity of waste to be managed by other means, which are then developed separately from diversion. What is needed is a more integrated approach, with diversion called on to minimise the hazards associated with waste and its disposal, and for disposal facilities to be flexible enough to deal with the uncertain changes in waste volumes and the degree of recycling and composting.

42. Targets should be used not to determine boundaries but open up paths by which to move forward. They should be:

- *Disaggregated.* The mark of the new waste system is that it deals with separate streams rather than mixed waste. Recycling and diversion policy has to be drawn up for these separate streams, and short and medium term levels of diversion assessed and introduced accordingly. This should be the first task for revising the waste targets in Lancashire, namely to keep separate the different flows of waste, so that best practice can be applied to each.

- *Substantive.* The targets should embody the long-term environmental goals which act as the unifying principle of the changes being introduced. Requests for householders to source separate their waste, with the additional care and inconvenience involved, means that the message embodied in the targets remains central.

- *Rolling.* Given an initial long-term target, short and medium term strategies need to be developed for each waste stream, and progress measured and interim targets re-assessed against performance.

III

Estimating Recycling Targets

Chapter 3

Recoverability and the Composition of Lancashire's Waste

Diversion models

1. Lancashire's Draft Strategy adopted a recycling and composting target for the County of 32% by 2010, and 51% by 2020.

2. These targets are based on the results of a model similar to that used in the Government's June 1999 Strategy document Away with Waste. The AWW model highlighted six key variables which together determine the maximum levels of recyclability.

- the recyclable materials in the dustbin
- the amount of each recyclable material which can be recovered
- the number of households served by collection schemes
- the number of households served who are willing to recycle
- the amount of each material that participating households recover in their bins
- the reject rate of recovered material.

After estimating numbers for each in respect to a system similar to that proposed for Lancashire with separate collections of organics and dry recyclables, they concluded that the achievable level of diversion was likely to range between 26% and 36%.

3. The original Lancashire figure of 32% lay between these low and high national estimates and was based on the County's own analysis of the numbers appropriate to its circumstances. Since then it has made a re-assessment, and revised its estimate to 36%, with a long term maximum of 56%. The details are shown in Table 1.

Table 1 Diversion rate variables

	AWW Low	AWW High	Lancs DMWMS	Lancs Revised	Lancs High	Ecologika
Divertable material	*78*	*78*	*n.a.*	*92*	*92*	*85*
Recoverable content	*77*	*77*	*67-95*	*67-95*	*67-95*	*100*
Overall recoverability	60	60	71	78	78	85
Accessible households	85	85	90	90	90	100
Participation rate	*60-75*	*77-90*	*85*	*85*	*85*	
Recovery rate	*60-95*	*60-95*	*60*	*60*	*95*	
Capture rate	54	75	51	51	81	65-75
Reject rate	5	5				
Overall diversion rate	26	36	32	36	56	60

4. The first two columns show the Away With Waste low and high assumptions for each of the variables. In each case they estimate that 60% of dustbin waste is potentially

recyclable. The maximum recycling rate is, however, only a little over half of that because it argued that no recycling scheme would be able capture all the recyclable materials:

- a door to door service would not be able to reach every household (85% is considered the maximum)
- those households which were reached would not all participate in the scheme
- the households which did participate would not put out all their recyclable materials
- a portion of those materials which were captured would be rejected in the course of sorting.

5. The successive leakages out of the recycling loop meant that in the end only just over a quarter of dustbin waste (on the low assumption of the capture rate) and a little over a third (on the high assumptions of the capture rate) could be reasonably targetted for recycling.

6. The Lancashire Draft Strategy (see column 3) assumed a higher level of recyclable materials in its waste stream than the national figures (71%), and a higher number of households open to a recycling service (90%). Its capture rate was however in line with the Government's low assumption (51%), though with higher expectations on participation, and a somewhat lower recovery of recyclable materials from those who did participate. In the revised Lancashire figures (column 4), there remains a low capture rate, but a higher level of recoverable materials. Only if the capture rate is substantially increased can recycling exceed 50% (column 5).

7. The variables considered in these models can be grouped under two main headings:

- the recyclability of materials in the waste stream
- the amount of those materials that can be captured (the capture rate)

This chapter assesses the first of these.

Recyclability

8. Any assessment of the Lancashire assumptions on recyclability rests on an analysis of the composition of municipal waste. The MWMSL based its estimate of 71% recyclability on national figures of the composition of *dustbin* waste that are also used in Waste Strategy 2000. These are derived from studies that used a trommel for separating different fractions of the waste.

9. The trommel-based method of waste composition analysis has three main drawbacks:

- moisture from the organic part of the waste is absorbed by other parts, particularly paper, so that the organic proportion tends to be understated (at 21% in WS2000) and paper over-stated (32%).

- some of the waste is so small that it is not picked up by the sorting process and appears as 'fines (7%).

- there is some mixing of waste so that there is a significant residual element which is classed as miscellaneous (10%).

10. To overcome these difficulties, a new methodology is now being employed for the practical planning and implementation of recycling programmes. It uses hand sorting rather than a trommel, and as a result has only a minimal residual. If done promptly it also avoids much the seepage between organics and paper.

11. The revision of the Lancashire estimates was a result of the application of this alternative methodology. Lancashire engaged MEL who conducted 20 studies of waste composition covering each Lancashire district, using hand sorting. Other Lancashire districts have arranged for waste composition studies of their own, so that together a significant data base has begun to build up.

12. For the purposes of this study, we have made our own estimates of the composition of the County's household dustbin waste using a model developed from hand sorted waste analyses undertaken elsewhere in the UK adjusted for the number of Lancashire households and household types. The results are shown in Table 2. [1]

13. There are limitations to the data. Our model suggests that an important component is green waste, and this requires more detailed evidence on households with gardens than is currently available, so our estimates are based on similar areas elsewhere. In the case of the MEL studies, 17 of the studies were undertaken in summer, with only 3 winter samples for comparison, and they did not include the impact of existing diversion of dustbin waste through recycling. But none of these points detract from the richness of the detail the studies provide on particular materials, and in MEL's case on the relative waste patterns of different Acorn groups.

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[1] There is some difference between our methodology and that of MEL. Ours are based on the sorting of collected loads of dustbin waste, whereas MEL sorted individual dustbins before collection, and thus could be expected to have a lower degree of seepage, hence a higher organic fraction and a lower paper one. This is born out by a comparison of the results. Secondly, our model was based on identifying categories which are 100% divertible, putting those types of paper which are difficult to recycle in the compostable stream and problematic plastics in the residual. MEL on the other hand looked at wider categories and then calculated the recoverable element in each. The differences between the two are small, as can be seen from Table 7. Thirdly we make an estimate for dustbin waste which includes items that may not reach the dustbin, either because they are recycled or composted at home.

Table 2

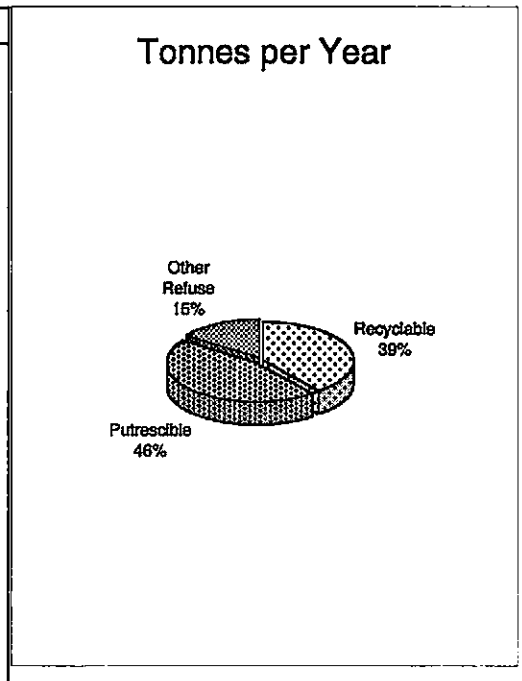
Lancashire

Estimated Domestic Waste Composition

Total households:	616,368

Kerbside households:	585,550	Bins	30,818

Main Recyclables	%	kg/hld/yr	tonnes
news + PAMs	12.3%	100	61,329
household paper	3.5%	28	17,172
card packaging	3.5%	28	17,172
corrugated cardbd	1.5%	12	7,359
subtotal paper	*20.7%*	*167*	*103,032*
clear glass	4.3%	35	21,485
green glass	3.1%	25	15,332
brown glass	1.1%	9.0	5,520
subtotal glass	*8.5%*	*69*	*42,317*
steel cans	2.2%	18	11,039
aluminium cans	0.3%	2.2	1,349
aluminium foil	0.3%	2.5	1,564
aerosols	0.3%	2.5	1,533
subtotal cans etc.	*3.1%*	*25*	*15,485*
HDPE plastic	1.0%	8.5	5,213
PS plastic	0.4%	3.2	1,963
PET plastic	0.9%	7.0	4,293
PP plastic	0.3%	2.5	1,533
PVC plastic	0.1%	1.2	736
sacks & carrier bags	1.8%	15	9,199
subtotal plastics	*4.6%*	*37*	*22,937*
Textiles/shoes	2.5%	20	12,266
Total Main Recyclables	39.4%	318	196,037
Other Refuse			
other metals	0.4%	3	1,840
engine oil	0.1%	1	613
good jumble sale items	0.9%	7	4,293
clean wood items	0.3%	2	1,533
household batteries	0.1%	1	613
renovation waste	3.1%	25	15,332
plastic film	1.6%	13	7,973
other dense plastic	0.8%	6	3,986
nappies + other san.	3.7%	30	18,399
other glass	0.3%	2	1,533
non-recyclable/composte	0.4%	3	1,840
multi-layer pkg	0.9%	7	4,293
drink boxes	0.4%	3	1,840
miscellaneous other	1.8%	15	9,199
fines	0.5%	4	2,453
Total Other Refuse	15.2%	123	75,741
Putrescibles			
Central compost			
compostable paper (NR)	2.5%	20	12,266
animal waste	2.5%	20	12,266
meat. bones, etc.	3.5%	28	17,172
subtotal central compost	*8.4%*	*68*	*41,703*
Home compost			
compostable kitchen	18.5%	149	91,993
garden waste	18.5%	149	91,993
subtotal home compost	*37.0%*	*299*	*183,986*
Total Organic Waste	45.4%	366	225,689
Total Waste Stream	100.0%	807	497,467



Summary	tonnes	%
Recyclable	196,037	39%
Putrescible	225,689	45%
Other Refuse	75,741	15%
Total	497,467	100%

Residential	497,467	63%
CA Site	176,563	22%
Street Sweepings	35,099	4%
Special/Manned	17,550	2%
Other Waste	59,315	8%
Domestic Waste	**785,994**	**100%**
Trade Waste: WCA	42,482	
Total Waste	**828,476**	

Material composition

14. The MEL studies together with the data derived from the individual district studies and Table 2, provide an estimate of the composition of domestic dustbin waste in Lancashire. Four points stand out:

- the great proportion of dustbin waste is readily divertible. Table 2 gives a figure of 85%, considerably more than that assumed in national waste figures, but in line with other hand sorted waste composition analyses.

- a high proportion comprises organics. MEL estimated 50% for summer and winter combined. In Table 2 the figure is 45%. Both are more than double the 21% estimated in the national waste strategy, because of the different methodologies adopted (it should be noted that all types of paper in our analysis comprise 23% of total waste, 19% in MEL) as against 33% in national figures.

- bio-degradables account for 75% of waste according to our model (72.5% in the Lancs CC data based on MEL) as against the 62% level indicated by the waste composition figures in the national strategy. These are the materials which have to be diverted from landfill, together with the small number of hazardous/polluting items such as batteries and engine oil.

- a number of the subsidiary materials have low volumes but high values (for example textiles and shoes which are 2.5% of waste but are worth in excess of £1 million, or aluminium cans and foil which account for 0.6% of waste but are worth £1.7 million, more than the combined values of the 61,000 tonnes of news and pams).

15. Some of these proportions may vary for sub sections of the population. The biggest variable is houses with gardens, given that garden waste makes up nearly a fifth of dustbin waste, and more in summer. We can also expect some variations in the overall quantity of waste and its composition by income group (though it is interesting that the MEL data shows remarkably little correlation between overall weights and Acorn Groups, once green waste has been removed). Taken as a whole, however, the broad picture shown in Table 2 is likely to hold throughout the County.

16. The first general conclusion from this data is that at least 80% of dustbin waste is readily divertible, over half of it in the form of organics.

Targetting the residual

17. High diversion authorities such as those in California or the Quinte municipality in Ontario whose districts have reached 60%-70% recycling rates, have analysed the residual and found that the materials originally located in the residual stream (such as nappies and renovation waste) could be targetted. At the same time pressure has been put on processors using materials like multi layer packaging which are difficult to recycle, to

switch to more recyclable materials. From this point of view they have argued that all household waste is potentially recyclable and that over the long term it is possible to aim for 100% recyclability and zero waste.

18. The drive for zero waste is now guiding design and materials policy in many of the large multinational companies, from Xerox to Hewlett Packard and the major auto makers (see the Canadian Zero Waste material in the Dossier). Industrial waste minimisation, further encouraged by producer responsibility legislation, is likely to work its way through to materials in the domestic waste within the timescale of the Lancashire strategy.

19. The second general conclusion is that a substantial portion of the 15%-20% of dustbin waste which is not readily divertible is nevertheless potentially open to reduction and recycling in the long term.

Other sources of waste

20. The MWMSL like the Waste Strategy 2000 applies the estimates of recyclability (and the likely capture) of dustbin waste to the municipal stream as a whole. There are two questions raised by this procedure:

- the size of the non dustbin streams
- the compositions of the supplementary streams in comparison with dustbin waste

21. The data suggest that dustbin waste has now shrunk to 60% of all municipal waste in Lancashire, and that other types and sources of waste are becoming increasingly significant. CA site waste now accounts for 25% of municipal waste, street sweepings and amenity waste for 6% and recorded trade waste for 5%. Taking the potential leakages of trade waste into other household waste categories into account, the actual trade figure may be as much as double that.

22. If the subsidiary streams have different compositions to the dustbin stream, it will affect the overall composition figures for all municipal waste, and the evidence we have both from Lancashire and elsewhere suggests that there will be some significant differences.

Trade waste

23. As far as trade waste is concerned, the only Lancashire data available is from a study of 50 commercial premises in Blackpool in the early 1990s, which showed a composition that is similar to that of the dustbin analysis. The study indicated that each set of premises produced at the level of 1.2 tonnes p.a., that 43% was food waste and organics, 16% plastics, 15% paper and card and 7% ferrous and non ferrous metals. However, studies of high street waste elsewhere in the UK indicate a lower proportion of organics

and a much higher level of paper and card, with paper comprising the great bulk of office waste, and cardboard the major part of most retail waste.

Household Waste Disposal Centres (CA sites)

24. The contrast is more marked with CA site waste. There has been no extensive study in Lancashire on a par with that conducted for dustbin waste. The County Council has, however, had access to the results of two sets of studies done in Cheshire, which are summarised in the first two columns of Table 3.

Table 3 Waste Composition at Lancashire CA sites

	Percentage Composition				Tonnes
Material	Cheshire Warp ave	Cheshire 99 May/June	Lancs CC estimate	Ecologika estimate	Lancs CA waste
Green w.	26	41	31	33	68,243
Kitchen w.	3	4		2	4,136
Building w.	16	23		25	51,700
Wood	13	11		11	22,748
Cardboard	5	2	7		0
Paper	6	2	see above	5	10,340
Textiles	4	3	4	4	8,272
Metals	3	5	1.5	5	10,340
White goods					0
Plastic	5	2	3	3	6,204
Glass	2	1	2	2	4,136
Misc	5	3		5	10,340
Furniture	9	2		5	10,340
Misc comb			18		
Misc noncomb			29		
Other	3	1	4.5		
All CA waste	100	100	100	100	206,798

25. The table also contains an estimate by Lancashire for its own CA waste, based on the Cheshire data (column 3), as well as our estimate, informed by the Cheshire figures and an earlier national study of CA site waste (see column four). The last column shows the total tonnages implied by the percentage breakdowns for Lancashire CA waste in 1999/2000. [2]

26. The Cheshire figures confirm that CA sites have:

[2] There is some overlap between the CA site, trade and dustbin composition analyses. Some of the green waste, paper, glass and textiles which appear in the CA data, are assumed to be primarily dustbin waste, while elements of trade waste and specials may enter into the weekly dustbin and CA streams. For the time being, however, the data provides a first approximation for the purposes of waste planning.

- a substantial organic fraction (between 29% and 45%)

- a large proportion of wood and builders waste (29%-34%)

What they do not bring out is the volume of consumer durables. Furniture is shown with a range of 2%-9%, white goods and other electrical and electronic goods are not separately specified. We would expect durables as a whole to comprise 10%-15% of the total.

27. Although more detailed waste composition analyses of civic amenity waste are desirable, the high levels of diversion already being achieved on some CA sites suggest that like dustbin waste, potential recyclability is high.

28. The third conclusion is that taking trade and CA waste into account is likely to increase the readily recyclable components of municipal waste.

29. In summary, the available evidence suggests that the great majority of the principal municipal waste streams are recyclable, and that the issue is how to capture this effectively and economically rather than with the inherent difficulty of separating and recycling the materials themselves.

30. The data for trade waste and CA sites, however, are still far from adequate for recycling purposes. We recommend that Lancashire undertake their own waste composition studies of these two streams, using hand sorting into categories designed to feed into diversion implementation plans.

Chapter 4

Capture Rates

(i) Scheme coverage.

1. All districts have households with differing physical accessibility. None should be excluded from long term plans for the new waste economy, any more than they were from the original weekly dustbin service. Some are easier and cheaper to access through doorstep collection, and these are usually the ones chosen for the early stages of a diversion scheme. But the creative part of introducing such a programme comes from finding new and economic ways of providing the service to less easily accessible households.

2. In some instances rural villages can develop their own 'closed loop' organics recycling system – collecting and composting source separated organic waste, and undertaking an initial collection and sort of the dry recyclables. Inaccessibility in this case encourages a community response.

3. Another group of households who are often left out of kerbside models are those living in high rise buildings. High rise estates have generally had low recycling rates, relying as they do on bring banks, commonly sited well away from the building because of noise. To raise rates, some councils in London have introduced doorstep collection of recyclables by caretakers or community groups, with the material deposited in the bring bank containers at ground level. This innovation has not only raised recycling rates, but addressed one of the most difficult and costly problems on estates, namely the blocking of chutes and the overflow of waste inside and outside the building.

4. More generally, non standard situations should be an invitation to innovation not a barrier to it. **The 90% assumption made by the Lancashire plan is a good one to start with. The goal should be to expand this to all households by the end of the decade.**

(ii) the capture rate.

5. The capture rate is the key operational variable in recycling systems. It should be interpreted as the capture of non contaminated recyclates and thus takes account of the reject rate. It is the variable monitored weekly by operators, since it is one that can respond readily to the way recycling programmes are managed.

The capture rate as quasi-market share

6. The capture rate is the equivalent of market share in a commercial economy. Recyclers need to attach as much importance to capture rates as a sales company would to market share. For recycling the potential market is given by the overall level of recyclate in households served, with the 'market share' measured by volumes of recyclate captured. The value of looking at recycling as a quasi market in this way is that it focuses on the

'competition' which recyclers faces for the recyclate, and ways in which they can increase a scheme's competitiveness.

7. One of the distinctive features of the recycling economy is that there is little competition in collection. Recycling schemes tend to be monopolists (or rather single 'buyers' or recipients - monopsonists) with respect to the capture of recycled material. The principle competition they face is from the residual dustbin. It is their competitivity with respect to the dustbin that determines their market share.

8. One way of making recycling relatively more attractive is by making the residual option less so. Many councils have followed this strategy, cutting the size of the residual bin, reducing the frequency of collection, limiting or prohibiting certain materials in them, and at the jurisdictional level introducing user charges for general refuse.

9. Such policies need to be complemented by measures designed to increase the attractiveness of recycling. Successful schemes overseas have as a rule given priority to social marketing, using many of the same tools to connect with householders as a consumer firm, from market research, advertising, data based marketing, special offers and so on. But social marketing is only one of many ways in which the design of schemes, and the skills of the collector can influence both participation and recovery rates. An initial list would contain the following:

- weekly collections get higher participation than fortnightly ones
- participation is closely linked to householder convenience; this is why kerbside schemes capture more than bring schemes, and why recycling collections on the same day as residual or organics collections tend to have a higher put out rate than more complex scheduling.
- community collectors have tended to achieve the highest capture rates of dry recyclables, followed by municipal collectors, and then private waste companies. This reflects the importance of householder (and workforce) identification with the goals of the programme.
- open boxes for dry recyclables tend to have lower contamination and get higher participation than sacks.
- source segregation increases the quality of recovered materials, lowers rejects, and while increasing collection costs cuts the cost of central sorting
- tracking the composition of the residual bin in relation to materials collected for recycling and composting, allows uncaptured materials to be targetted through leaflets and other forms of householder information.
- householder incentives are effective in increasing participation and capture, either as carrots (bonuses, prize drawers, de facto rebates on Council tax, free or

subsidised bins and other environmental equipment) or sticks (charges for sacks, green waste, or special collections).

- 'knowledge' investment in new collector skills, in householder support, social marketing and management information systems is critical for high participation and capture rates, and the recovery of good quality materials.

10. These are the variables which feed into the determination of capture rates. Some imply increased costs (such as weekly rather than bi-weekly collections) but many involve little if any net cost, and where there is an incremental cost for high capture recycling some or all of it can be funded by savings from or charges on the residual service.

11. There are number of general points from recycling programmes which have been successful in increasing the 'quasi market share' of recycling in these ways:

- there are no limits to capture any more than there are for a monopolist taking 100% market share. Increasing capture rates, like increasing market share, will depend on a wide range of actions taken by the designers and operators of the scheme.

- there is a tendency for both participation and recovery rates to rise over time, with rapid increases achievable in the short and medium term.

- overall capture rates, unlike commercial market shares, tend to have a ratchet element in them: once they have gone up, they are not likely to come down, as long as the service is maintained, because underlying the trends is a change in householder habits.

- recycling programmes should be driven (like commercial markets) not by worst or average practice, but by best practice. This is true also of capture rate targets. Instead of arguing rates down, recycling planners should analyse the best performing schemes and ensure that system design and an appropriate structure of incentives are in place in order to emulate them.

Capture rate assumptions and experience

12. Away with Waste assumed a capture rate of 75%, with participation ranging from 77%-90% of households served, and recovery running from 60%-95%). Lancashire in their revised estimates assume a similar level of participation (85%) but a lower recovery rate (60%). They also show the impact of an increase in recovery rates to 95%, leading to the capture rate rising from 51% to 81%.

13. The best overseas programmes have shown that these higher rates are achievable and can be exceeded. Table 4 gives the latest results of one Canadian scheme by way of

Table 4

Waste Composition and Diversion Rates in Peterborough, Ontario

Recyclable Material

Peterborough 3 Weeks of Collection	Kg. collected in 3 weeks Blue Box	Garbage	Available	Available kg/hhld/yr	Average Capture	% of Category	% of Whole
OCC	43.95	3.31	47.26	27.31	93%	10%	3%
Boxboard & Brown paper	26.40	11.54	37.94	21.92	70%	8%	2%
ONP/OMG/Phone books	155.50	5.25	160.75	92.88	97%	35%	10%
Household Paper	19.45	22.78	42.23	24.40	46%	9%	3%
Glass							
clear	52.85	4.17	57.02	32.95	93%	12%	4%
coloured	29.00	5.41	34.41	19.88	84%	7%	2%
Sub Total	81.85	9.59	91.44	52.83	90%	20%	6%
Ferrous	11.05	2.47	13.52	7.81	82%	3%	1%
Aluminum	7.05	1.56	8.61	4.98	82%	2%	1%
Plastics							
PETE screw-top	9.35	1.41	10.76	6.22	87%	2.3%	0.7%
HDPE screw-top	4.85	2.22	7.07	4.08	69%	1.5%	0.5%
Tubs	2.40	1.96	4.36	2.52	55%	0.9%	0.3%
Film	9.40	17.25	26.65	15.40	35%	5.8%	1.7%
Other narrow-neck	1.45	0.85	2.30	1.33	63%	0.5%	0.1%
Sub Total	27.45	23.69	51.14	29.55	54%	11%	3%
Polycoat	3.60	1.61	5.21	3.01	69%	1.1%	0.3%
Aseptics	0.00	0.45	0.45	0.26	0%	0.1%	0.0%
Paint cans	0.00	0.00	0.00	0.00	na	0.0%	0.0%
Aerosols	0.30	1.11	1.41	0.81	21%	0.3%	0.1%
Total Recyclables	376.60	83.34	459.94	265.74	82%	100%	30%

Contamination in B. Box	4.95		3.73	1%

Other Garbage

Peterborough 3 Weeks of Collection	Kg. collected in 3 weeks Blue Box	Garbage	Available	Generated kg/hhld/yr		% of Category	% of Whole
Possible R Plastics	1.25	6.95	8.20	4.74		3%	0.5%
Possible R Textiles	0.00	10.99	10.99	6.35		4%	0.7%
NR Glass	0.95	9.24	10.19	5.89		3%	0.7%
NR Rigid Plastics	0.20	10.59	10.79	6.24		4%	0.7%
NR Film Plastics	0.10	9.21	9.31	5.38		3%	0.6%
NR Textiles & Footwear	0.50	11.61	12.11	6.99		4%	0.8%
NR Metals	1.30	5.50	6.80	3.93		2%	0.4%
HHW	0.00	5.55	5.55	3.21		2%	0.4%
Diapers & Sanitary	0.00	15.60	15.60	9.01		5%	1.0%
Animal Waste (+ K Litter)	0.00	124.05	124.05	71.67		42%	8.0%
Treasures	0.00	17.04	17.04	9.84		6%	1.1%
Building & Reno	0.00	36.01	36.01	20.81		12%	2.3%
Multi-Materials	0.15	21.19	21.34	12.33		7%	1.4%
Misc./Sweepings	0.00	17.41	17.41	10.06		6%	1.1%
Total Garbage	4.65	300.95	305.40	171.07		100%	19%

Organics

	Kg. collected in 3 weeks Curbside	Garbage	Available	Available kg/hhld/yr	Average Capture	% of Category	% of Whole
Kitchen Organics							
Compostable	0.00	203.69	203.69	117.80	0%	26%	13%
Non-Compostable	0.00	88.97	88.97	51.40	0%	11%	6%
Compostable NR fibres	0.00	39.53	39.53	22.84	0%	5%	3%
Sub Total	0.00	332.38	332.38	192.04	0%	42%	22%
Yard Waste							
Greens/Browns	249.45	9.80	259.35	149.85	96%	33%	17%
Brush	194.50	0.00	194.50	112.38	100%	25%	13%
Sub Total	443.95	9.90	453.85	262.22	98%	58%	29%
Total Compostable	443.95	342.28	786.23	454.27	56%	100%	51%

30 Number of Households

illustration. Peterborough is a medium sized town with a rural hinterland. It has had a series of innovative green initiatives over the past five years. The overall capture rate of dry recyclables is 82%, with rates over 90% for a number of materials, including 97% for old newsprint. This is an average capture of 4.2 kg per hh per week.

14. By way of comparison, some of the inner London schemes started with a capture rate of 1.3 kg per hh pw, but within three years this has risen to 2.7 kg per hh pw, and the operator expects it to go on rising as participation increases and new materials are added. Rural areas serviced by the same operator with weekly collections have reached this upper level straightaway.

15. 2.7 kg a week in Lancashire would translate into a 44% capture rate of dry recyclables, or 17% of total dustbin waste. 4.2 kg per week would produce a capture rate of 69%, (27% of dustbin waste) and 5 kg per week would yield a rate of 82% (or 32% of dustbin waste).

16. In organics, the Peterborough results show that 98% of garden waste is captured. Since they have not yet introduced kerbside organics collection, kitchen waste is only diverted through home composting and is not included in the estimates. Residual refuse stands at 19%, 1.5% of which was captured in the blue box.

17. What we know from elsewhere is that kitchen organics collections can achieve very high levels of capture (as Bury St Edmunds has found) in part through not permitting the disposal or kitchen organics in the residual bin.

Dustbin capture rate conclusions

18. Four conclusions can be drawn about the capture rates of dustbin waste:

- capture rates are a key variable which are directly amenable to the application of continuous improvement.

- initial capture rates averaging 100kg p.a. of dry recyclables per household passed should be taken as a starting point, with the aim of doubling it to 200kg p.a. (63% of available dry recyclables) within 5 years.

- high rates of organic capture can be rapidly achieved (80% plus) with the introduction of separate organic collections and restrictions of organics in the residual bin.

- combining a dry recyclables capture rate of 63% and an organics capture rate of 80% would yield (given Lancashire's waste composition) a combined capture rate of 72%.

Supplementary streams.

19. With the exceptions of street sweepings, high capture rates can be more rapidly achieved in the other municipal streams compared to those for recyclates in dustbin waste:

- CA sites are available to all households with cars. Householders can be directed to the relevant recycling containers, and restrictions put on residual disposal, given sufficient staffing to monitor the process. In formal terms, participation rates are 100%, and recovery rates should reach 80% and above.

- Special collections likewise cover all requesting households, and can get high participation and recovery rates, with suitable advice and incentives (for example the free or discounted collection of separated items, as against a charged service for mixed waste).

- Trade waste similarly covers all registered clients, and is also open to significant financial incentives being given to those who recycle.

Capture rates in the supplementary streams are potentially higher than those for the domestic dustbin over an equivalent time period.

20. It is therefore recommended that the Draft Strategy extend its model to include the supplementary streams of CA sites, special bulky waste collections and trade waste.

Chapter 5

Diversion rates

Medium term targets

1. The revised Lancashire estimates indicate an achievable level of 36% diversion of dustbin waste, with an upper limit of 56%. Our view is that this is too restricted. What we know from three bin systems introduced in the UK is that they can rapidly achieve diversion rates of between 40% and 60% (the Mersea Island trial in Colchester has recently been measured at 57%), chiefly because of the high rates of capture of organics. Levels of this sort then form a foundation for further increases, with high level diverters in California and Canada now following the industrial model and planning for zero waste.

2. The Lancashire estimates also need to be modified to take into account other waste streams. The Away With Waste model is not appropriate for CA sites or special collections. The analysis of the streams should be kept separate, both in terms of the composition of the waste and the ease of diversion. Lancashire CA sites have already shown that they can divert in excess of 50% of their throughput, and sites in both Dorset and Hampshire have now moved up into the 70% to 80% range. Equally bulky waste, trade waste and street sweepings are also open to diversion, and though these are smaller parts of the municipal waste stream, they should be taken into account in defining an overall target.

3. What can be said on the basis of British experience is that there are now benchmark levels for dry recycling (22% in Bath), for garden and kitchen organics (34% in Bury St Edmunds) and CA sites (80% in Dorset). If each of these rates were achieved in Lancashire, irrespective of the recycling of other types of waste, the County could reach a level of 57% diversion by 2005/6.

4. Our view is that a level of 57%-60% is achievable in Lancashire over a five year time period. Our assumptions within the framework of the Lancashire recycling model are shown in column 6 of Table 1 above. Compared to the revised Lancashire medium level assumptions (column 4), there are relatively small differences in terms of overall recoverability and the proportion of households included in the schemes. The major difference is in our assumption of a 70% capture rate against the Lancashire figure of 51%.

Reviewing the capture rates

5. The Lancashire 51% rate when applied to the waste composition figures in Table 2 implies the capture of:

- 162 kg of dry recyclables per household per year, or 3.11 kg per week
- 187 kg of organics per household per year or 3.59 kg per hh per week.

6. For organics so low a rate of capture is not warranted for a well run scheme. Whole countries and major regions in Europe are already moving beyond this, with Germany and the Netherlands now exceeding 60% organics diversion for all households, and Austria and Flanders approaching 80%. Finland has recently announced a target of 75% composted organics by 2005. With a three stream system as outlined in the Lancashire strategy, including a separate doorstep collection of organics, many Lancashire councils should be able to approach Bury St Edmunds levels, that have been achieved through high participation and low contamination rates.

7. If Lancashire captures 80% of its organics from a County wide separate collection programme, and 60% of the dry recyclables, then the diversion rate for the County's dustbin waste would also reach 60%, assuming that there was no recycling of the residual 15% that the waste composition studies identify as difficult to recycle.

8. For the supplementary waste streams, notably CA sites, special collections and trade waste, the targetted rates should be higher, because of the greater control that waste collectors have over the way the waste is presented by the householder or commercial client, and because of a greater ability to introduce differential charging that favours recycling.

9. Table 5 summarises the proposed targets for each of the main municipal waste streams.

Table 5 Medium Term diversion targets for Lancashire

Item	1999/0 tonnes	Recycling & composting targets %	Tonnes recycled & composted
Household waste	526,547	60	315,928
St cleansing & amenity	52,649	25	13,162
CA sites	206,798	70	144,759
Trade	43,370	50	21,685
All municipal waste	829,364	60	495,534

Column 1 gives the tonnages recorded for each stream in the Lancashire data. Column 3 shows the tonnages which would be diverted on the basis of the target levels in column 2:

- 60% diversion for dustbin waste (column 6 of Table 1)
- 25% for street sweepings and amenity waste
- 70% for CA site waste (in line with the Hampshire/Dorset rates, and already being approached in the Lancashire pilot at the Abbey Lane site).
- 50% for trade waste, (an understatement of potential)

On this basis Lancashire would achieve a 60% diversion rate for municipal waste as a whole.

Conclusions

10. The first part of this report has reviewed the basis for the recycling and composting targets proposed within the Draft Strategy. The Draft Strategy adopted a model used by the Government in Away with Waste whose value is that it identifies important variables which contribute to the success of any recycling scheme.

11. But care should be taken in how such a model is used, for three reasons:

- the model can encourage too passive and defensive an approach to recycling, seeing diversion as subject to a number of barriers and leaks, and therefore restricted even under optimistic assumptions. Such models have tended to understate the potential for diversion. Within a year of the publication of the AWW model, leading schemes in the UK were reporting diversion rates of 40%-60%, with rates of best practice municipalities abroad climbing into the 50%-70% range. Significantly the model was dropped from Waste Strategy 2000, and though the long term national recycling target was maintained at 33%, targets for a number of authorities have been raised by the DETR to 40% by 2005/6.

- the model can engender a mechanistic rather than developmental approach to recycling. Instead of each variable being treated as subject to continuous improvement, they are considered in terms of more or less likely limits or maxima. The limit thrown up by such models can quickly become a boundary to be defended, rather than a target to be exceeded. This may explain why in the UK high diversion examples which have apparently exceeded these limits are treated with suspicion, to be explained away as a special case, or non reproducible, or inapplicable, rather than as a suggestive source of ideas.

- it is designed to analyse dustbin recycling, yet has been used as a proxy for other parts of the waste stream which require a different mode of analysis. Recoverability, accessibility, capture, and contamination all needed to be treated differently for CA site and special collections than they are for dustbin waste.

12. The model should not be employed to set limits to diversion, but rather to formulate a more dynamic picture for each part of the waste stream, targetting the key variables and building on best practice experience elsewhere to chart a potential time profile for a succession of levels that local authorities can aim for and then exceed.

13. In relation to the particular assumptions made about each of the main variables in the model, we make the following observations:

- the Draft Strategy assumption that 70.5% of material in dustbin waste is potentially recyclable, has been recently revised by the County Council to 78% as the result of

the MEL study. In our view it probably still understates the potential (Table 2 gives a level of 85%) but this is best confirmed through further waste composition studies undertaken as part of the process of implementation.

- the Draft Strategy assumes 90% of households receive diversion services by 2005. This is a reasonable working assumption for the next four years. In the medium to long term however we suggest that the Strategy should aim to make recycling and composting a universal service, with the type of service being design to suit the circumstances of each household.[3]

- the assumption of a 51% capture rate of recyclable content, made in the Draft Strategy, is a significant understatement of medium term potential, as applied to organics diversion. We suggest a medium term combined target for dry recyclables and organics of 70%.

14. When these considerations are applied to the Draft Strategy model, they indicate:

- **a medium term target of 60% of dustbin waste rather than the Strategy's 32%.**

15. The probable composition of CA site and trade waste, and the manner of their collection, also suggest that:

- **a composite 60% rate of diversion is also readily approachable for the non dustbin streams.**

[3] In considering the difficulties of extending recycling and composting to all households, it should be kept in mind that a century ago there was an issue about how many households could be reached with a single municipal waste service. The doubts arose because of public resistance to the adoption of the dustbin (London residents in Hackney held out against it for almost a decade). Before long, however, the weekly dustbin collection became an accepted part of household routine. Similarly, separated bins (inside and outside the home) are now the norm in places that have introduced high diversion.

IV

Targets and the Growth of Waste

Chapter 6

Waste Growth

Growth and recycling

1. The planning of recycling and composting as a means for diverting waste from landfill has been accompanied by a sharp increase in the growth of municipal waste. Planners have compared the increased quantity of recycled materials with the increase of waste arisings and concluded that diversion will not be able to solve the landfill problem and that other means of treatment are called for. In this argument, a number of elisions are made, which need to be separated out if an adequate integrated waste strategy is to be developed.

2. The key issues that need to be clarified are the following:

- what is the source of any growth in waste arisings
- what is the material composition of that growth
- what are the factors underlying any growth and how are they likely to develop over the medium and long term
- how does the composition and source of growth relate to the potential for recycling, and/or for any other form of treatment

Disaggregating growth

3. The principal point to be kept in mind in reviewing the connection of waste growth and recycling is that it is misleading to discuss waste growth as an aggregate. In a modern waste economy recycling, composting and environmentally beneficial disposal depend on the disaggregation of waste streams. Maintaining the mixed waste categories used in traditional waste planning is no longer adequate for an environmental age.

4. Consider three possibilities about the composition of waste growth:

- that it comprises increases in bulky goods – rubble from building conversions, household appliances, other electronic and electrical goods, and furniture.
- that it comprises an increase of the organic fraction of municipal waste, stemming from a growth in gardening, and the switch of commercial and institutional green waste into the municipal stream.
- that is consists of a switch of non-organic commercial and institutional waste (principally paper and cardboard) into the municipal waste stream – through

increased use of CA sites, fly tipping, and unrecorded leakages into household collections.

5. In the first case, there would be three strategic considerations:

- how far could these bulky goods be recycled
- how would they be affected by Producer Responsibility legislation
- what is the best means of residual disposal

6. The most immediate point to be made about this waste is that some methods of residual treatment would be entirely unsuitable: notable any form of thermal treatment, or anaerobic digestion. The reason is that (a) much of this material is inorganic and neither combustible or digestible, and (b) the goods contain materials such as PVC and brominated flame retardants which are hazardous when burnt. A conclusion about disposal and treatment methods drawn from aggregate waste growth would prove inappropriate if the growth took this form.

7. In the second case green waste from domestic gardens, parks or arboriculture are one of the most straightforward materials to collect separately (whether from households, commercial operators or at CA sites) and divert. In this case anaerobic digestion would be applicable, as would thermal treatment, but the latter would rarely be the BPEO given the ease of diversion and the relatively low thermal value of such material.

8. In the third case, trade cardboard and paper are readily capturable and marketable as recyclate. Although they have a higher thermal value than organics, and are also a valuable feedstock for composting/digestion, the CO2 savings derived from recycling the paper fraction would generally make recycling the BPEO.

Waste growth in Lancashire

9. These are three of a range of possibilities. What evidence is there on waste growth in Lancashire – its patterns, its sources and its composition? Table 6 shows the trends in the

Table 6 Growth of Lancashire Waste 1993/4-1999/00 (tonnes)

	1993/4	1996/7	1999/2000	% change 93/4-99/00	%change 96/7-99/00
All household	651,145	668,893	785,994	21	18
All municipal	697,112	714,860	829,364	19	16

Source: Lancashire County Council

County's household and municipal waste in the period 1993/4-1999/2000.

Over a six year period, household waste rose by 21%, an average of 3.5% p.a., with municipal waste slightly lower at 19% or 3.2% p.a.. This rate of growth is above the long run national trend of household waste arisings, but in line with the more recent increase in national waste growth which Waste Strategy 2000 estimates at 3%.

Growth and the Landfill Tax

10. The Lancashire figures over the six year period have one marked feature. There is a sharp break in growth rates after 1996/7. For the first three years of the period shown in Table 6, the household waste growth rate is 1%. But after 1996/7 it rises to an average of 6% p.a., and again this has been a common pattern throughout the UK.

11. This sudden change is too large and sudden to be explained by economic growth rates or changes in population or purchasing habits. Rather it appears to have a strong connection to the introduction of the landfill tax in late 1996 and a change in the structure of incentives between different waste streams. The landfill tax escalator and the increasing costs of landfill in many parts of the country have intensified the change in the relative incentives.

12. The nub of the issue is the following. Regular household waste and CA site waste is collected free. The greater is the disparity between the free service, and those streams which have to pay for the cost of disposal, the greater the incentive to move waste from the charged streams to the free ones. Just as high trade tariffs encourage contraband, so increased waste disposal charges encourage the smuggling of waste into the uncharged streams, though in this case there are few customs officers standing by to prevent it.

13. The switching can take place in a number of ways:

- small traders dropping off waste at CA sites, or as street litter
- carpet layers or home renovators introducing a charge for households to dispose of their waste, thus encouraging the householder to switch disposal to CA sites and special collections
- dustman illicitly picking up trade waste on domestic rounds;
- trade waste increasing above the assumptions made by Counties about the proportion of household waste collections which comprises trade waste (with districts having an interest in such an increase).

14. There is evidence of all of these from elsewhere in the country. In Haringey for example a survey of small traders found that over a third of them used neither commercial or Council services, but disposed of their waste themselves (at least some of

it in and around street litter bins). Chelmsford found that a major part of the post landfill tax increase in their waste arisings came from special collections, which the Council halved by applying cost based charging. In Essex as a whole the introduction of restrictions on trade waste at CA sites cut CA tonnages by 15% in the first year. The National Association of Waste Disposal Officers (NAWDO) identified the seepage of trade waste into the household stream as a significant problem for municipal waste management in the post-landfill tax era[4].

15. How far is this a factor in Lancashire's waste growth? Table 7 provides a breakdown of different components of household waste and their contribution to waste growth in the post landfill tax period. Street cleaning and amenity waste has grown by just over 1%, and trade is recorded as having fallen by 2% over this period. The principal increase has been in household waste (4% p.a.) and CA site waste (at nearly 9% p.a.)

Table 7 Growth of Household & Municipal Waste in Lancashire 1996/7-1999/2000

	1996/7 tonnes	1999/2000 tonnes	Growth 96/7-99/00 %
Household waste landfilled	443,391	496,789	12
Street cleansing + amenity	50,704	52,649	4
Recycling LAs	15,601	25,120	61
Recycling: 3rd party	5,694	4,638	-19
All non CA household	515,390	579,196	12
CA landfilled	85,270	116,673	37
CA recycled	13,546	15,311	13
CA reused	38,496	50,811	32
CA composted	16,191	24,003	48
All CA waste	153,503	206,798	35
All household	668,893	785,994	18
Trade	45,967	43,370	-6
All municipal	714,860	829,364	16

Source: Lancashire County Council

[4] The NAWDO paper compared growth rates before and after the introduction of the landfill tax for 25 Waste Disposal Authorities and concluded that part of the increase may well have been due to an increase in "stealth" tipping by tradesmen at council sites. IWM Proceedings March 1999, pp 26-30

CA site growth

16. In terms of total tonnages, the growth in CA site waste accounts for 46% of the increase, the growth of the number of properties for 21% and increases in household waste per property for 32% of the total (see Table 8).[5]

Table 8 Components of household waste growth in Lancashire 1996/7-1999/00

Component	Growth tonnes	Share of growth %
Bulky & sweepings	1,945	2
CA sites	53,292	46
Increase no of dom. prop.	24,159	21
Household waste landfilled & recycled	37,705	32
All household waste	117,101	100

Source: Lancashire County Council

Borough/district waste growth

17. A more detailed analysis of household waste by collection authorities confirms the concentration of growth in CA waste and the dustbin streams, but shows substantial variations, both between districts/boroughs, and the relative importance of the different streams (see Table 9). For data reasons the period analysed is 1995/6-1999/00, but because of the stability before 1996/7 it is unlikely to significantly alter the conclusions as they apply to the post landfill tax period.

18. The overall Lancashire increase is 19%, but rates vary between Fylde and Chorley where the growth is over 30% and Lancaster where the growth is only 8%. The growth in CA site waste is over 40% in West Lancs, Blackburn and Preston (in each of which there is below average dustbin growth) but almost static in Burnley and Wyre, and actually declines in Lancaster. Compared to the low rates of dustbin growth in West Lancs, Preston and Blackburn, Fylde dustbin waste grew by 41%, and Chorley and Wyre by 30% or more. These variations provide potential clues to the causes of waste growth, and also help in the framing of waste control policies appropriate to each district.

[5] There are differing bases for estimating the number of domestic properties producing waste, with variations being found between the estimates for Council Tax purposes and those identified on refuse rounds. In the Lancashire case, the estimate for the increased number of households is less than for the number of domestic properties, which would lower the element accounted for by increased households and increase the contribution of dustbin waste per head.

Table 9 % change in household waste 1995/6 - 1999/00

	All waste	Non CA	CA site
Fylde	32	41	20
Chorley	31	32	31
Ribble Valley	25	22	32
Wyre	25	30	5
Blackpool	21	19	27
South Ribble	21	18	27
Hyndburn	19	21	16
All Lancashire	*19*	*19*	*20*
Burnley	18	24	1
Rossendale	18	16	28
West Lancs	18	7	41
Blackburn	16	11	41
Preston	15	9	49
Pendle	14	14	14
Lancaster	8	18	-5

Source: Lancashire County Council

Explanations for the growth in CA waste

19. Returning to the County wide aggregates, the sharp rise in CA site waste may be attributed to a range of factors: an above average growth in the discard of consumer durables; an increase in car use allowing wider access to the sites; the expansion of gardening and home renovation. But none of these adequately account for the size of the growth, its sudden changes, and the variations between authorities.

20. The change in growth patterns is particularly marked for CA waste. In the three years upto 1996/7 CA site waste actually fell by 12%, but then rose dramatically after the introduction of the landfill tax. If as seems likely a substantial proportion of this is trade waste – and this may be one of the reasons for the Government excluding the diversion of CA site rubble from household waste recycling – what is needed is an analysis of the change in CA site waste composition over time, a task made easier by the high level of diversion already taking place at Lancashire sites.

Causes of the growth in dustbin waste

21. This leaves the question of the cause of the sudden increase in the weight of dustbin waste per household. Detailed studies of waste growth elsewhere suggest that dustbin

waste per household has remained remarkably stable.[6] What accounts for the 4% per annum increase observed in Lancashire and what are its components?

21. The starting point is the weighbridge figures. The weight of waste recorded for weekly domestic collection rounds should in principle be primarily made up of dustbin waste. But we know that other types of waste are carried by these vehicles: bulky waste for example which in some areas it is easier to take in the general refuse freighter than to send a special truck; institutional waste such as waste from schools; and trade waste, which may be picked up officially or unofficially as part of the general rounds.

22. To identify the dustbin component, one piece of evidence is the MEL waste composition studies. MEL collected samples of dustbins from specified domestic rounds, and analysed their contents. This allowed them to calculate the amount of waste produced by the average Lancashire household per week taking into account the relative size of Acorn groups in each District, and the seasonal variations. The result was an estimated 12.17 kg per household per week or 633 kg per annum. Using Census based projections of population, the annual weights arising in each district can then be calculated. The results are shown in the first column of Table 2.

23. To the MEL estimates should be added those dustbin materials excluded from the sample count because they had already been recycled (columns 2 and 6) or composted (columns 3 and 5), to give a figure for aggregate dustbin waste in the seventh column. For Lancashire, the MEL based figures indicate total dustbin waste for 1999/2000 of 450,000 tonnes or 732 kg per household per year, in line with the historical national average (see footnote 6).

24. The eighth column of Table 2 shows household waste as weighed less the estimates for street sweepings and amenity waste, much of which is weighed and accounted separately. What can be seen immediately (in the last column) is that there is a gap between the totals derived from the estimates of dustbin waste, and the figures from the weighbridge. Overall the gap amounts to 103,000 tonnes, which is 19% of the total, and as much as 32% in the case of Blackpool. This translates to an average household arisings of 899 kg p.a.

[6] An MEL study for the energy from waste industry found that nationally the waste generated per household had remained remarkably stable at 14.2 kg per week (738 kg p.a.) over the period 1983/4-1995/6, see Practical Effects of UK and North American Recycling Programmes, Energy from Waste Association, 1999. An Ecologika study of four district councils in Essex found a similar result in the three years after the introduction of the landfill tax, with waste per household remaining constant, and the growth of municipal waste being concentrated in the CA site, special collections and trade waste streams.

Table 10 Lancashire Dustbin Waste by District 1999/2000

	Dustbin by waste comp	Recycling	Home Compost	Recycling + hom comp	CA green waste	CA paper/ glass/text	All dustbin with MEL	Non CA hhw+ CA rec - SSA	Gap to be explained
Blackburn	37,649	420	0	420	916	573	39,558	48,006	8,448
Blackpool	41,149	1,343	0	1,343	2,053	299	44,844	66,133	21,289
Burnley	27,713	822	476	1,298	697	425	30,132	31,944	1,811
Chorley	30,099	1,554	0	1,554	1,021	174	32,848	36,100	3,252
Fylde	22,853	2,137	243	2,380	3,322	704	29,259	34,441	5,182
Hyndburn	21,724	1,862	201	2,063	555	356	24,699	30,014	5,315
Lancaster	32,749	2,957	621	3,578	4,049	598	40,974	51,391	10,417
Pendle	19,273	1,986	0	1,986	795	509	22,562	30,431	7,868
Preston	37,472	3,107	0	3,107	1,730	312	42,621	55,622	13,001
Ribble Valley	14,016	1,164	0	1,164	1,368	681	17,229	20,159	2,930
Rossendale	18,603	1,014	0	1,014	509	267	20,393	24,202	3,809
South Ribble	28,072	3,125	0	3,125	2,689	480	34,366	41,277	6,911
West Lancs	29,991	1,438	0	1,438	2,779	506	34,714	35,158	444
Wyre	28,683	3,706	1,583	5,288	1,520	348	35,839	49,077	13,239
Total	390,062	26,634	3,124	29,758	24,003	6,232	450,055	553,956	103,899

Source: Lancashire County Council

25. One explanation is that the MEL data understate the quantity of dustbin waste by reason of the sample, the time of year, or whatever. For Lancashire as a whole their estimate of an annual generation of 633 kg per hh (plus 99kg recycled or composted giving a total of 732kg per hh p.a.) is substantially less than levels recorded elsewhere in the UK and than the 899 kg per hh p.a. registered over the weighbridge.

26. Using our own model based on waste compositions elsewhere in the UK suggests a higher figure for dustbin waste of 807 kg p.a. for the average household, which would give a total of 497,000 tonnes p.a for the County as a whole. This still explains only half the gap. But taken together with the MEL estimates provides a first measure of the potential size of leakages into the domestic stream. The MEL data indicate a leakage of 104,000 tonnes. Our model suggests a lower figure of 57,000 tonnes. The lower estimate amounts to 10% of recorded dustbin waste, and more than street cleansing and amenity waste combined. More significantly, it accounts for almost all of the 62,000 tonnes increase in dustbin waste recorded in Table 8, leaving aside any increase in the number of domestic properties.

27. What conclusions can be drawn from the above analysis?

- the 4% p.a. growth in Lancashire's household waste arisings since 1996/7 appears primarily to have been the result of a switch of charged-for waste into uncharged domestic waste streams.

- some of this switching is legitimate, some is illicit. The greater the difference in disposal costs between the charged and uncharged streams the greater will be the pressure for switching to take place.

- there are long term limits to the impact of switching, given that there is no evidence that waste arisings in the charged-for streams are growing in weight at the 4% rate observed

- there are two supplementary factors in household waste growth – the increase in the number of households, and the rise in weight of consumer durables per household. There are long term limits to the growth of the first. The second is likely to diminish as a local authority disposal problem as producer responsibility regulations are extended.

- the underlying long term rate of growth of household waste arisings is likely to be considerably lower than the 3% rate of growth assumed in the national Waste Strategy 2000 and the Lancashire strategy, if there is any growth at all[7]. In countries and states that have introduced policies to minimise waste and maximise recycling, there has been an uncoupling of waste from growth, with the US , Canada, Austria, Sweden and Germany reporting static or declining rates of waste growth per capita during the first half of the 1990s. With the application of European led waste reduction and recycling policies in the UK, a similar cut in household waste growth is to be expected (most immediately in packaging).

- waste that has been switched into the household stream for economic reasons is not a reliable basis for investment in capital intensive disposal facilities. Rather the appropriate policy response is to manage this waste through a changed structure of incentives in order to reduce and recycle it.

- one policy response to leakages into uncharged-for streams is to strengthen enforcement. The height restrictions and CCTV monitoring on Essex CA sites is one example. Another is the requirement in parts of London for entry to CA sites to be conditional on the showing of a residents card. As far as the domestic rounds are concerned, there have been recent advances in the technology for bar coding domestic bins and on-board weighing, which could be used to monitor the sources of waste on these rounds.

- a second policy would be to reduce the difference in disposal cost between the separate streams. Charging for supplementary collections (such as green waste or bulky items) is one option for household waste. Charging for extra household waste on top of a free minimum is another. Permitting trade waste at CA sites for a charge based on incremental costs would produce a similar effect.

- a third policy would be to encourage trade waste to flow through local authority channels, rather than discouraging it through policing or charging. This would expand the quantity of waste subject to municipal waste diversion policies. In this case charges should be set that encourages traders to recycle (through a low cost pick up for example) rather than present mixed waste for disposal.

28. The relevant comparison for the purposes of waste planning is not the increased tonnages of household waste relative to the overall level of achieved recycling, but rather

[7] The MEL study cited in footnote 6 estimated a growth rate of 0.8% p.a. upto 2016, principally as the result of household growth.

the extent to which the increase in waste changes the assessment of recyclability and capturability. In the Lancashire case, the likely predominance of the sources of growth in trade and bulky waste suggests that recyclability is likely to be higher than average, and more susceptible to capture both at CA sites and through diversion-oriented incentives.

V

Recycling in Lancashire

Chapter 7

Current Recycling in Lancashire.

Disaggregated recycling

1. The argument about the need to disaggregate the growth of waste applies also to recycling. For operational purposes, though aggregate targets are still necessary since this is the form in which they are set by government, waste streams need to be broken down and each assessed for their recycling potential, and set a relevant target reflecting locally determined environmental priorities. This in turn requires upto date, disaggregated data to allow progress to be charted and monitored.

2. The first task in assessing how Lancashire recycling rates could be raised is to establish what has been achieved to date, both in aggregate and broken down in four ways, by:

- type of diversion
- waste stream
- local authority
- material

This chapter gathers together the available material on these issues.

Aggregates

3. The first point that arises from a survey of current recycling levels is that there is no readily available, unambiguous, and up to date source of data on one of the key indicators of contemporary waste management. Over the past year the DETR/Audit Commission definitions have changed three times, with major implications for the level of targets set for local authorities and the ways in which they can be met. The County itself had gathered estimates of rates from the boroughs and district authorities, but these used a number of different criteria and did not conform to any of the DETR series.

4. The changes in the DETR definitions have an immediate relevance for Lancashire authorities, given that statutory targets are to be set in relation to them. In its circular on targets (21st September 2000) the DETR presents figures showing Lancashire with a household waste recycling rate of 10% for 1998/9, with districts rates ranging from 3% in Preston to 13% in Fylde and West Lancs. These estimates have now been superceded by new figures attached to the DETR Guidance on Municipal Waste Management Strategies (March 2001) which retain the Lancashire wide estimates but adjust downwards all save the three boroughs/districts with the lowest recycling rates, and leave all

boroughs/districts below the County wide figure. The two sets of estimates for household waste recycling are shown in columns 1 and 2 of Table 11 below. [8]

Table 11 Lancashire Diversion rates

Borough	DETR 98/9 estimate 1	DETR 98/9 estimate 2	99/00 DETR definition (1)	99/00 LCC data %	Dustbin diversion %	Dustbin & hc diversion %	CA diversion %	Full diversion LA + CA %
Blackburn	4	4	4	9	1	1	44	9
Blackpool	5	5	5	10	2	2	42	12
Burnley	9	3	5	2	2	4	33	10
Chorley	8	4	7		4	4	39	12
Fylde	13	7	13	11	6	7	47	22
Hyndburn	10	6	8	6	6	7	39	14
Lancaster	11	6	11	8	6	7	42	19
Pendle	10	4	9	35	6	6	35	14
Preston	3	3	8	4	5	5	50	13
Ribble Valley	11	6	12	23	6	6	50	21
Rossendale	8	5	7	0	4	4	41	11
South Ribble	11	7	13	8	8	8	51	22
West Lancs	13	9	10		4	4	44	19
Wyre	9	7	9	10	7	10	45	17
Total	10	10	8		5	5	44	15

Source: DETR, Lancashire County Council

Note: DETR definition omits home composting (hc) and rubble. Full diversion includes them
Dustbin diversion (column 5) excludes home composting, which is included in column 6.
CA diversion (column 7) includes rubble. It represent the municipal waste diversion rate.
Figures for column 4 are those submitted by districts/boroughs to Lancashire County Council
Figures for columns 5-8 are derived from Lancashire County Council data.

Column 3 is based on 1999/2000 Lancashire data, excluding rubble and home composting as specified by the Audit Commission and DETR guidelines and can be compared to the 1999/2000 data submitted to the County Council by boroughs and districts.

5. It can be seen that there is still some uncertainty about establishing a starting point. The column 3 figures show an increase for each borough and district (but not for the County) over the recently revised estimates made by the DETR, but some of the discrepancies are greater than the rate of recycling expansion would have suggested. Nor is column 3 consistent with the local authority figures of column 4.

6. Given the significance attached to this data by Government, we may expect a stabilisation in methodology in order to ensure that statutory enforcement is workable. But for local authorities the important thing is to keep data on all sources of diversion and develop their own targets informed by environmental rather than statistical goals, which at the same time satisfy the centrally determined targets.

7. As it is we estimate that Lancashire's overall recycling level was 8% in 1999/00 (excluding rubble and home composting) and 14.5% if they are included.

[8] In addition to the September 2000 circular and the March 2001 Guidance on Municipal Waste Management Strategies, the Audit Commission definition of recycling to include incinerator ash was suddenly dropped when it was realised that Disposal Authorities could best meet their medium term recycling targets by incinerating all their waste and recycling the post combustion metals and the residues.

Diversion I: Recycling

8. Table 11 also makes clear (in columns 5 and 6) that for all boroughs and districts, recycling and composting remain a marginal activity. Of the two greater attention has been paid to recycling. While a number of districts have been constrained by lack of finance to limit their recycling to that which has low net cost to the overall waste budget, expanding recycling within the constraints of income received from material sales and recycling credits, others have been able to give some net budgetary support to recycling initiatives. According to available data, nine districts operate some form of kerbside recycling collection, but only two have multi-material collections. Of the 25,000 tonnes recycled by the non-unitary districts in 1999/2000, the major part was collected in bring banks, (together with a further 6,000 tonnes of dry 'dustbin' recyclables collected in banks at CA sites).

Diversion II: Composting

9. As far as composting is concerned, there are records of only one trial of the doorstep collection of kitchen and garden waste. Most policy has to date been focussed (by the County) on the encouragement of green waste separation at CA sites (24,000 tonnes in 1999/2000) and (by the boroughs and districts) on home composting.

- *Green waste at CA sites*

10. If we work from the estimated waste composition figures for CA sites and assume that 35% of CA site waste is organics, (Table 3), then green waste diversion from CA sites accounts for only a third of the organic fraction. The Abbey Lane pilot is now achieving in the region of two thirds organic waste diversion, and shows both the potential and the overall significance of this part of Lancashire's waste stream (see Table 15 below). Doubling the capture of organic waste on CA sites would alone add 3% to Lancashire's household diversion rate.

- *Home composting*

11. With respect to home composting, Lancashire County Council is exceptional in providing composting credits for estimated amounts of waste diverted by home composting. Whether the impact is counted as recycling or waste reduction, does not affect the environmental benefits of this policy. It not only diverts organic waste from landfill, it does so in a way that requires no collection resources (or emissions) and provides material which is used to improve soils in domestic gardens.

12. There are three uncertainties in considering the scale of the impact of home composting on diversion in the County. First, how far householders undertake home composting in any case. A survey in South Ribble suggested that a third of households with gardens did some form of home composting, half of whom had a purpose built unit. Second, there is a question of how much each active household diverts by composting. Both Lancaster and South Ribble found from their surveys that an estimated 200 kg per

hh p.a. of kitchen and garden waste was being composted, which is relatively high by national standards. Third, there is no clear data on how many households have gardens in which they can compost.

13. For all these reasons it is difficult to estimate how much organic waste is diverted by these methods in the County. Table 12 shows the number of compost bins distributed under local authority schemes.

Table 12 Lancashire Home Composter Schemes

Borough	No of home composters
Blackburn	3,900
Blackpool	1,100
Burnley	6,175
Chorley	2,000
Fylde	1,700
Hyndburn	3,500
Lancaster	4,000
Pendle	2,000
Preston	2,500
Ribble Valley	1,000
Rossendale	
South Ribble	1,000
West Lancs	2,200
Wyre	5,000
Total	36,075

Source: Lancashire CC

14. The total of 36,000 covers less than 6% of all Lancashire households, yet at 200 kg per hh p.a. they would divert 7,200 tonnes p.a., or 3,600 tpa at 100 kg p.a. In 1999/2000 Lancashire gave recycling credits to 5 districts for 3,100 tonnes estimated to have been diverted by home composting.

Diversion by waste stream

15. Rates of recycling vary substantially between waste streams. Recycling and composting are a central, and in some cases a majority feature of the management of CA sites. Column 7 of Table 11 shows 44% of CA waste being diverted in 1999/00 with sites in three authorities reaching 50%. This has been the case for some years.[9] On the other hand, as we have seen, recycling of dustbin waste remains marginal and almost non

[9] This has been the case for some years. In 1995/6, CA site recycling had already reached 37%, with 10 of the 26 sites exceeding 50%, and one achieving 60%.

existent for other parts of the municipal waste stream such as street sweepings, trade waste and special/bulky collections.

16. The overall quantities of recycling and composting in Lancashire by those streams in which there is any diversion are shown in Table 13.

Table 13 Lancashire household waste recycled by borough/district 1999/2000 (tonnes)

	LA recycling	3rd Party rec	Home Composting	All recycling & hc	CA Diversion excl rubble	CA rubble diversion	CA site All diversion	CA div no rub & LA rec	CA diversion &LA rec&hc
Blackburn	0	420	0	420	2,138	3,758	5,896	2,558	6,316
Blackpool	1,343	0	0	1,343	3,173	5,874	9,047	4,516	10,390
Burnley	744	78	478	1,298	1,422	1,780	3,202	2,244	4,500
Chorley	1,315	239	0	1,554	1,789	2,428	4,217	3,343	5,771
Fylde	1,934	204	243	2,380	5,137	4,696	9,833	7,274	12,213
Hyndburn	1,714	148	201	2,063	1,328	2,215	3,543	3,190	5,606
Lancaster	2,775	182	621	3,578	5,619	6,309	11,928	8,576	15,506
Pendle	1,456	530	0	1,986	1,901	2,094	3,995	3,887	5,981
Preston	2,116	991	0	3,107	2,659	3,990	6,649	5,766	9,756
Ribble Valley	509	655	0	1,164	2,559	2,939	5,498	3,723	6,662
Rossendale	875	139	0	1,014	1,146	1,227	2,373	2,160	3,387
South Ribble	2,643	482	0	3,125	4,199	5,096	9,295	7,324	12,420
West Lancs	1,058	380	0	1,438	4,041	5,333	9,374	5,479	10,812
Wyre	3,516	190	1,583	5,288	2,201	3,072	5,273	5,907	10,561
Total	21,996	4,638	3,124	29,758	39,312	50,811	90,123	65,946	119,881

Note: Blackburn local authority recycling is not included in the County Council data for 1999/2000 Source: Lancashire County Council

CA sites contribute 75% of all material diverted, with CA rubble accounting for 42% of all diversion, and other CA site recycling and composting for a further third. In spite of the County's positive policies home composting still only makes up a tenth of the remainder, third party recycling only a little more, and borough/district operated schemes the rest.

17. What is clear from Tables 11 and 13, is that in terms of aggregate recycling rates diversion in one part of the waste stream (CA sites) carries the rest. To expand recycling and composting, strategies should be developed for each of the streams, both the leading stream (since there is still a substantial further diversion to be achieved on CA sites) and the laggards.[10]

Diversion by authority

18. The range of variation between authorities is relatively small. This is true both of high levels at C A sites and low levels in district/borough operated recycling.

19. In terms of CA site recycling all Boroughs and Districts have contributed to the high overall rate. In addition to the three which have reached 50%, a further seven exceed 40%, and none has dropped below 33%(Table 11 column 7). This provides a strong basis for expansion, and given the fact that waste handled at CA sites comprises 26% of all household waste in Lancashire, this has a significant impact on overall household rates.

[10] The above takes the wide definition of recycling, since it shows clearly what has already been achieved and brings out the contrast in achievement between the streams. The point holds whether some particular diversion practice is classed as reduction, or as relevant only to municipal waste.

At a minimum, raising all CA sites to the levels achieved at Abbey Lane (see below) would add a further 30,000 tonnes to the CA figure, or 4% of household waste.

20. At the other end of the scale, in dustbin recycling, only one authority, Wyre, has reached 10% diversion with the aid of its substantial home composting programme. Without home composting, the highest level is in South Ribble (at 8%) with most authorities in the range of 4%-6%, close to the 5% average for the County as a whole.

Diversion by material

21. With materials on the other hand, the results are quite different. In dustbin waste, 85% of diversion is accounted for by two materials; paper and card (41%) and green waste (44%), with glass coming well behind at 10%. In the district/borough operated bring banks and kerbside collection paper is even more dominant, accounting for 70% of the total. At this level, recycling is by and large paper collection, as shown in Table 14.

Table 14 Lancashire dustbin materials and capture rates (tonnes)

Material	Dustbin estimate	LA & 3rd party diversion	CA site	All diversion tonnes	All diversion %	Residual for diversion
News & pams	61,239	16,759	5,281	22,041	36	39,198
Other paper	17,172			0	0	17,172
Card packaging	17,172			0	0	17,172
Corrugated cardboard	7,359			0	0	7,359
Glass	42,317	5,407	1,033	6,440	15	35,877
Aluminium cans	1,349	221		221	16	1,128
Other cans	14,136			0	0	14,136
Plastic	22,937			0	0	22,937
Textiles & shoes	12,266	1,484		1,484	12	10,782
Main recyclables	196,037	23,871	6,314	30,186	15	165,851
Garden waste	91,993		24,003	24,003	26	66,428
Kitchen peelings	91,993			0	0	90,431
Kitchen putrescibles	17,172			0	0	17,172
Animal waste	12,266			0	0	12,266
Compostable paper	12,266			0	0	12,266
All organics	225,689	0	24,003	24,003	11	198,563
Nappies + other sanitary	18,399			0	0	18,399
Plastic film	7,973			0	0	7,973
Good jumble sale items	4,293			0	0	4,293
Other items	45,076			0	0	45,076
All other refuse	75,741			0	0	75,741
All dustbin waste	497,467	23,871	30,317	54,189	11	440,155

Source: Ecologika & Lancashire County Council

22. Yet the table also highlights the fact that:

- almost two third of the news and pams (39,000 tonnes) are still uncollected (compare this to the 98% capture rate in Peterborough shown in Table 4 above to have a measure of the potential).

- 84%-88% of glass, aluminium cans and textiles are uncollected and almost all the plastics

- the only significant organics diversion to take place is garden waste – an estimated 26% - with any recycling of kitchen organics confined to home composting. Kitchen organics alone make up an estimated 24% of material still available for diversion.

Overall we estimate there are still 166,000 tonnes of dry recyclables and 199,000 tonnes of organics available for recycling (see column 6).

23. There is a similar picture for CA site waste. Leaving aside items of dustbin waste captured at CA sites, nearly 90% of the remaining diversion is accounted for rubble and wood waste. The figures are shown in Table 15, together with estimates of available materials taken from the waste composition studies summarised in Table 3.

Table 15 Waste Diversion at Lancashire CA sites

	Lancs comp tonnes	Lancs diversion (t)	% diverted	Tonnage available	Abbey Lane tonnes	AL July diversion	AL % diversion
Green w.	68,243	24,003	35	44,240	281	189	67
Kitchen w.	4,136		0	4,136	17		
Building w.	51,700	50,811	98	889	213	183	86
Wood	22,748	1,206	5	21,542	94	36	38
Cardboard	0				0		
Paper	10,340	5,281	51	5,059	43	27	63
Textiles	8,272	105	1	8,167	34	0	
Metals	10,340	6,006	58	4,334	43	34	79
White goods	0	739		-739	0	1	
Plastic	6,204		0	6,204	26		0
Glass	4,136	1,033	25	3,103	17	10	58
Misc	10,340		0	10,340	43		0
Furniture	10,340		0	10,340	43		0
Misc comb							
Misc noncomb							
Other		939		-939			
All CA waste	206,798	90,123	44	116,675	853	482	57

Source: Lancashire County Council

This table indicates that the main materials for targetting are green waste, wood, furniture, textiles and plastics.

24. That diversion of these can be rapidly increased is indicated by the results of the high diversion pilot that has been started at the Abbey Lane CA site in West Lancs. Column 5 of Table 15 shows the monthly quantity of available material that would be expected if the composition of waste was similar to that for Lancashire as a whole. Column 6 then shows the amount of each material that was diverted at Abbey Lane in July 2000. What is striking – in addition to the sharp increase in green waste diversion – is the rapid increase in the capture of wood waste (to a level of 38%), of metals and of glass. Textiles, furniture and plastics remain low.

25. The data, particularly for CA sites, needs to be further refined. But Tables 14 and 15 provide a first mapping of what are in effect the Lancashire mines, forests and quarries of the secondary materials era. They show some 450,000 tonnes of recyclable material still available for diversion from dustbin waste and CA sites alone.

Conclusion on current recycling performance.

26. The overall picture is of a County which:

- diverts one part in seven of its municipal waste (14.5%) at an aggregate level and has three districts that have already exceeded 20%, with only one failing to reach 10%.

- has concentrated its diversion largely at CA sites (75%) and in bring banks,

- has focussed diversion on builders waste (51,000 tonnes), green waste (27,000 tonnes including home composting), and paper (22,000 tonnes) which together account for 83% of diversion

- has established a high diversion pilot CA site (Abbey Lane) which has shown how rapidly capture rates of particular materials can be increased

- has large untapped sources of recyclable tonnage, most notably organic waste, household bulky waste, paper, glass and plastics, and untapped value in 11,000 tonnes of textiles and 1,000 tonnes of aluminium cans.

This provides a platform from which to move forward.

Chapter 8

High diversion strategy in Lancashire.

1. The accompanying Dossier carries material on a number of High Diversion schemes that offer useful ideas for Lancashire. But any strategy will have to be designed around the particular needs and features of the County. Recycling schemes can not be imported and set up like a machine. Overseas experience and technique provide a modular toolbox from which purpose designed schemes can be formed.

The Lancashire Strategy

2. The MWMSL has already drawn on such experience. It proposes to develop intensive recycling in three ways:

- to promote waste minimisation in order to stabilise waste arisings. The Council has recently decided as a first major step to fund a £1.35 million home composting programme over three years, which would provide home composters to 10% of the Lancashire population, together with a team of compost specialists to provide householder advice. This would be expected to divert from 6,000 tpa to 12,000 tpa, which is between 3% and 6% of household organics, or between 0.75% and 1.5% of the household waste stream.

- to expand three stream collection services to 90% of Lancashire households by 2005. The services would include a separate collection of dry recyclables, another for household organics and a third for residual waste. New three stream programmes have already been drawn up in Chorley, South Ribble and Preston, for launch in 2001, funded jointly by the districts and landfill tax credits.

- to establish a consortium to market the increased quantity of recycled and composted materials.

3. We have no doubt that these should be core policies of any intensive recycling strategy. Our only comment is on how they might be expanded in scope, both to relate to the wider environmental and economic aims of diversion policy, and to extend the impact of the policies on other municipal and private waste streams.

4. The four key strategies, implicit in the Draft Strategy but which could usefully be made explicit, are:

- the primacy of organics

- recycling of other bio-degradable waste

- the removal of hazardous waste from the residual stream

- increasing resource productivity through re-use and recycling

These are considered in turn.

1. The primacy of organics.

5. We agree with the Draft Strategy that priority should be given to maximising the diversion of organics. This is for the following reasons:

- removing organics from residual waste is of major significance in reducing the hazards and pollution associated with landfill, cutting leachates, as well as emissions of methane and carbon dioxide gases, that carry with them volatile organic compounds (VOCs) derived from toxic materials and liquids in the landfill.

- organics comprise 45% of Lancashire's dustbin waste, and high capture rates through a kerbside organic collection supported by home composting will make the largest impact on waste diversion in a short time, as well as on the UK and EU targets of cutting bio degradable waste going to landfill. The immediate impact of an organics led strategy has been the lesson of high diversion in the US (see the ILSR report in the Dossier) and the UK. Bury St Edmunds found it was diverting 34% of dustbin waste through its introduction of organics collection, even though it excluded putrescible waste.

- removing all organics from the residual bin makes it possible to shift residual collection from weekly to fortnightly.

- organic waste produces compost which can serve as a peat substitute and return nutrients to depleted urban and rural soils

- compost facilities act as reserve capacity for cardboard and paper when prices are low.

6. The strategy should, however not be confined to the domestic stream. By establishing a network of local composting facilities (both open windrow and closed vessel), Councils will be providing an infrastructure which can be accessed by a wide variety of trade, institutional and industrial waste.

7. Because the removal or organic waste from landfills – whatever their source – is a primary goal of contemporary waste policy, the introduction of kerbside organic collections and the encouragement of home composting should be complemented by a range of other initiatives:

- the monitoring of CA sites to ensure that no organic waste is deposited in the residual refuse containers, as well as the promotion of CA sites for the low cost disposal of arboricultural and horticultural trade waste.

- the separate collection of organics from all public institutions (Council buildings, schools, hospitals, prisons, care homes, military camps) some of which may be large enough to support their own in vessel composter.

- the composting of parks waste and the selective processing of street sweepings (particularly in Autumn)

- organics collections from restaurants and hotels, street and vegetable markets, venues such as football grounds, and exhibition centres.

8. The operational responsibility in many of these cases may be taken by waste companies, community groups or the operators themselves. Councils can, however, play a major role by:

- providing leadership (based on the introduction of organics diversion in the domestic and public institutional sector)

- ensuring that there is a network of accessible collection and processing facilities,

- funding an organics diversion advisory service for public and private sector operators.

2. The diversion of other bio degradables through intensive recycling.

9. For any multi-material kerbside collection, priority should be given to high capture rates for all grades of paper and textiles.

10. Programmes targetting paper diversion offer a triple dividend:

- the diversion of bio degradable paper from landfill

- the provision of recovered material to substitute for virgin fibre

- a long term reduction in private waste costs.

11. In the case of textiles, although the volumes are smaller, recycling removes a further element of biodegradable waste from landfill and has the additional benefit that the recyclate is a high value product.

12. As with diversion in general, programmes to increase the capture of paper and textiles need to be market led. Paper provides particular challenges because of its price

fluctuations. It should be an early task of the Marketing Consortium (acting as a Lancashire equivalent to WRAP, the new national market development agency) to identify outlets (and if necessary new uses) for different grades of paper and card and then to ensure a stable supply through the local kerbside collection schemes. At first, and minimally, grades of paper and card which cannot find a market can be composted, but this should be seen only as a short term measure.

13. Both paper and textiles, unlike composting, have established supply chains. In the municipal sector this is primarily in news and pams, though some cardboard is collected at CA sites. But the private sector already diverts considerable quantities of paper and board. The Environment Agency survey of Commercial and Industrial waste in 1998-9 estimated that 77% of the 7 million tonnes of paper and board identified nationally was recovered (almost entirely for recycling), leaving 1.6 million tonnes uncaptured. We suspect that this understates available material because of the large residual quantities of waste that could not be identified in the survey.

14. Considerable quantities of office paper and trade cardboard are currently disposed of to landfill, and it is these which local authority initiatives are well positioned to target. Waste composition studies of offices, high streets and airports all indicate substantial proportions of paper and card which are not being recovered, and that are more easily and cheaply accessible than paper in the domestic stream.

15. Overseas experience suggests that what is needed in these cases is not so much new markets – since an established market infrastructure of merchants and processors already exists – as experienced advisers to show firms and institutions how recycling can be introduced 'smartly' and with short pay back periods.

16. Just as the proposed marketing consortium can act alongside WRAP to develop the demand side for recyclates, so Lancashire should establish a programme of technical support – for example through a Best Value Unit – to strengthen the supply side.

3. The removal of hazardous household waste from landfill.

17. Kerbside schemes and CA sites should make special provision for the separation, collection, recycling or specialist disposal of a large number of low volume hazardous items in the domestic, commercial and institutional waste streams. They include car batteries, acids, anti-freeze, oils, paint, flammables, propane tanks, inorganic cyanides, oxidisers, isocynates, pesticides, aerosols, dry cell batteries, oil filters, pharmaceuticals, cylinders and syringes.

18. The purposes of targetting hazardous items is two fold:

- to divert them from the mixed household stream so that they can be handled safely

- to increase householder awareness of the toxicity of these items, as part of more general waste awareness.

19. Given the relatively small quantities of these items, they can be carried in small containers or sacks attached to a kerbside collection vehicle, or in hazardous waste containers at CA sites. An effective way of increasing participation (as with other household goods like textiles which are not a normal part of a weekly waste stream) is to have an advertised day, say once a quarter, when householders are encouraged to dispose of hazardous items, having stored them in the meantime.

4. Increased resource productivity through expanding re-use and recycling.

20. The expanded recycling of the principal remaining materials in the household waste stream – cans, metals, glass and plastics – through multi material kerbside collection is an immediate way of increasing resource productivity.

21. There is also scope for the existing Household Waste Disposal Centres (CA sites) to make a major contribution. Some CA sites in other parts of the country are already converting themselves from bulky waste transfer stations to Re-use and Recycling Centres, expanding their undercover facilities, and establishing recycling 'chains' or 'return loops' for a wide range of items: white goods, furniture, wood, renovation waste, vehicle parts, electrical and electronic equipment.

22. A number of the materials will be covered by the new Producer Responsibility Directives, which will put a premium on the recycling of these items. There is a potential role for new Re-Use and Recycling Centres to act as quasi transfer stations for recycled goods in these new arrangements, as well as for consumer durables not covered by the Directives.

23. Once re-designed in this way, Lancashire's Re-Use and Recycling Centres could act as MRFs for skip waste, and for bulky waste collected by Councils as part of their doorstep services. In both instances differential charging would encourage householders and builders to source separate the waste that was to be collected.

Extending the Lancashire approach

24. Lancashire's plans for a three stream collection system throughout the County would form the central spine of an intensive diversion programme. We have suggested extending the proposals by:

- developing new arrangements for a fourth bulky waste stream
- targetting hazardous waste in the domestic, commercial and institutional streams
- planning the infrastructure to accommodate the diversion of trade and other commercial and institutional waste

- providing a range of advisory services to households and workplaces, as well as to the operators of the new systems

25. In keeping with the aims of the Lancashire Strategy, the extended approach performs the following functions:

- it applies the Pareto principle of concentrating on the major elements of waste, first and foremost on organics and paper which together make up some two thirds of the domestic dustbin and trade waste streams.

- it targets the removal of bio-degradables from residual waste in order to radically reduce the hazards of landfill

- it embodies the main purposes of the new waste strategy, so that the promotion of the particular schemes acts at the same time to increase the general awareness of the problem of waste. An explicit approach of this kind carries more weight in this respect than a policy centred round the achievement of Government objectives, albeit that the achievement of those objectives will be one result of the policy.

26. As it is, the commitment to the three stream system puts Lancashire in the forefront of intensive diversion plans at County and Metropolitan level in the UK, and makes an immediate connection to leading examples of best practice abroad:

- Nova Scotia became the first Canadian province to reach 50% diversion on the basis of a three stream system of the kind proposed by Lancashire

- many Dutch and German municipalities have achieved high diversion in this way, Holland having introduced compulsory separation of household organic waste in 1994.

- in the US, a study of eighteen leading schemes which have achieved combined composting/recycling rates of between 40% and 60%, found that two common characteristics of these schemes were a targetting of organics, and an emphasis on source separation. (Details of the Nova Scotian and US programmes are contained in the Dossier).

Lancashire thus has international experience on its side.

Chapter 9

Implementing High Diversion

A new waste system: the role of local authorities

1. The directions outlined above suggest a redefined role for local authorities with respect to waste. Traditionally their function has been to preserve public health through the management of household waste. In the contemporary period the threats to public health now come in a different form and from trade and institutional waste as much as that from households.

2. The task for local authorities, therefore, is to put in place a collection and processing infrastructure to which all waste producers and collectors can tap in, and to provide strategic leadership and advice in their local communities on the waste diversion issue.

3. The principal infrastructure consists of three elements:

- physical centres for sorting, bulking, receiving (in the case of the redesigned Re-Use and Recycling Centres), together with a pattern of regular kerbside collections of different components of municipal waste

- a working economic 'chain' for re-using and recycling each material. High diversion programmes now use the term 'void space' not to refer to available landfill, but to gaps in an economic 'loop', such as the lack of adequate repair and maintenance capacity which would allow more re-use, or of uses of green glass.

- an informational network, comprising advisory services, public information, systems design and skills training

4. In some of these cases local Councils may be the provider, making low cost use of existing resources, in depots for example, or through regular Council newsletters. But this is not necessary.

> **Their key role is rather as facilitators of a new set of resource cycles, making sure that the physical, economic, and informational conditions are in place to allow the cycles to operate.**

5. Once in place, such a system can enjoy considerable **economies of scope**:

- there is a low marginal cost of adding an extra material to a fleet of recycling collection vehicles which are in any case passing all houses once a week.

- collectors can act as an effective two way channel of communication in the course of their physical tasks since they visit each householder weekly. Some recycling boxes are now made with a small space which takes a weekly newsletter or leaflet, which can be used as a low cost means of direct mailing.

- compost advisers who make home visits can also be trained to provide other environmental advice (on recycling, as well as energy and water use).

These are all ways in which the core capacity of a new system can be used for multiple purposes, and increase the value arising from a core investment.

District diversion.

6. The above provides an overall picture of the new waste system being introduced at the County level. The issue for Boroughs and Districts is

- how to ensure high diversion

- how to phase the strategy

- how to establish the programme at least cost.

7. We cannot in this report go into all the detailed choices that have to be made to ensure that three stream collection is 'smart', in the sense of being both effective and low cost. The Lancashire Strategy quite rightly leaves the design of the three stream system to each Waste Collection Authority, since every borough and district will be different, and the Collection Authorities have the detailed local knowledge to plan the most environmentally and cost effective schemes. Collection methods in dense inner urban areas may well be different to those most suited to suburban districts or market towns. They will certainly be different in high rise and multi occupancy blocks, and dispersed rural areas

8. What we have done is to look in more detail at two districts, one a predominantly urban area (Preston) the other the most rural of Lancashire authorities (Ribble Valley). Between them they contain many of the different neighbourhoods and housing types which characterise Lancashire as a whole. Preston is a mixture of a dense inner urban core, with back to back terraces, and a more suburban periphery of detached and semi detached housing. The Ribble Valley has two market towns (Clitheroe and Longridge) and a large area of villages and scattered rural dwellings.

9. The results of the case studies are attached to this report. They can do no more than indicate an approach, one that starts from the District's waste composition, and looks at 60% high diversion schemes and their costs over five years. In the case of Ribble Valley, we have assumed that the new collection services are provided weekly for the market towns, but fortnightly in the outlying areas, for reasons of economy. Because it operates

on a black sack system, the Council has greater flexibility in redesigning the residual refuse round than districts with wheeled bins.

10. In the case of Preston, which uses wheeled bins, the Council already runs a kerbside paper service that is to be extended borough wide, with multi material kerbside increased to 26,000 households. The case study looks at the impact of adding a further service collecting dry recyclables in the inner urban area using small electrically powered vehicles (PCVs).

11. PCVs have been developed in relation to the needs of inner city areas in London. They travel on the pavement (thus reducing congestion on the road and at the same time increasing the productivity of the collector because of his/her proximity to the recyclate) and are electrically powered, thus cutting down on both costs and emissions. Potentially they could be well adapted to the terraces found in many towns in Lancashire, particularly for collecting in the alleyways behind.

12. The two studies show the impact of three different schemes of organics diversion in each case, at different target capture rates, and then provide an estimate of costs. Just as our approach to materials capture suggests that it is important to set an immediately achievable level and then improve on it, so we have assumed high costs which can then be continuously reduced.

13. The conservative cost estimates indicate an increase in waste system costs of 80% on average in each case over the 5 year transition period. This is almost certainly too high. Reductions could be made through running alternative weekly collections of residuals and organics as Preston is planning to do, or through the use of co-collection vehicles in the rural areas of the Ribble Valley.

14. The operational aim over this period should be to make the schemes cost neutral by the end of year 5. In the survey of best practice diversion programmes in the US (included in the Dossier,) 9 out of the 14 councils for which comparable cost was available recorded the same or decreased waste management costs, and four others had an increase of costs caused only by the rise in disposal gate fees. Seattle cut its waste costs by 8% within five years of introducing intensive diversion, and in the case of the Canadian district of Quinte, the net cost reductions were over 30%. Just as diversion rates can be regularly improved, so costs can be cut as new ways are found to increase both capital and labour productivity.

15. Tables 16 and 17 estimate the diversion impact of alternative systems for Lancashire, and as with the two district studies, show the levels of capture that would be required for a 60% diversion target to be reached. Table 16 looks at organics diversion:

- The top box sets out the estimated quantity of organics, based on the model whose results are summarised in Table 2, to be found in kerbside households on one side, and those served by paladins on the other.

Table 16

Lancashire Organic Systems

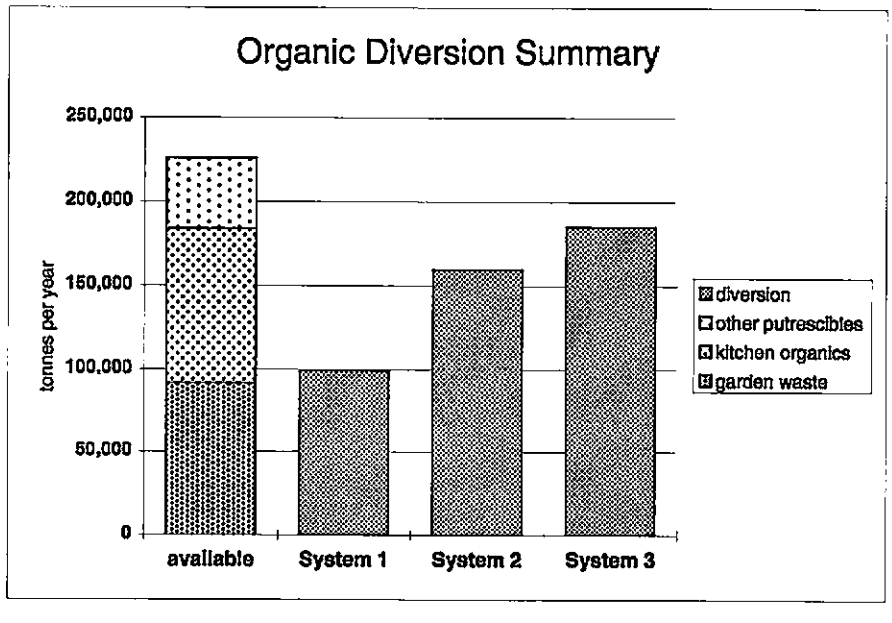
	Kerbside Collection		Bin Collection		
Organic material available	kg/hhld	tonnes	kg/hhld	tonnes	total tonnes
garden waste	150	87,832	135	4,160	91,993
kitchen organics	150	87,832	135	4,160	91,993
other putrescibles	68	39,817	61	1,886	41,703
total	368	215,482	331	10,207	225,689

System 1	participation	tonnes	% hhlds	tonnes	total tonnes
free home composters	67%	27,462	10%	216	27,678
seasonal garden waste	80%	70,266	30%	1,248	71,514
% & tonnes organic diversion	45%	97,728	14%	1,464	99,192
					44%

System 2	participation	tonnes	% hhlds	tonnes	total tonnes
home composters	40%	14,053	10%	216	14,269
fortnightly organics	80%	140,532	60%	4,993	145,524
% & tonnes organic diversion	72%	154,585	51%	5,208	159,793
					71%

System 3 Preferred System	participation	tonnes	% hhlds	tonnes	total tonnes
home composters	40%	16,395	10%	216	16,611
weekly putrescible collection	75%	161,612	70%	7,145	168,757
% & tonnes organic diversion	83%	178,007	72%	7,361	185,368
					82%

Organic Diversion Summary	available	System 1	System 2	System 3
garden waste	91,993			
kitchen organics	91,993			
other putrescibles	41,703			
diversion		99,192	159,793	185,368



- The second box shows the potential results of a system based on an intensive home composter programme supplemented by the seasonal collection of garden waste. This is the lowest cost option and when fully established would result in 44% diversion of the organic fraction. This would amount to 20% of Lancashire's estimate dustbin waste.

- The third box shows a system with home composting taken up by only 40% of households, but with a fortnightly collection of garden and kitchen vegetable waste (similar to that operating in Bury St Edmunds). This system leads to an expected 60% increase in organics diversion to 160,000 tonnes, or 71% of available domestic organics. This is 32% of estimated dustbin waste.

- The fourth box is the most intensive option. It assumes home composting remains at 40% of households, but with a higher diversion rate because of the impact of an intensive system on household practices. It then introduces a weekly collection of putrescibles, which raises the tonnages collected by 16%, and the overall rate of organics diversion to 82%. Using this system Lancashire would be diverting 37% of its dustbin waste.

- The fifth box presents a summary.

16. The impact of these systems on costs can be worked through for each district. The third one is on the face of it the highest cost option, but much depends on how the rest of the system is organised. In the Bury St Edmunds case (collection system 2), residual refuse is still collected weekly, so residents receive three collections a fortnight, two residuals, and one organics.

17. System 3 on the other hand would allow the residual collection to go fortnightly, so householders would receive three collections a week but with two organics and one residual. Although close vessel composting is more expensive than windrows, it is still less than forecasted landfill costs, and the savings generated by higher diversion could outweigh the lower cost of System 2's windrowing on the reduced tonnage depending on the technologies chosen.

18. Table 17 looks at the effects of doorstep collection on the capture of dry recyclables, as estimated from the results in Table 2. The left hand column assumes a 75% aggregate capture rate, and diverts 139,000 tonnes, of which 53% is paper, and 22% glass. The right hand column has a lower capture rate from the households currently served by paladins, though it assumes doorstep collection has been introduced to supplement the more usual

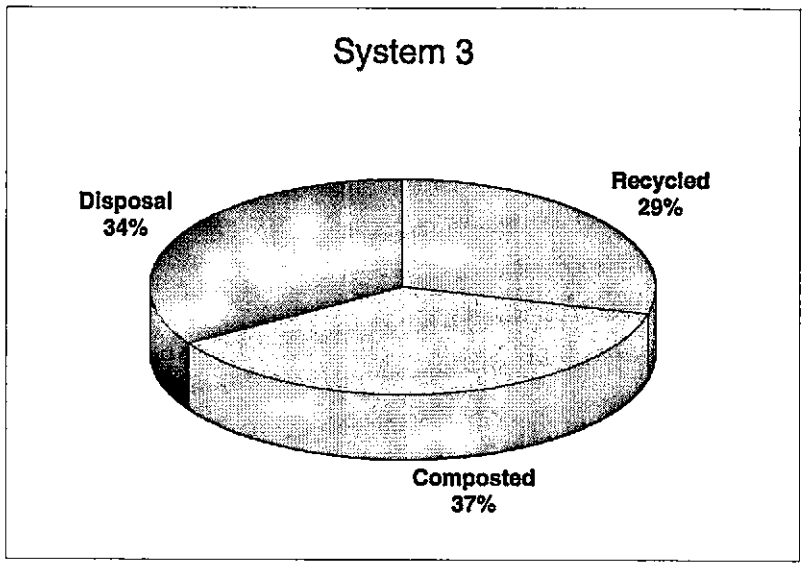
Table 17

Lancashire

Recycling Diversion Rates

	Full Kerbside		
household type	kerbside	estates	
household units	585,550	30,818	
capture rate	75%	50%	tonnes
Main Recyclables			
news + PAMs	43,916	1,387	45,303
household paper	12,297	388	12,685
card packaging	12,297	388	12,685
corrugated cardbd	5,270	166	5,436
subtotal paper	*73,779*	*2,330*	*76,109*
clear glass	15,371	388	15,759
green glass	10,979	277	11,256
brown glass	3,952	100	4,052
subtotal glass	*30,302*	*766*	*31,068*
steel cans	7,905	250	8,155
aluminium cans	966	31	997
aluminium foil	1,120	35	1,155
aerosols	1,098	35	1,133
subtotal cans etc.	*11,089*	*350*	*11,439*
HDPE plastic	3,733	118	3,851
PS plastic	1,405	44	1,450
PET plastic	3,074	97	3,171
PP plastic	1,098	35	1,133
PVC plastic	527	17	544
sacks & carrier bags	6,587	208	6,795
subtotal plastics	*16,425*	*519*	*16,943*
Textiles/shoes	8,783	277	9,061
Total Main Recyclables	139,280	4,207	143,487

System Diversion			
	System 1	System 2	System 3
Organic Diversion	99,192	159,793	185,368
Recycling	143,487	143,487	143,487
Total Diversion	242,679	303,281	328,855
Percent Diversion	49%	61%	66%
Refuse to Landfill	254,788	194,186	168,612



bring banks. The overall level of diversion is 143,000 tonnes or 29% of dustbin waste.

19. Together these tables indicate that 185,000 tonnes of organics can be diverted with a weekly collection of putrescibles (as against 27,000 tonnes through home compost programmes and CA site recycling in 1999/2000) and 143,000 tonnes of dry recyclables (as against 30,000 tonnes in the same year). This represents 67% of dustbin waste (as estimated in Table 2).

20. If the new Re-Use and Recycling Centres achieve the 70% + best practice diversion levels, this would amount to a further 145,000 tonnes.

21. Together the organics, dry recycling and Re-Use and Recycling Centres schemes would on this basis divert 473,000 tonnes, a 60% diversion of household waste from landfill. Further diversion of any hidden trade waste component in the weekly domestic collections, or from special collections and street sweeping and amenity waste would be additional to this.

22. Re-working the figures in terms of the DETR definitions omitting home composting and rubble, would produce a household waste recycling level of 57%, although the landfill reduction would remain the same at 60%.

VI

Conclusions

Chapter 10

Conclusions and Recommendations.

The overall conclusions of this review are four fold:

1. Diversion rates.

1. The diversion targets included in the MWMSL are insufficiently ambitious in the medium term given the commitment to transform the waste management system as outlined in the Plan. Within 5-7 years, the introduction of a three stream collection system to 90% of Lancashire householders, innovatively run, supported by a continued strategy of high diversion on CA sites, would be likely to raise the rate of household waste diversion to the 50%+ levels now being achieved by leading high diversion schemes in this country and abroad. In the longer term, further diversion can be achieved by adding more materials and waste streams and increasing the capture rate.

2. Implementation.

2. The immediate emphasis should be shifted away from targets to the cost effective implementation of the strategy. There are a number of points that should be kept in mind in designing the programme in addition to those concerning capture rates discussed above:

- the most cost effective systems are those where the kerbside collection of dry recyclables and organics are not add ons to the existing system but are integrated into a new one; one of the main ways of keeping costs down is to ensure that savings in residual rounds are maximised as diversion increases.

- home composting and bring banks do not conflict with kerbside collection systems; both are cheap, they may suit some households and increase awareness in others, and the lower capture rates implied for the kerbside collections will allow an increase in pass rates and a reduction in trips to depot.

- recycling and composting should be designed to be market led, with collectors acting as part of a supply chain, responding to the requirements of processors with respect to delivery times and quality, and developing alternative outlets for particular materials to provide a safeguard against market downturns.

- the marketing of materials requires professional expertise acting on behalf of the collectors, tasked with securing good material prices, developing market strategies that reduce dependence on any one processor, and expanding the uses and value of given materials.

- a new management information system should be introduced, common to all Lancashire authorities, that tracks waste composition and operational data in real time, and serves as the basis for operational targets to be set and monitored.

- a new educational and training programme is required to provide the collector and managerial skills necessary to operate the much more complex and culturally sensitive high diversion systems.

3. Disposal

3. Just as the diversion strategy should be designed to support the management of residual waste so the forms of residual management should complement diversion. We suggest a four part approach to diversion at this stage:

- a rapid implementation of the three stream systems and CA site recycling in order to economise on existing disposal capacity

- the removal of biodegradable and household hazardous waste from the residual stream in order to reduce the pollution associated with residual waste

- the retaining of flexible means of disposal and avoidance of large scale treatment plants such as incinerators at this stage of the sector's development

- the shortening of disposal contracts to retain flexibility in the light of technical and regulative change and of the impact on disposal of increased diversion.

4. Finance.

4. In the long run, intensive recycling schemes can reduce waste management costs. Although it is more expensive to run separate collections, recycling is a declining cost industry. The extra costs should be offset by income from recovered materials, given that that the pattern overseas is for prices to rise as new processing industry is established.

5. The financial problem is posed by the costs of transition. Government policy over the past year has made more funds available to finance the start up costs of the new system. There are now substantial Government funds for recycling and composting:

- the £140 million challenge fund earmarked for recycling

- the £220 million PFI finance for which recycling and composting are the first priority,

- the increased waste element in the SSA for the coming three years

- the £50 million New Opportunities Challenge Fund to support community environmental initiatives including recycling.

6. There has also been direct and indirect pressure put by the Government for the allocation of landfill tax offsets to recycling as well as movement to ensure that collectors benefit from PRNs. For Lancashire to proceed promptly with its diversion strategy, it is important that all these funding sources continue to be explored.

7. What is required is for the first broad estimate of costs included in the Draft Strategy to be substantially developed as part of a five year business plan, that sets out the detailed diversion programmes drawn up by each borough/district and by the County and the unitary authorities in relation to CA sites.

8. This would provide the basis for a financial strategy aimed at raising funds from a range of sources (not only those mentioned above, but from the sale of materials, residual waste charges, leasing and loan arrangements, private financing, as well as borough/district and County contributions).

9. Only when a County wide agreement has been reached on operational responsibility for each part of the new system and an assessment of the transition costs has been made, can the distribution of costs between the County and the boroughs/districts be seriously discussed. Under the current divisions of operational and financial responsibility:

- the County faces steeply rising disposal costs which will not be reduced by increased diversion (save in the operation of CA sites) because of the system of recycling credits.

- districts and boroughs - after an initial increase in collection costs following the introduction of three streams systems - can expect their net costs to return to or fall below existing waste budgetary levels by the end of a five year period, as system collection costs are cut, and as income rises through improved material prices, PRN receipts, and increased recycling credits as capture rates improve.

10. Partial proposals such as abandoning recycling credits, or yielding material sales income to sorting operators or disposal contractors, do not make sense unless a full 5 year budgetary exercise has been undertaken[11]. Districts and boroughs who give up their main income sources would find themselves left with the increased costs of collection without compensatory sources of income which stand to rise over the medium and long term. A County wide financial plan on the other hand would identify the relative costs and benefits of the new system and their distribution, and would allow districts and boroughs to provide some form of offset to the increased disposal budget that the County would otherwise face.

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[11] In the Preston and Ribble Valley case studies we have included recycling credits in district income. They represent savings in disposal cost that result from diversion. There is currently a proposal to drop the system of recycling credits in Lancashire, but in order to show the economic benefits resulting from diversion in the model, the County would have to pass on the savings from reduced disposal in some other form – for example through the finance of a portion of the capital or running costs. The impact on the net outcome would be the same whichever form the disposal savings are transferred. We have kept them as recycling credits since this is a more transparent way of showing the savings, as against a subsidising of costs.

Recommendations

1. The MWMSL should clarify the environmental goals of the plan

2. The 80% reduction in landfill target should be revised to refer to the 80% reduction of biological waste

3. The Strategy should set out diversion priorities in terms of the environmental goals of minimising the hazards and pollution of mixed waste disposal, reducing methane and CO2 emissions, and optimising the value of recovered materials

4. Diversion targets and disposal strategies should be designed to complement each other, reducing the polluting content of the residual waste stream on the one hand, and ensuring flexible disposal options on the other.

5. The Draft Strategy should design policies which integrate recycling targets and disposal in terms of separate materials rather than aggregates of mixed waste

6. The focus of the Draft Strategy should shift from a mechanistic to a cybernetic model of planning, with an emphasis on continuous improvement.

7. A distinction should be made between long term targets, and short and medium term operational ones.

8. The County should commission waste composition studies of CA site, bulky waste collections and trade waste.

9. In determining benchmark capture rates the Strategy should set levels drawn from best rather than average or below-average practise.

10. The model for estimating recycling rates used in the Draft Strategy should be revised to include CA sites, bulky waste collections and trade waste.

11. The Draft Strategy target to provide 90% of households with a segregated collection service by 2005 should be extended to provide 100% of households with intensive diversion services by 2010.

12. The capture rate assumed for establishing targets with a three stream collection system should be raised from the 51% assumed in the draft strategy to 70%, and the recoverability assumption from 78% to 85%.

13. On this basis the Draft Strategy medium term diversion targets should rise from 32% to 60%, with scope for the further increases necessary to meet the Government's recovery targets through recycling and composting allowed for in the long term.

14. Growth rates in household waste since the introduction of the landfill tax should not be taken as a reliable basis for long term waste planning. The leakage of trade waste into the household stream should prompt a trade waste diversion programme and a re-assessment of the structure of financial incentives and the effectiveness of regulatory enforcement rather than increasing the pressure to commission large scale municipal disposal facilities.

15. Growth in consumer durable waste at CA sites should be addressed by targetted re-use and recycling programmes in partnership with industry as part of the implementation of Producer Responsibility regulations.

16. As part of a new waste and recycling management information system, the County Council should collect and collate on a quarterly basis real time information on the growth of waste arisings and of recycling and composting distinguished by authority, by material, and by channel of diversion.

17. Within the context of the Draft Strategy's three stream collection proposals, primacy should be given to diverting organics both in the domestic and commercial/institutional waste streams. This will involve not only separate organics collection for all households in the County, in line with current EU proposals, but the establishment of an infrastructure of local closed vessel and open windrow composting facilities and organic collection points, promoting on site and community composting, and targetting organics diversion in parks, public institutions and at events, venues and street markets.

18. A second priority is the diversion of other bio-degradable waste – notably paper and textiles – from the municipal and commercial/institutional streams. This will require the proposed marketing consortium – alongside WRAP – to develop a market development and sales strategy and co-ordinate the expansion of supply in line with it.

19. In addition to three stream collection, the Strategy should also target a fourth stream of durable and bulky waste. This will require the conversion of the existing network of Household Waste Disposal Centres (CA sites) into Re-use and Recycling Centres (RRCs), linked in to extended special collection services, and designed to accept commercial and institutional waste for recycling as well as the municipal stream.

20. Facilities should be provided at the Re-Use and Recycling Centres and as part of the multi material kerbside collections, to recover hazardous items from the household and commercial and institutional streams. This should be promoted as a critical part of the policy to 'detoxify' the residual waste stream.

21. A programme of home advisers and enterprise consultants needs to be put in place to advise householders and workplaces on the techniques of recycling and composting,

22. There also needs to be established a technical advisory service to give 'Best Value' supply side support to the new collection systems and processing facilities within the County.

23. The Borough and District Councils, with the support of Lancashire County Council should develop their own operational and economic model for planning and monitoring intensive diversion systems.

24. In the new waste system local authorities should redefine their role as (i) facilitators of a new set of resource cycles, making sure that the physical, economic and informational conditions and infrastructures are in place to allow the cycles to operate and (ii) proactive promotors of good environmental practices and guardians of public health with respect to the production and management of waste and recycling.

25. Recycling programmes should be designed to maximise economies of scope and system rather than economies of scale.

26. Recycling and composting should be planned not as add ons, but as an integrated part of the full waste management system. Integration is particularly needed to secure savings in residual collection costs, and to link special collections with the Re-Use and Recycling Centres.

27. Home composting and bring banks should be seen as complementary to not competitive with doorstep collection of organics and dry recyclables.

28. Professional expertise is needed to sell into and develop markets.

29. Lancashire should establish new training modules to support its recycling programme, covering the new skills required for collectors, managers, household advisors, and social marketers.

30. In order to retain flexibility in a period of rapid change, disposal contracts should be kept short (7-10 years) and should not mix the tasks of disposal with the organisation of recycling, sorting and processing.

31. In order to avoid the danger of crowding out and undermining the targets for intensive recycling and composting, no decisions on incinerators or other large scale disposal facilities should be made until 2006, by which time the County's three stream strategy will be in place, and its performance against Government targets can be assessed.

32. A five year multi authority business plan should be drawn up by the end of 2002 setting out the ways in which the three stream system for dustbin waste, and the diversion programmes for other streams will be introduced in each district, together with a financial plan and funding strategy sufficient to cover the incremental costs of transition.

33. As part of the comprehensive financial plan the County and Districts should agree a reasonable distribution between them of the increased net system costs arising during the transition.

Preston

Preston

1. Preston is a predominantly urban district. It has a dense inner core, with many terraced streets, and relatively high occupancy, including a transient student population. This is surrounded by more suburban areas, of detached and semi detached housing, with gardens. According to MEL's Acorn Profiles, one in seven (9,000) of the Borough's 57,000 households have low incomes and face economic hardship, but the majority of the population are classed as better off. The same survey indicates that 28%of households live on council estates, of whom two thirds are in better off homes, and 10% live in multi ethnic areas. We estimate that Preston's households produce a quantity of dustbin waste (804 kg p.a.) that is close to the Lancashire average.

2. According to the DETR measures Preston had the lowest recycling rate (3%) of all Lancashire districts in 1998/9, and accordingly has been set the joint lowest target (18%)(together with Blackburn and Blackpool) for 2005/6. But this understates Preston's current position and its potential. Its CA site already has a diversion rate of 50%, including substantial quantities of rubble, which are excluded from the DETR definition. In addition to 41 bring banks, it also operates a fortnightly kerbside collection of paper for 13,000 households, and a collection of paper and mixed cans using a split bodied vehicle for a further 13,000. In 1999/2000 it recycled 9% of its household waste, using DETR definitions, and 14% if rubble diversion and home composting are included.

3. Furthermore it is planning to shortly introduce a three stream collection system in the suburban areas, which would make it one of the leaders of diversion in Lancashire. The plan has two elements:

- to replace the paper collecting RCV by a new 6 compartment vehicle for multi material kerbside collection, and to refurbish the RCV to serve a further 26,000 households with a paper only collection. This would mean that nine tenths of the borough would be covered by a kerbside paper collection service. Materials would be taken to the small sorting and bulking facility at the Argyle Street Depot, before being dispatched for processing.

- to introduce organics collection for the areas currently served by the dry recyclable collection. The 14,000 households would be provided with a second 240 litre wheeled bin for kitchen organic and garden waste to be collected fortnightly on the same day as the dry recyclables. Residual waste would be collected on alternate weeks.

The aim is to reach 50% diversion of dustbin waste in the areas in question.

4. The challenge will be how to extend such a three stream system with multi material dry recyclable collection to the inner areas of the town. Currently these areas present a waste problem. There is considerable flytipping in the back alleyways between the terraces, and this has to be collected by a separate vehicle as part of the street cleansing service. Some of the fly tipping may come from traders. Some is bulky waste. The result

is that 10% of all household waste is collected as street sweepings, 7,400 tones in 1999/00, making it the second highest levels of street sweepings in Lancashire.

5. In addition, many of the houses have only small yards, so that there is less scope for home composting. The small housing size also means it is more difficult to store source segregated materials in the house or flat , or to house two 240 litre wheeled bins. The premium on space can be met in two ways. First by providing weekly rather than fortnightly collections – in this instance, for dry recyclables and for organics where space does not allow for two wheeled bins. In the latter case the existing wheeled bin could be used for organics, with residuals collected weekly from black sacks. Secondly the containers should be chosen to fit the space available. There are now a wide range of plastic boxes for example, from which householders could choose according to available space and preference.

6. A parallel approach can adopted for the high rise and multi occupancy buildings currently served by paladins. The most common method for dry recyclables in such buildings is to have bring banks, preferably close to the ground floor entrance. But there have been experiments going further than this which have estate cleaners/caretakers/ tenants or community groups providing regular door to door collection of recyclables and depositing the materials in the bring banks. A system of this kind has been successfully introduced by the London Borough of Hounslow.

7. What should be remembered in these cases is that ,while the density of accommodation poses some problems for recycling in terms of storage, it also offers substantial cost savings in collection, since houses are close to each other (minimising journey time between each) and the doorstep is close to the street or landing (thus cutting down time between the point of pick-up and the collection vehicle). The consequent savings can enhanced if collection is undertaken with the modern pedestrian controlled collection vehicle (PCV), now operating in the London Boroughs of Islington and Haringey, since the small electric cart can travel on the pavement and further minimise the gap between the point of pick up and the vehicle. The productivity gains and cost savings of the electrically powered PCVs means that collection frequency can be increased from fortnightly to weekly at modest extra cost. A weekly schedule also helps raise the participation and capture rates, in addition to easing the problem of in house storage.

8. The following tables set out the impact and costs of a range of recycling and composting schemes, including those using PCV's in the inner part of the town. It is estimated that the cost of introducing a weekly doorstep collection for dry recyclables would be £7 per household p.a., with a doorstep organics collection costing more than double that, (£17) because of larger vehicles and the low level of revenue assumed from compost sales. Set again this, however, are savings that can be made in the collection of residuals, which reduce incremental net system costs to £13 per hh p.a. by year 5.

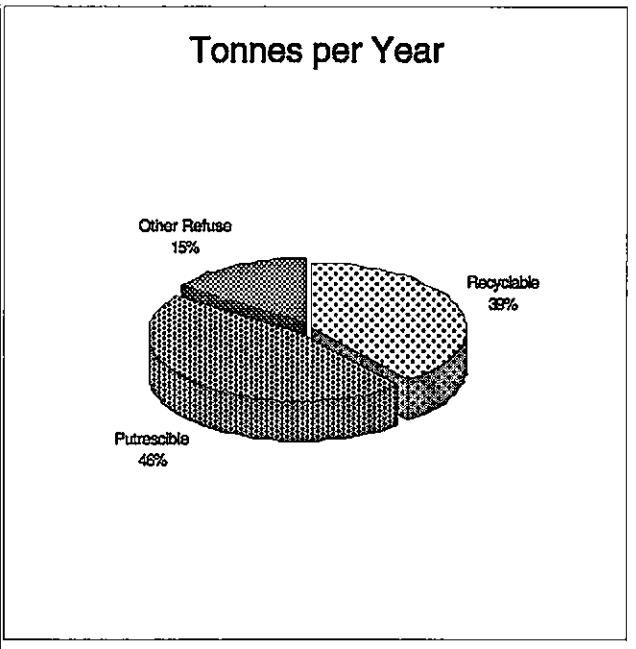
9. By the end of the transition period Preston would be diverting more than 47,000 tonnes of material, a diversion rate of 60%. This would lead to CO2 savings of 31,256 tonnes p.a. which is equivalent to taking 11,366 cars off the road.

Preston
Estimated Domestic Waste Composition

Total households:	56,900

Kerbside households:	54,900	Bins	2,000

Main Recyclables	%	kg/hld/yr	tonnes
news + PAMs	12.1%	97	5,528
household paper	3.5%	28	1,588
card packaging	3.5%	28	1,588
corrugated cardbd	1.5%	12	680
subtotal paper	*20.5%*	*165*	*9,384*
clear glass	4.3%	35	1,985
green glass	3.1%	25	1,418
brown glass	1.1%	9.0	510
subtotal glass	*8.6%*	*69*	*3,912*
steel cans	2.2%	18	1,021
aluminium cans	0.3%	2.2	125
aluminium foil	0.3%	2.5	145
aerosols	0.3%	2.5	142
subtotal cans etc.	*3.1%*	*25*	*1,432*
HDPE plastic	1.1%	8.5	482
PS plastic	0.4%	3.2	181
PET plastic	0.9%	7.0	397
PP plastic	0.3%	2.5	142
PVC plastic	0.1%	1.2	68
sacks & carrier bags	1.9%	15	851
subtotal plastics	*4.6%*	*37*	*2,121*
Textiles/shoes	2.5%	20	1,134
Total Main Recyclables	39.3%	316	17,982
Other Refuse			
other metals	0.4%	3	170
engine oil	0.1%	1	57
good jumble sale items	0.9%	7	397
clean wood items	0.3%	2	142
household batteries	0.1%	1	57
renovation waste	3.1%	25	1,418
plastic film	1.6%	13	737
other dense plastic	0.8%	6	369
nappies + other san.	3.7%	30	1,701
other glass	0.3%	2	142
non-recyclable/composta	0.4%	3	170
multi-layer pkg	0.9%	7	397
drink boxes	0.4%	3	170
miscellaneous other	1.9%	15	851
fines	0.5%	4	227
Total Other Refuse	15.3%	123	7,002
Putrescibles			
Central compost			
compostable paper (NR)	2.5%	20	1,134
animal waste	2.5%	20	1,134
meat, bones, etc.	3.5%	28	1,588
subtotal central compost	*8.4%*	*68*	*3,856*
Home compost			
compostable kitchen	18.6%	149	8,505
garden waste	18.3%	147	8,385
subtotal home compost	*36.9%*	*297*	*16,890*
Total Organic Waste	45.4%	365	20,746
Total Waste Stream	100.0%	804	45,730



Summary	tonnes	%
Recyclable	17,982	39%
Putrescible	20,746	45%
Other Refuse	7,002	15%
Total	45,730	100%

Residential	45,730	62%
CA Site	11,372	15%
Non resid in hhv	9,892	13%
Special/SS	7356	10%
Other Waste	0	0%
Domestic Waste	**74,350**	**100%**
Trade Waste: W	5,278	
Total Waste	**79,628**	

Preston
Organic Systems

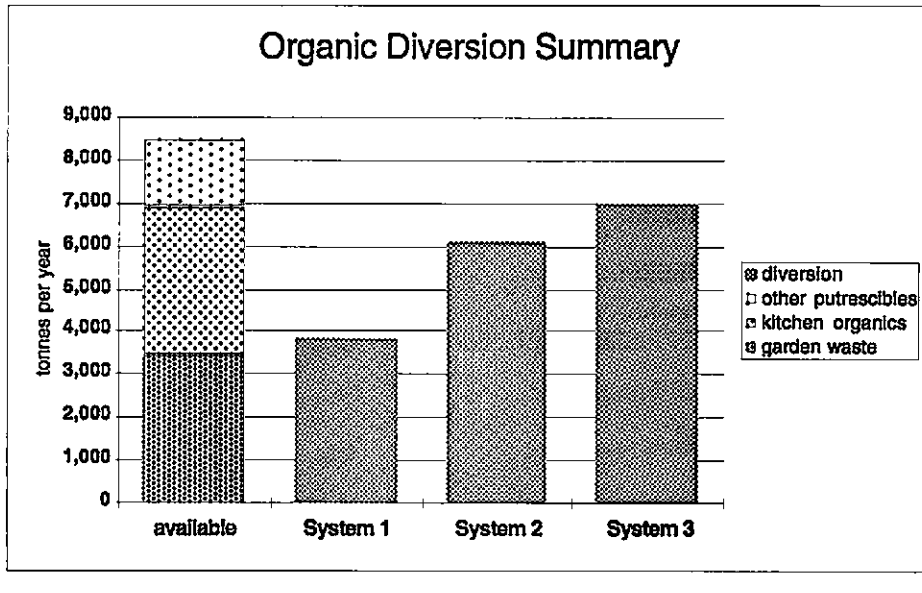
Organic material available	kg/hhld	tonnes	kg/hhld	tonnes	total tonnes
garden waste	150	8,235	75	150	8,385
kitchen organics	150	8,235	135	270	8,505
other putrescibles	68	3,733	61	122	3,856
total	368	20,203	271	542	20,746

System 1	participation	tonnes	% hhlds	tonnes	total tonnes
free home composters	67%	2,575	10%	14	2,589
seasonal garden waste	80%	6,588	30%	45	6,633
% & tonnes organic diversion	46%	9,163	11%	59	9,222
					44%

System 2	participation	tonnes	% hhlds	tonnes	total tonnes
home composters	40%	1,318	10%	14	1,332
fortnightly organics	80%	13,176	60%	252	13,428
% & tonnes organic diversion	72%	14,494	49%	266	14,760
					71%

System 3 Preferred System	participation	tonnes	% hhlds	tonnes	total tonnes
home composters	40%	1,537	10%	14	1,551
weekly putrescible collection	80%	16,163	70%	380	16,542
% & tonnes organic diversion	88%	17,700	73%	394	18,093
					87%

Organic Diversion Summary	available	System 1	System 2	System 3
garden waste	8,385			
kitchen organics	8,505			
other putrescibles	3,856			
diversion		9,222	14,760	18,093

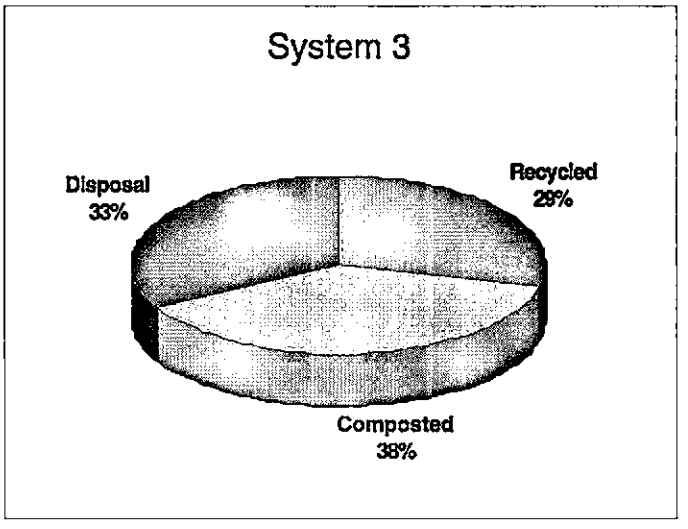


Preston

Recycling Diversion Rates

household type	kerbside	multi occup	
household units	54,900	2,000	
capture rate	75%	50%	tonnes
Main Recyclables			
news + PAMs	4,015	88	4,102
household paper	1,153	25	1,178
card packaging	1,153	25	1,178
corrugated cardbd	494	11	505
subtotal paper	*6,814*	*149*	*6,963*
clear glass	1,441	25	1,466
green glass	1,029	18	1,047
brown glass	371	6	377
subtotal glass	*2,841*	*50*	*2,891*
steel cans	741	16	757
aluminium cans	91	2	93
aluminium foil	105	2	107
aerosols	103	2	105
subtotal cans etc.	*1,040*	*23*	*1,062*
HDPE plastic	350	8	358
PS plastic	132	3	135
PET plastic	288	6	295
PP plastic	103	2	105
PVC plastic	49	1	50
sacks & carrier bags	618	14	631
subtotal plastics	*1,540*	*34*	*1,574*
Textiles/shoes	824	18	842
Total Main Recyclables	12,956	271	13,226

System Diversion			
	System 1	**System 2**	**System 3**
Organic Diversion	9,222	14,760	18,093
Recycling	13,226	13,226	13,226
Total Diversion	22,448	27,986	31,320
Percent Diversion	49%	61%	68%
Refuse to Landfill	23,282	17,744	14,411



Preston

Waste arisings in kg per hh p.a.							hhlds	56900
Working Area			MEL Based					
Main Recyclable	Kerbside	Multi occup	total * 1.25	Total	kg/hh/week	MEL	Bring+Kerb	CA site
news + PAMs	97.50	87.75	85.01	68.01	0.73	37.96	25.75	4.30
household paper	28.00	25.20	31.20	24.96	0.48	24.96		
card packaging	28.00	25.20	23.40	18.72	0.36	18.72		
corrugated cardbd	12.00	10.80	11.70	9.36	0.18	9.36		
subtotal paper	*165.50*	*148.95*	0.00	0.00		0.00		
clear glass	35.00	31.50	36.62	29.30	0.50	26.00	2.82	0.48
green glass	25.00	22.50	16.60	13.28	0.21	10.92	2.01	0.34
brown glass	9.00	8.10	5.61	4.49	0.07	3.64	0.72	0.12
subtotal glass	*69.00*	*62.10*	0.00	0.00		0.00		
steel cans	18.00	16.20	27.66	22.13	0.42	21.84	0.29	
aluminium cans	2.20	1.98	2.64	2.11	0.04	2.08	0.03	
aluminium foil	2.55	2.30	1.30	1.04	0.02	1.04		
aerosols	2.50	2.25	1.30	1.04	0.02	1.04		
subtotal cans etc.	*25.25*	*22.73*	0.00	0.00		0.00		
HDPE plastic	8.50	7.65	7.15	5.72	0.11	5.72		
PS plastic	3.20	2.88	0.00	0.00		0.00		
PET plastic	7.00	6.30	6.50	5.20	0.10	5.20		
PP plastic	2.50	2.25	0.00	0.00		0.00		
PVC plastic	1.20	1.08	0.65	0.52	0.01	0.52		
sacks & carrier bags	15.00	13.50	12.35	9.88	0.19	9.88		
subtotal plastics	*37.40*	*33.66*	14.95	11.96	*0.23*	11.96		
Textiles/shoes	20.00	18.00	34.83	27.87	0.52	27.04	0.60	0.22
Total Main Recyclables	317.15	285.44	0.00	0.00		0.00		
Other Refuse			0.00	0.00		0.00		
other metals	3.00	2.70	5.20	4.16	0.08	4.16		
engine oil	1.00	0.90	0.00	0.00		0.00		
good jumble sale items	7.00	6.30	0.00	0.00		0.00		
clean wood items	2.50	2.25	0.00	0.00		0.00		
household batteries	1.00	0.90	0.65	0.52	0.01	0.52		
renovation waste	25.00	22.50	16.90	13.52	0.26	13.52		
plastic film	13.00	11.70	12.35	9.88	0.19	9.88		
other dense plastic	6.50	5.85	12.35	9.88	0.19	9.88		
nappies + other san.	30.00	27.00	13.65	10.92	0.21	10.92		
other glass	2.50	2.25	5.85	4.68	0.09	4.68		
non-recyclable/compos	3.00	2.70	1.53	1.22	0.02	1.22		
multi-layer pkg	7.00	6.30	0.00	0.00		0.00		
drink boxes	3.00	2.70	0.00	0.00		0.00		
miscellaneous other	15.00	13.50	13.00	10.40	0.20	10.40		
fines	4.00	3.60	19.50	15.60	0.30	15.60		
Total Other Refuse	123.50	111.15	0.00	0.00		0.00		
Putrescibles			0.00			0.00		
Central compost			0.00	0.00		0.00		
compostable paper (N	20.00	18.00	10.17	8.14	0.16	8.14		
animal waste	20.00	18.00	0.00	0.00		0.00		
meat, bones, etc.	28.00	25.20	76.70	61.36	1.18	61.36		
subtotal central compost	68.00	61.20	0.00	0.00		0.00		
Home compost			0.00	0.00		0.00		
compostable kitchen	150.00	135.00	102.05	81.64	1.57	81.64		
garden waste	150.00	75.00	171.91	137.52	**2.06**	107.12		30.40
subtotal home compost	300.00	210.00	0.00	0.00		0.00		
Total Organic Waste	368.00	271.20	0.00	0.00		0.00		
Total Waste Stream	808.65	667.79	781.28	625.03	10.71	556.92	32.23	35.88

Preston

CO2 Reduction		
	tonne / tonne	Kerbside CO2
newspaper	2.54	10,433
glass	0.36	1,050
ferrous	2.34	1,773
aluminium	11.63	2,325
PET	2.56	754
OCC	2.99	1,508
boxbd/mixed paper	1.49	1,749
Rigid plastic	2.06	1,057
sacks/carrier bags	2.06	1,299
PS	2.06	277
Textiles	1.50	1,262
Total Recycling		**23,489**
kitchen waste	0.61	8,272
yardwaste	0.00	
NR paper	1.49	
NR glass	0.36	
NR ferrous	2.34	
NR non-ferrous	11.63	
NR plastic	2.06	
nappies + sanitary	2.06	
ceramics	0.10	
building & reno	0.20	
HHW + pharm.	0.00	
animal waste	2.00	
other	0.10	
Total other		8,272
TOTAL REDUCTION		31,761

kg from CA site	total	textiles		glass	paper	green
Ingol	13,414,000	12,700		54,000	244,880	1,730,000
	13,414,000	12,700		54,000	244,880	1,730,000

generation	
landfill	50,457
ss/CA	7,356
trade	5,278
	63,091
LA recycling	2,116
3rd party Recycling	991
	3,107
total less ss'CA	53,564
hhlds	56,900
kg/hhld	941
MEL kg/hhld	557
difference	41%
Model	804
difference	15%

Preston		Recycling Programme						
		1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
	kg/hhld/yr			tonnes	tonnes	tonnes	tonnes	tonnes
Recyclables								
news & PAMS	97			1,795	2,818	3,259	3,659	3,931
other paper	68			1,258	1,975	2,285	2,565	2,758
glass	69			1,277	2,004	2,318	2,603	2,796
cans	25			463	726	840	943	1,013
plastic	37			685	1,075	1,243	1,396	1,499
textiles	20			370	581	672	755	811
total recyclables	316			5,846	9,180	10,618	11,921	12,806
Collection With PCVs	target							
new vehicles				5	2	1	0	0
total vehicles	8		0	5	7	8	8	8
number of hhlds	27500			15,000	24,500	28,000	28,000	28,000
capture rate	75%			30%	50%	50%	60%	70%
material captured	6,518			1,422	3,871	4,424	5,309	6,194
weekly (5) or fortnightly (10)	5			5	5	5	5	5
pass-bys/day	750			600	700	700	700	700
tonne/vehicle-day	3.13			1.09	2.13	2.13	2.55	2.98
Collection with stillages	target							
new vehicles				2	0	0	2	0
total vehicles	3		2	4	4	4	6	6
number of hhlds	27500			28,000	28,000	28,000	27,900	27,900
capture rate	75%			50%	60%	70%	75%	75%
material captured	6,518			4,424	5,309	6,194	6,612	6,612
weekly (5) or fortnightly (10)	5			10	10	10	5	5
pass-bys/day	800			700	700	700	930	930
tonne/vehicle-day	8.36			4.25	5.10	5.96	4.24	4.24

Material Sales

	£ / tonne		2000/01	2001/02	2002/03	2003/04	2004/05
news & PAMS	£25		£44,863	£70,446	£81,460	£91,483	£98,273
other paper	£15		£18,870	£29,631	£34,272	£38,480	£41,336
glass	£10		£12,765	£20,045	£23,184	£26,030	£27,962
cans	£20		£9,250	£14,525	£16,800	£18,863	£20,263
plastic	£0		£0	£0	£0	£0	£0
textiles	£85		£31,450	£49,385	£57,120	£64,133	£68,893
total recyclables			£117,198	£184,032	£212,856	£238,988	£256,726
£ per tonne			£20.05	£20.05	£20.05	£20.05	£20.05

Preston	Organics Programme							
		1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
	kg/hhld/yr			tonnes	tonnes	tonnes	tonnes	tonnes
Organic								
garden waste	147			1,858	3,981	5,662	5,662	5,662
home compostables	149			1,648	3,507	5,366	6,206	6,922
other compostables	68			492	1,229	1,967	2,295	2,623
other paper	0			in above	in above	in above	in above	in above
total compostables	365			3,997	8,718	12,995	14,163	15,206
home composting								
new units				1000	2000	2000	1000	0
total units			3600	4600	6600	8600	9600	9600
kg/unit			125	125	125	125	125	125
tonnes diverted			450	575	825	1075	1200	1200
kerbside organics 1								
new vehicles				3	3	2	0	0
total vehicles			0	3	6	8	8	8
number of hhlds				18,000	36,000	48,000	48,000	48,000
garden waste capture rate				70%	75%	80%	80%	80%
garden waste capture				1,858	3,981	5,662	5,662	5,662
Organics capture rate				40%	50%	60%	70%	80%
Organics material captured				1,073	2,682	4,291	5,006	5,722
weekly (5) / fortnightly (10)				5	5	5	5	5
pass-bys/day				1,200	1,200	1,200	1,200	1,200
other compostables				492	1,229	1,967	2,295	2,623
organics kerbside				3,422	7,893	11,920	12,963	14,006
tonne/vehicle-day				4.39	5.06	5.73	6.23	6.73
kerbside organics 2								
new vehicles				0	0	0	0	0
total vehicles			0	0	0	0	0	0
number of hhlds				0	0	0	0	0
garden waste capture rate				80%	85%	90%	95%	95%
garden waste capture				0	0	0	0	0
Organics capture rate				50%	60%	70%	85%	85%
Organics material captured				0	0	0	0	0
weekly (5) / fortnightly (10)				5	5	5	5	5
pass-bys/day				1,000	900	900	900	900
other compostables				0	0	0	0	0
organics kerbside				0	0	0	0	0
tonne/vehicle-day								

Total central tonnage				2000/01	2001/02	2002/03	2003/04	2004/05
garden waste				1,858	3,981	5,662	5,662	5,662
mixed organics				1,073	2,682	4,291	5,006	5,722
other compostables				492	1,229	1,967	2,295	2,623
Total Organics				3,422	7,893	11,920	12,963	14,006

Preston	Other Systems

Other Systems	Base tonnes	1998/99 tonnes	1999/00 tonnes	2000/01 tonnes	2001/02 tonnes	2002/03 tonnes	2003/04 tonnes	2004/05 tonnes
CA Site								
% diversion			50%	50%	55%	56%	60%	70%
tonnes per year	13,414		13,414	6,707	7,378	7,512	8,048	9,390
Special collections								
% diversion			0%	10%	30%	40%	50%	50%
tonnes per year	840		4000	84	252	336	420	420
Trade & Institutional								
% diversion			0%	10%	20%	35%	45%	55%
tonnes per year	15170		5278	1,517	3,034	5,310	6,827	8,344
Domestic Refuse								
tonnes per year	50,457		50,457	32,845	24,991	19,375	17,104	15,476
weekly (5) /fortnightly (10)	5		5	5	5	5	10	10
pass-bys per vicle-day	1,100		1,100	1,200	1,300	1,400	900	950
households	55,000		55,000	55,000	55,000	55,000	55,000	55,000
number of vehicles	10		10	9.17	8.46	7.86	6.11	5.79

Preston	Tonnage Summary								
	Target		1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
tonnes per year	%	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Recycling									
kerbside recycling	75%	13,226		1,854	5,846	9,180	10,618	11,921	12,806
bring recycling	0%	0		1,253	1,000	800	700	500	200
home composting	7%	1,551		450	575	825	1,075	1,200	1,200
central composting	75%	15,532		0	3,422	7,893	11,920	12,963	14,006
CA site recycling	70%	9,390		6,649	6,707	7,378	7,512	8,048	9,390
Specials recycling	50%	420		0	84	252	336	420	420
Trade recycling	50%	8,344		0	1,517	3,034	5,310	6,827	8,344
Street sweeping recycling	20%	1,955		0	0	0	652	977	1,303
total recycling	**63%**	50,417		10,206	19,151	29,361	38,122	42,857	47,669
Disposal									
residential refuse	31%	13,379		50,007	32,845	24,991	19,375	17,104	15,476
CA site disposal	30%	4,024		6,765	6,707	6,036	5,902	5,366	4,024
Specials disposal	50%	420		840	756	588	504	420	420
trade disposal	50%	6,827		5,278	13,653	12,136	9,861	8,344	6,827
Street sweeping	80%	4,561		6,516	6,516	6,516	5,864	5,539	5,213
total disposal	**37%**	29,211		69,406	60,477	50,267	41,506	36,771	31,959
Total Arisings		79,628		79,612	79,628	79,628	79,628	79,628	79,628
Percent Diversion		**63%**		**13%**	**24%**	**37%**	**48%**	**54%**	**60%**

Preston — Capital Costs

			1999/00		2000/1		2001/2		2002/3		2003/4		2004/5	
	unit cost	life	units	cost	units	cost	units	cost	units	cost	units	cost	units	cost
Recycling														
recycling bins	£3.00	10			43,000	£129,000	9,500	£28,500	3,500	£10,500	0	£0	0	£0
bring banks												£0		£0
recycling trucks (PCVs)	£8,000	7	1		5	£40,000	2	£16,000	1	£8,000	0	£0	0	£0
stillage trucks (system 2)	£45,000	7	1		2	£90,000	0	£0	0	£0	2	£90,000	0	£0
other vehicles	£0	5			0	£0	0	£0		£0		£0		£0
HIAB trucks	£35,000	7			1	£35,000	1	£35,000		£0		£0		£0
MRF land	£300,000				0	£0		£0		£0		£0		£0
MRF building	£600,000	20			0	£0		£0		£0		£0		£0
MRF equipment	£400,000	20			0	£0		£0		£0		£0		£0
total MRF	£1,300,000					£0		£0		£0		£0		£0
Total Recycling						£294,000		£79,500		£18,500		£90,000		£0
Composting														
composters	£15	10			1,000	£15,000	2,000	£30,000	2,000	£30,000	1,000	£15,000	0	£0
organic wheelies	£20	15			18,000	£360,000	18,000	£360,000	12,000	£240,000	0	£0	0	£0
organics trucks 1	£130,000	7			3	£390,000	3	£390,000	2	£260,000	0	£0	0	£0
organics trucks 2	£130,000	7			0	£0	0	£0	0	£0	0	£0	0	£0
windrow composting		20				£0		£0		£0		£0		£0
in-vessel composting site	£300,000					£0	0	£0		£0		£0		£0
in-vessel building	£750,000	18				£0	0	£0		£0		£0		£0
in-vessel equipment	£750,000	18				£0	0	£0		£0		£0		£0
total in-vessel composting	£1,800,000					£0		£0		£0		£0		£0
Total Composting						£765,000		£780,000		£530,000		£15,000		£0
Refuse														
refuse vehicles	£130,000	7			2	£260,000	1	£130,000	1	£130,000		£0		£0
refuse wheelies	£15	15				£0		£0		£0		£0		£0
trade/special refuse bins						£0		£0		£0		£0		£0
trade/special vehicles	£120,000	7				£0		£0		£0		£0		£0
other						£0		£0		£0		£0		£0
Total Refuse						£260,000		£130,000		£130,000		£0		£0
Total						£1,319,000		£989,500		£678,500		£105,000		£0

					2000/1		2001/2		2002/3		2003/4		2004/5	
Leasing Alternative	unit cost	life	Lease factor	0.20	units	lease cost	units	lease cost	units	lease cost	units	lease cost	units	lease cost
recycling bins	£3	10	0.00		43,000	£0	9,500	£0	3,500	£0	0	£0	0	£0
recycling trucks (PCVs)	£8,000	7	0.20		5	£8,000	2	£3,200	1	£1,600	0	£0	0	£0
stillage trucks (system 2)	£45,000	7	0.20		2	£18,000	0	£0	0	£0	2	£18,000	0	£0
other vehicles	£0	5	0.20		0	£0	0	£0	0	£0	0	£0	0	£0
HIAB trucks	£35,000	7	0.20		1	£7,000	1	£7,000	0	£0	0	£0	0	£0
Total Recycling						£33,000		£10,200		£1,600		£18,000		£0
composters	£15	10	0.00		1,000	£0	2,000	£0	2,000	£0	1,000	£0	0	£0
organic wheelies	£20	15	0.00		18,000	£0	18,000	£0	12,000	£0	0	£0	0	£0
organics trucks 1	£130,000	7	0.20		3	£78,000	3	£78,000	2	£52,000	0	£0	0	£0
organics trucks 2	£130,000	7	0.20		0	£0	0	£0	0	£0	0	£0	0	£0
Total Composting						£78,000		£78,000		£52,000		£0		£0
refuse vehicles	£130,000	7	0.20		10	£260,000	1	£26,000	1	£26,000	0	£0	0	£0
refuse wheelies	£15	15	0.20		0	£0	0	£0	0	£0	0	£0	0	£0
Total Refuse						£260,000		£26,000		£26,000		£0		£0

New Lease Costs by Year	£371,000	£114,200	£78,600	£18,000	£0
Annual Lease Payments	£371,000	£485,200	£564,600	£582,600	£582,600

		2000/01	2001/02	2002/03	2003/04	2004/05
Recycling	capital	£129,000	£28,500	£10,500	£0	£0
	lease	£33,000	£43,200	£44,800	£62,800	£62,800
Composting	capital	£375,000	£390,000	£270,000	£15,000	£0
	lease	£78,000	£156,000	£208,000	£208,000	£208,000
Refuse	capital	£0	£0	£0	£0	£0
	lease	£260,000	£288,000	£312,000	£312,000	£312,000
Total Capital		£504,000	£418,500	£280,500	£15,000	£0
Total Lease		£371,000	£485,200	£564,800	£582,800	£582,800
Total Annual		£875,000	£903,700	£845,300	£597,800	£582,800