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Business Growth Report, June 2007

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# An Analysis of MSW MRF Capacity in the UK

An Assessment of Availability, Requirements, and  
Potential Opportunities for New Facilities

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# Executive summary

Materials Recovery Facilities (MRFs) have a key role to play in the creation of high-quality/high value recycle streams that can be used as feedstock materials by a range of industries.

This report summarises initial WRAP-funded research into the availability of (and possible local bottlenecks in) MRF capacity able to sort dry recyclables produced as part of the Municipal Solid Waste (MSW) and Commercial and Industrial (C&I) waste streams.

- The study found that MSW MRF capacity in the UK currently totals around 2.5M tonnes per annum; another 0.6M tonnes has secured planning consent but is not yet operational. For a range of reasons, practical MRF capacity is likely to be significantly less than this headline figure.
- In 2006, it is estimated that the MSW stream utilised 55% of available MRF capacity. The scenarios in this report suggest that this could increase to around 70% in 2010 and nearly 100% in 2015. These figures do not take into account C&I waste also utilising capacity at these MRFs.
- The report shows an imbalance between the point of arisings of dry recyclables and the location of capacity capable of sorting them. Further difficulties can exist if there is a mismatch between MRFs' sorting capabilities and local authority collection strategies.
- At a regional level, the West Midlands currently has insufficient MRF capacity to deal with its co-mingled dry recyclables. By 2010 & 2015, this may become even more acute, similar problems are likely to develop in the North East, the North West, Yorkshire and the Humber, the East Midlands and the East of England by 2010, and in the South West by 2015.
- Investment in new MRF capacity is likely to be needed in some areas – a situation exacerbated by the potential obsolescence of a significant proportion of current UK MRF capacity. Further investment in expanding and improving some existing facilities may also be appropriate. In both cases, it will be essential to ensure that the sorted materials produced by MRFs are of a quality that meets reprocessors' requirements.
- More work is required to identify and confirm specific investment opportunities. Close co-operation between local authorities and MRF developers is vital to ensuring the viability of any new MRF investments.

The research was undertaken by Optimat Ltd in partnership with Biggar Economics Ltd. Demand data was based on April 2005 to March 2006 figures reported in Defra's WasteDataFlow system ([www.defra.gov.uk/environment/statistics/wastats/wdf.htm](http://www.defra.gov.uk/environment/statistics/wastats/wdf.htm)); estimated MRF capacity was as of the end of January 2007.

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## 1.0 Introduction

Local authorities are collecting increasing amounts of recyclable materials across England, Wales, Scotland and Northern Ireland – a trend that must continue if the UK is to continue meeting its Landfill Directive targets. A growing number of local authorities are introducing schemes for collection of co-mingled dry recyclables either because kerbside recycling is difficult to implement in their areas or to boost recycling rates. This strategy critically depends on the availability of high-quality sorting capacity that can separate the collected materials to the necessary quality and maximise their resale value.

This report summarises the findings of a WRAP study, carried out in 2006/07 by Optimat Ltd in partnership with Biggar Economics Ltd, which set out to:

- identify current/planned MRF capacity capable of sorting co-mingled dry recyclables collected as part of the MSW stream;
- assess the ability of the UK's MRF capacity to meet demand for dry recyclable sorting capacity now and in the future; and
- provide an indication of areas where there might be the need/opportunity to invest in new, high-quality MRF capacity.

The following definitions are used throughout this report:

- MRFs are facilities that separate clean, dry co-mingled materials into individual material streams and prepare them for sale to commodity markets;
- MSW is waste collected by (or on behalf of) local authorities from households and civic amenity sites, trade premises, and some other non-household waste (e.g. local authority parks & garden waste); and
- dry recyclables are paper, card, plastics, glass, and steel or aluminium cans
- co-mingled waste streams comprise multiple types of material that are collected together;
- single materials comprise materials that have undergone some degree of front-end sorting but offer potential for further sorting (e.g. mixed coloured glass, mixed plastics etc).

The projections produced by the study are not intended to be precise predictions but initial indications that help to highlight where future needs and opportunities might arise. These will require verification through detailed follow-up research.

## 2.0 Course of work

The study's findings were based on an analysis of (i) information provided by MRF operators and (ii) a wide range of authoritative published information (e.g. waste arisings data generated by Defra's WasteDataFlow project). In addition, an economic model specifically developed for the project estimated future arisings and collection volumes of co-mingled dry recyclables.

Comparisons of demand for MRF capacity and available MRF capacity were produced, showing the situation in 2006, with predictions for 2010 and 2015, for each part of the UK – 36 areas in all, based on the Nomenclature of Territorial Units for Statistics (NUTS) 2 areas established by Eurostat.

These areas were also aggregated into regions, to produce broad conclusions about MRF availability and the potential need for investment in additional capacity. In parallel, the UK's overall performance in MSW management and recycling was compared with other countries worldwide.

## 3.0 Dry recyclables: arisings & collection

In 2005/06:

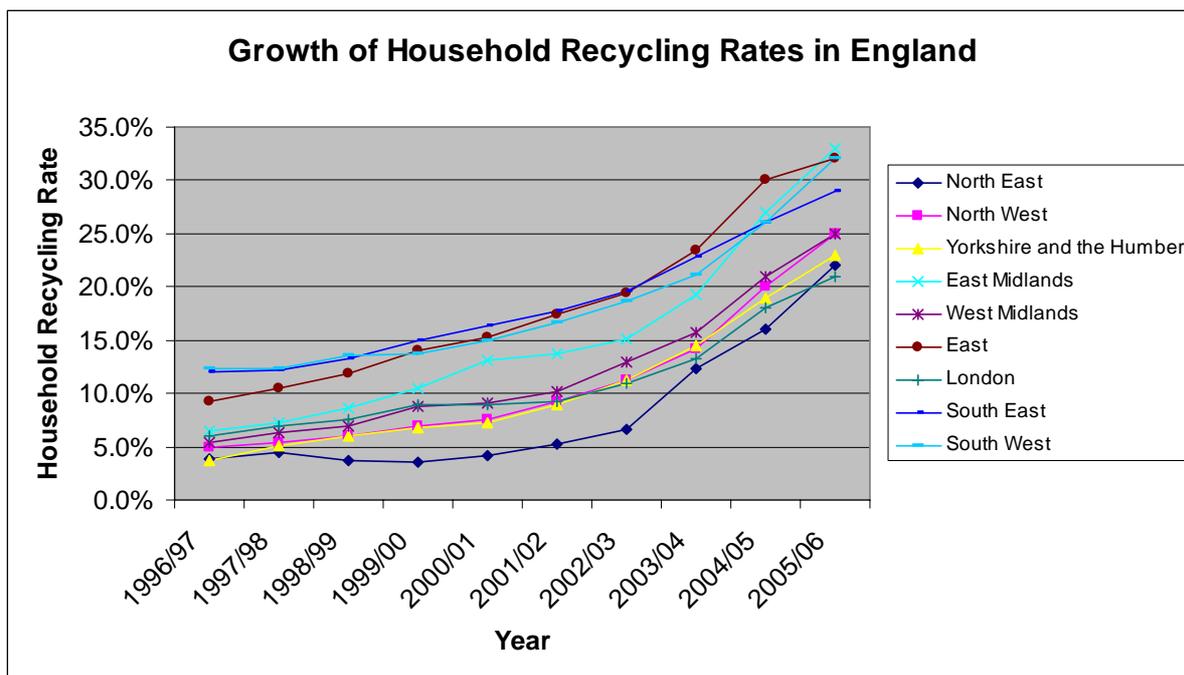
- total MSW dry recyclable arisings across the UK reached an estimated 11.6M tonnes;
- around 3.9M tonnes of this was collected by(or on behalf of) UK local authorities;
- around 1.36M tonnes was delivered to UK MRFs for sorting; and
- an estimated 0.5M tonnes of C&I waste (based on anecdotal evidence) was also processed at these MRFs.

Looking ahead, significant growth in the collection of dry recyclables can be expected, driven by changes in collection trends and increased consumer participation in kerbside schemes.

Overall household recycling rates and local authority introduction of co-mingled dry recyclable collections are both showing a strong upward trend, with obvious implications for UK MRF capacity.

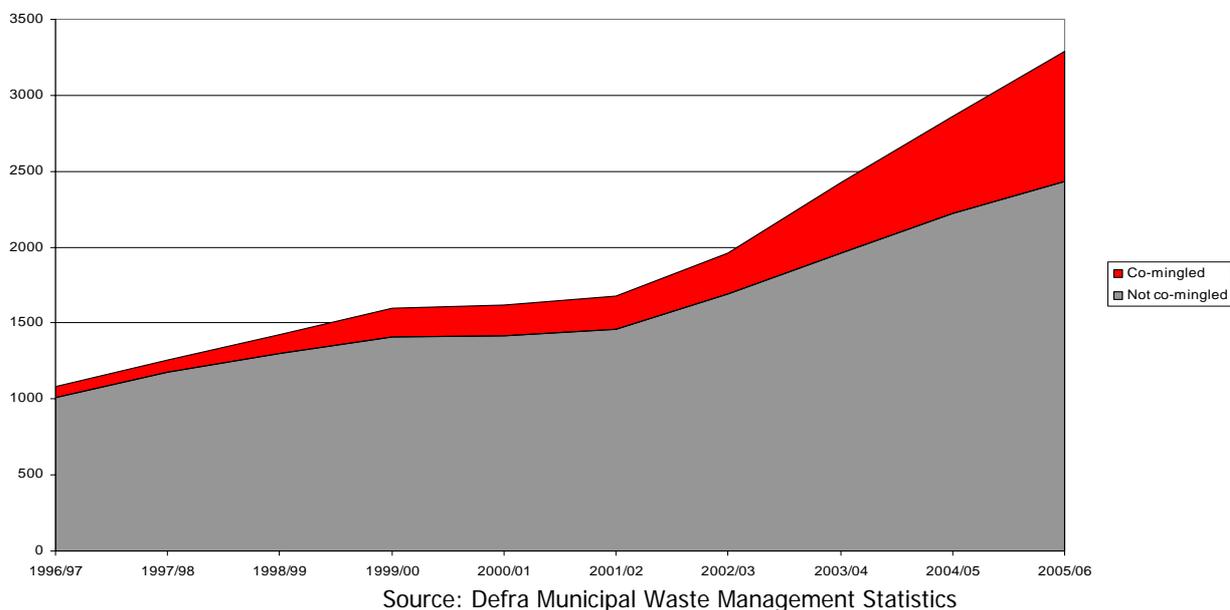
The following two graphs (covering England only) underline these trends:

## Overall Household Recycling Rates



Source Defra Municipal Waste Management Statistics

## Growth in co-mingled collections in England (kT)



## 4.0 MRF capacity: existing availability

In 2006, total UK MRF capacity was around 2.5M tonnes per annum, representing the combined capacities of 82 facilities:

- 28% were larger MRFs (>50,000 tonnes per annum) totalling 1.6M tonnes per annum; and
- 72% were smaller MRFs (<50,000 tonnes per annum) totalling 0.9M tonnes per annum.

The following table shows the geographical location of this capacity:

### MRF capacity by NUTS 2 area

NUTS 2 Area	Total capacity (excl single material)	Without glass*	With glass**	Paper only	Cans only	Glass only	Not defined
<i>Tees Valley and Durham</i>							
<i>Northumberland and Tyne and Wear</i>	36		36				
<i>Cumbria</i>							
<i>Cheshire</i>	5	5				15	
<i>Greater Manchester</i>							
<i>Lancashire</i>	98	50	48				
<i>Merseyside</i>	13		13				
<i>East Riding and North Lincolnshire</i>	15	15					
<i>North Yorkshire</i>	80	50	30				
<i>South Yorkshire</i>				25			
<i>West Yorkshire</i>	50	50					
<i>Derbyshire and Nottinghamshire</i>	4		4				
<i>Leicestershire, Rutland and N'ptonshire</i>	122	82	40				
<i>Lincolnshire</i>	75		75				
<i>Herefordshire, Worcestershire and Warks</i>	16	16					
<i>Shropshire and Staffordshire</i>					2		
<i>West Midlands</i>							
<i>East Anglia</i>	176	176					
<i>Bedfordshire and Hertfordshire</i>	75	62	13				
<i>Essex</i>	19	12	7				
<i>London</i>	396	156	240				
<i>Berkshire, Bucks and Oxfordshire</i>	193	193		23			
<i>Surrey, East and West Sussex</i>	95	67	29				
<i>Hampshire and Isle of Wight</i>	157	157				100	
<i>Kent</i>	83	83					
<i>Gloucs, Wiltshire and North Somerset</i>	32		32				
<i>Dorset and Somerset</i>	22		22				
<i>Cornwall and Isles of Scilly</i>	57		57				
<i>Devon</i>	33	18	15				
<b>Sub-total England</b>	<b>1,853</b>	<b>1,192</b>	<b>661</b>	<b>48</b>	<b>2</b>	<b>115</b>	<b>0</b>
<i>North Eastern Scotland</i>	88	13	75				
<i>Eastern Scotland</i>	75	75					110
<i>South Western Scotland</i>	87	45	42				

<b>Highlands and Islands</b>	20	20					
<b>Sub-total Scotland</b>	<b>270</b>	<b>153</b>	<b>117</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>110</b>
<b>West Wales and The Valleys</b>	115	30	85				
<b>East Wales</b>	145	45	100				60
<b>Sub-total Wales</b>	<b>260</b>	<b>75</b>	<b>185</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>
<b>Northern Ireland</b>	116	108	8				
<b>Totals</b>	<b>2,498</b>	<b>1,528</b>	<b>970</b>	<b>48</b>	<b>2</b>	<b>115</b>	<b>170</b>

\*Contains some textiles

\*\*Contains some green waste, timber and textiles

## 2006 MRF Capacity (kT) by material input by NUTS 2 Area

Note: NUTS 2 areas = Nomenclature of Territorial Units for Statistics 2 areas established by Eurostat

In addition:

- seven MRFs were identified which had secured planning permission but were not yet operational (total capacity around 0.6M tonnes per annum); and
- five MRFs that only handle single materials and three MRFs where the material inputs could not be verified during the survey were not included in the total.

The total capacity figure of 2.5M tonnes per annum may significantly overstate actual operational capacity, because:

- while six facilities dealing mainly in C&I waste were excluded, the amount of C&I waste processed at other MRFs is thought to total around 0.5M tonnes per annum; and
- some capacities reported by MRF operators may have been licensed site capacities, rather than operational capacities.

Moreover, local authority collection strategies can have a key impact on whether sufficient MRF capacity is available in a particular part of the country. For example, including glass in a co-mingled collection round in an area where MRFs are not designed to sort material containing glass may necessitate transporting the material to a facility a considerable distance away that can handle glass.

The study also established that, in 2005/06:

- gate fees at MRFs ranged from £28 to £50 per tonne;
- average sorting costs are strongly influenced by the degree of sorting achieved and ranged from £10 to £65 per tonne;
- MRFs were applying significantly differing degrees of refinement in their sorting operations;
- UK-based reprocessing of MRF sorted materials co-existed alongside export of separated materials;
- residue percentages ranged from around 5% to 17%, consisting of contaminants in the collected material and materials unable to be sorted;
- most residue material was landfilled, but in some cases energy from waste (EfW) and incineration processes were preferred;
- landfill costs, incurred as a result of residue disposal, ranged from around £40 to £61 per tonne; and
- in some cases, no formal contracts covered the supply of materials to MRFs, but elsewhere contracts of up 28 years' duration were in place.

## 5.0 MRF capacity v future demand

The economic model produced indications of the possible situation in 2010 and 2015, compared with the situation in 2005/06. In terms of scenarios, it was assumed that:

- 12% of dry recyclables were sent to MRFs in 2005/06;
- 16% of dry recyclables would be sent to MRFs in 2010; and
- 20% of dry recyclables would be sent to MRFs in 2015.

The model assumed that steady increases in UK recycling would lead to achievement of the 45% recycling target for 2015 referred to in Defra's Waste Strategy 2007.

Demand created from the C&I waste stream of an estimated 0.5M tonnes per annum of was excluded from the analysis. It should also be noted that the actual operational capacity is affected by a combination of both equipment and labour availability.

It is important to note that the scenarios for 2010 and 2015 could be conservative positions. If current trends continue, quantities of dry recyclables collected and the proportion of co-mingled collections could be higher than the scenarios' assumptions.

The results produced by the model showed that:

- by 2010, for the UK as a whole, dry recyclable arisings increase to 13.3M tonnes; and
- by 2015, for the UK as a whole, dry recyclable arisings increase to 15.4M tonnes.

The following table shows the range of predicted percentage increases in dry recyclables collected:

### Potential increases in dry recyclables collected (base year 2005/06)

	<b>By 2010</b>	<b>By 2015</b>
Increase across individual NUTS 2 areas	Between 22% and 93%	Between 32% and 142%
Representing an increase across the UK as a whole	46%	75%

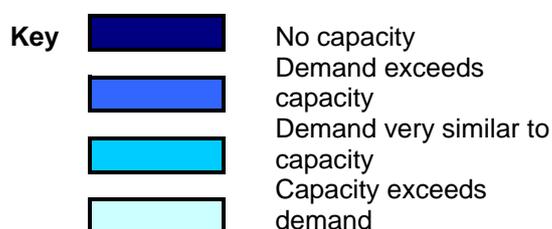
The model then assessed demand for MRF capacity against available capacity by NUTS 2 area, producing the following results:

- in 2006, around 55% of total MRF capacity was utilised and over 30% of areas had insufficient capacity;
- in 2010, around 70% of total MRF capacity is utilised and almost 45% of areas have insufficient capacity, with a number of others close to capacity; and
- in 2015, nearly all MRF capacity is utilised and almost 60% of areas have insufficient capacity, with a number of others close to capacity.

Both the 2010 and 2015 calculations took into account MRF capacity granted planning consent but currently not yet operational. The scenario excludes any further capacity expansion beyond that already in progress. The following table summarises the results:

### Summary of demand/capacity scenarios

NUTS 2 Area	2006	2010	2015
Tees Valley and Durham			
Northumberland and Tyne and Wear			
Cumbria			
Cheshire			
Greater Manchester			
Lancashire			
Merseyside			
East Riding and North Lincolnshire			
North Yorkshire			
South Yorkshire			
West Yorkshire			
Derbyshire and Nottinghamshire			
Leicestershire, Rutland and Northamptonshire			
Lincolnshire			
Herefordshire, Worcestershire and Warwickshire			
Shropshire and Staffordshire			
West Midlands			
East Anglia			
Bedfordshire and Hertfordshire			
Essex			
London			
Berkshire, Buckinghamshire and Oxfordshire			
Surrey, East and West Sussex			
Hampshire and Isle of Wight			
Kent			
Gloucestershire, Wiltshire and North Somerset			
Dorset and Somerset			
Cornwall and Isles of Scilly			
Devon			
North Eastern Scotland			
Eastern Scotland			
South Western Scotland			
Highlands and Islands			
West Wales and The Valleys			
East Wales			
Northern Ireland			



The table shows there are already potential capacity problems in some areas and that, based on the particular scenarios developed, these would become increasingly severe by 2010 and 2015.

It is essential to recognise that this represents the most optimistic picture, e.g. it assumes that available capacity can sort all materials collected, though this may not be the case. Furthermore, C&I waste arisings could also significantly reduce MRF capacity available to sort municipal co-mingled dry recyclables.

The positive capacity situation for the Greater London area does highlight that this analysis assumes all materials are both collected and sorted within a fixed geographical boundary. The prevailing market view would suggest capacity is well utilised in the general London area

### 6.0 Regional findings

To produce a clearer view across the UK, the findings were also aggregated into regional results. These are summarised in the table below:

**Dry recyclables input to MRFs vs. Capacity by Region**

Region	2006	2010	2015	Key
North East	Light Blue	Dark Blue	Dark Blue	 Demand exceeds capacity  Demand very similar to capacity  Capacity exceeds demand
North West	Lightest Blue	Dark Blue	Dark Blue	
Yorkshire and the Humber	Lightest Blue	Dark Blue	Dark Blue	
West Midlands	Dark Blue	Dark Blue	Dark Blue	 Demand exceeds capacity  Demand very similar to capacity  Capacity exceeds demand
East Midlands	Light Blue	Dark Blue	Dark Blue	
East	Light Blue	Dark Blue	Dark Blue	
South East	Lightest Blue	Lightest Blue	Lightest Blue	 Demand exceeds capacity  Demand very similar to capacity  Capacity exceeds demand
London	Lightest Blue	Lightest Blue	Lightest Blue	
South West	Light Blue	Light Blue	Dark Blue	
Scotland	Lightest Blue	Lightest Blue	Lightest Blue	 Demand exceeds capacity  Demand very similar to capacity  Capacity exceeds demand
Wales	Lightest Blue	Lightest Blue	Lightest Blue	
Northern Ireland	Lightest Blue	Lightest Blue	Lightest Blue	

The table particularly highlights the relative weakness of the North of England in terms of MRF availability. Looking at specific regions, it emerged that:

- in 2006, capacity in the West Midlands region can cope with less than 50% of the demand, and capacity utilisation exceeds 75% in the North East, East Midlands, East and South West;
- in 2010, six regions have insufficient capacity, e.g.:
  - West Midlands: capacity can cope with ~12% of demand
  - North East: capacity can cope with ~62% of demand
  - East Midlands: capacity can cope with ~91% of demand
  - East: capacity can cope with ~94% of demand
- in 2015, seven regions have insufficient capacity, e.g.:
  - West Midlands: capacity can cope with ~7% of demand
  - North East: capacity can cope with ~34% of demand
  - North West: capacity can cope with ~40% of demand
  - Yorkshire and the Humber: capacity can cope with ~69% of demand.

## 7.0 Key conclusions

The study indicated that:

- although the UK's current MRF capacity exceeds current MSW demand, demand is projected to equal capacity by 2015 – this does not take into account the use of MRF capacity to sort C&I waste so capacity could be at higher utilisation level in real terms;
- there are distinct regional variances, e.g. the West Midlands already has MRF capacity problems, while the North East, the North West, Yorkshire and the Humber, the East Midlands and the East of England are likely to face problems by 2010, and the South West is likely to experience difficulties by 2015;
- at a sub-regional level, six NUTS 2 areas currently have little or no MRF capacity at all and, in a number of other areas (five in 2006 increasing to 15 by 2015), the level of collected dry recyclables exceeds available MRF capacity
- actual capacity constraint is likely to be worse than scenarios indicate because the stated capacities are annual figures but since waste flows are variable the nominal capacity of a MRF will be higher than can be achieved in practice because of the need to be able to deal with peak flows; and
- significant need will exist for new MRF capacity, with (i) close co-operation between MRF developers/operators and local authorities and (ii) long-term stability in collection strategies which are critical to ensuring the viability of new investments.

Further detailed analysis is needed to pinpoint the precise areas in the UK with insufficient MRF capacity. Such analysis, looking at local authority collection strategies and local MRF sorting capabilities, may generate data justifying investment in MRFs.

A new MRF's viability will not just depend on location (an issue closely tied to the need to reduce transportation distances for collected recyclables, in order to cut financial and environmental costs). It will also depend on:

- processing to a standard that ensures the materials it produces are high-value and meet market requirements;
- being flexible enough to respond to changes in materials collected; and
- being large enough to keep unit sorting costs low.

These considerations mean that an MRF's optimum capacity is likely to be 85,000-120,000 tonnes per annum (see the Entec Consulting/Dougherty Group presentation to WRAP's MRF Conference in 2006, available at [www.wrap.org.uk](http://www.wrap.org.uk)). It is also important to recognise that a new MRF is likely to take 12-18 months to come on stream, excluding the securing of planning permission.