ANNEX B

GREATER MANCHESTER MUNICIPAL WASTE MANAGEMENT STRATEGY

REVIEW 2006

Strategic Environmental Assessment and Sustainability Appraisal

Draft Environmental Report
Assessment of Alternative Scenarios

GMWDA
April 2006

GREATER MANCHESTER MUNICIPAL WASTE MANAGEMENT STRATEGY

REVIEW 2006

Draft Environmental Report

Assessment of Alternative Scenarios

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GMWDA
April 2006

Assessment of Alternative Scenarios

Introduction

In the development of the existing 2004 MWMS a BPEO/Sustainability Analysis was used to compare the potential performance of potentially viable options for the management of municipal waste, in particular the residual waste streams. This assessment methodology was used for the assessment and evaluation of technologies within projected scenarios.

A series of 16 indicators were established. For the assessment, the matrix included a commentary on the performance of the scenarios for each question or indicator. Most importance was placed on four indicators: percentage of material recycled and composted; followed by percentage of energy recovered; direct and indirect emissions; and environmental impacts, costs, proven practicality and reliability. This emphasis was determined in order to balance significant environmental indicators with deliverability of a workable solution.

The BPEO assessment methodology[1] together with sustainability issues, business case issues (Costs, Finance and Deliverability) and risk assessment are set out in the Table A below. This assessment methodology can be used to evaluate both the MWMS as a whole but also to evaluate specific management systems or technical options at different levels within the development of the MWMS revision. However, whilst this assessment will essentially focus on the technical understanding of what is BPEO and how this sits with the business case criteria, it does not wholly meet the requirements of SEA and SA which have a wider focus.

It is proposed that the BPEO/Business case assessment will be used as a supplement to inform the wider SEA/SA and ensure that the options considered are adequately detailed and technically and financial robust.

The proposed SEA/SA criteria (Table A) are based on the criteria established for the NW Regional Spatial Strategy (RSS) development, which is currently in process. These criteria have already been used in the appraisal of the waste management policies at a regional level which form an integral element of the NW RSS.

[1] Acknowledgements The BPEO/Business Case assessment process has taken account of various tools that have been developed to aid in decision making. These include:

- Multi Criteria Assessment: A Manual, DETR February 2001;
- Best Practicable Environmental Option, SEPA September 2000;
- Guidance on Policies for Waste Management Planning, DTLR May 2002;
- WISARD (Waste Integrated Systems Assessment for Recovery and Disposal) a life cycle assessment tool, Environment Agency.
- CIWM Working Party on BPEO assessment
- NW RTAB Waste Management Technical Report 2001
- IMPLEMENTING ACTION FOR SUSTAINABILITY An Integrated Appraisal Toolkit for the North West 2003
- A Practice Guide for the Development of Municipal Waste Management Strategies (Defra, November 2005)

Table A

Overall legislation and Strategy
Does the option comply with legislation and national policy?
Does the option deliver MWMS objectives and targets?
Environment and Resources
What are the potential sources of emissions and residues and have these been identified and quantified? What are the pollution impacts and what of emissions which are detrimental to; • Public health? • Air? • Water? • Land?
What is the impact of each option on the landscape character of the area?
What is the effect on the local ecology?
What will be the global impact of each option i.e. the greenhouse gas impacts and quantity of emissions contribution to depletion of the ozone layer?
What are the positive and negative impacts of each option on the local environment: noise, odour, dust, litter and vermin?
What are the positive and negative impacts of each option on the local transport and the local environment congestion, fossil fuels use and emissions?
What are the impacts and implications for use of raw material, non-renewable resource, re-use, recycling and energy recovery?
What are the risks from accidents? (Environmental effects and health and safety)?
Economy and Social
What are the impacts on the local economy?
What will be the effect on local employment & diversity of skill levels?
Are waste producers encouraged to take responsibility for their own waste?
Will this meet with public approval?
What are the implications for the welfare of local people?
Costs, Finance, Deliverability and Risks
Are performance levels for delivery of strategy targets for recycling, composting, recovery and bi-diversion proven and demonstrated in working examples?
Are operational criteria, reliability and technical suitable for local circumstances?
Are capital costs and financing efficient in the short, medium and long term and what are the comparative costs for options?
Are operational costs efficient in the short, medium and long term and what are the comparative costs for options?
What are the costs of change (to new systems and technologies)?

What are the procurement and contract policy implications (e.g. analyse market stability for recyclables)?
What are the key issues in securing site infrastructure & land-use planning for the proposed options?
What level of flexibility is there in the light of medium to long term unexpected changes in waste composition and quantities?
How dependent is the option on key stakeholders and partnerships?
How dependent is the option on public acceptance and participation?
Is the proposal low risk and what are the key areas of risk and mitigation?

Technical Scenarios Modelled

1. **Do nothing with 16% diversion from landfill, no non HH waste reduction and current waste management arrangements**

   This scenario is considered for comparative purposes as this reflects the status quo for disposal of residual waste. However, this scenario is not viable as a long-term strategy as it will fail to meet permitted quantities under the LATS and Landfill Directive requirements. Costs can be predicted to increase significantly.

2. **Source segregated recycling and composting only as a means of meeting the waste strategy targets**

   This scenario, which relies on source segregated recycling and composting to meet the strategy targets is viable for target until at least year 2008/9 and has the potential to satisfy strategic performance targets until year 2010/11 if waste reduction and minimisation targets are met.

3. **Source segregated recycling and composting, treating residual waste by MBT or related processes with a similar output specification, with energy recovery from RDF**

   This scenario (assessment) is based on MBT or related processes, with similar output specification, producing RDF which is used for energy recovery and recyclate together with some treated residues disposed of to landfill that are classified as biologically degradable together with source segregated recycling and composting and in-vessel composting for kitchen waste after 2015.

4. **Source segregated recycling and composting, treating residual waste by Energy from Waste through a traditional Thermal Recovery Facility**

   Under this scenario recycling and composting targets are achieved almost entirely through source segregated collection whilst thermal treatment ensures that landfill bio-diversion targets are met.

Scenario 1 - Waste arisings 2005/6 baseline

	Waste Management options			
Waste Arisings Tonnes	Recycling Tonnes	Composting Tonnes	Residual waste Bolton TRF	Residual waste Landfill treatment
Collected Household waste (HHW) **919,000 tonnes**	Separate source collection 10% **92,000 tonnes**	Separate source collection and composting 8% **74,000 tonnes**	Residual waste for energy recovery 7.4% **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	Collected household waste produces **643,000 tonnes** residual collected plus **33,000** tonnes TRF residues Residual waste for landfill is 71% of collected HHW **676,000 tonnes**
Civic Amenity **345,000 tonnes**	Soil rubble and hardcore 5% (non counting) 18,000 327,000 tonnes Recyclables 20% **65,000 tonnes**	Green Waste Composting 20% **65,000 tonnes**		Residual waste for landfill **197,000 tonnes**
Non Household and Bulk Waste **155,000 tonnes**				Residual waste for landfill 100% **155,000 tonnes**
Totals **1,419,000 tonnes**	Recyclables **157,000 tonnes**	Compost **139,000 tonnes**	Energy Recovery **77,000 tonnes**	Biodegradable landfill **995,000 tonnes** **(**1m. tonnes permitted) Total Landfill **1010,000 tonnes**
Total Recycled and Composted 296,000 = 20.8% of MSW (23.4% of Household waste) Total Recovery (Gross 110,000) = 7.3% Total Landfill 1,075,000 = 71% Biodegradable landfill 995,000 tonnes - LATS permitted amount 1,205,000 (Total as managed - biodegradable + non biodegradable) **Failure to increase diversion from landfill would result in exceeding LATS quantities by 2009 and beyond**				

Scenario 2 - 2010 Waste arisings @ 2% growth - 33% source segregated recycling &composting [Maximising residual landfill]

Waste Arisings 1,535,000 Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & use of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) **994,000 tonnes**	Separate source collection 18% **179,000 tonnes**	Separate source collection and composting 12% **119,000 tonnes**	Residual waste for energy recovery - **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	nil	Untreated residual collected **586,000** tonnes plus **33,000** tonnes TRF residues **Total 619,000 tonnes**
Civic Amenity **374,000 tonnes**	Soil rubble and hardcore 5% (non counting) 19,000 tonnes **355,000 tonnes** Recyclables 35% **124,000 tonnes**	Green Waste Composting 20% **71,000 tonnes**			Residual waste for landfill **160,000 tonnes**
Bulky Waste **167,000 tonnes**					Residual waste for landfill 100% **167,000 tonnes**
Totals **1,535,000 tonnes**	Recyclables **303,000 tonnes**	Compost **190,000 tonnes**	Energy Recovery **436,000 tonnes**		Biodegradable landfill **882,000 tonnes** **(**1m. tonnes permitted) Total Landfill **915,000 tonnes**

Total Recycled and Composted 493,000 = 32% of MSW (36% of Household Waste)
Total Recovery (Gross 110,000) = 7.1% of MSW
Total Landfill (inc TRF residues) 915,000 tonnes
Biodegradable landfill 882,000 tonnes - LATS permitted amount 819,000 (Total as managed - biodegradable + non biodegradable)

Years 2010/11 and on increasing failure to meet LATS targets and strategy.

Scenario 3 - 2010 Waste arisings @2% growth 33% source segregated recycling and composting, Maximising residual waste treatment by MBT

Waste Arisings 1,535,000 Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & use of RDF (tonnes)	Residual waste Landfill
Collected Household waste (HHW) **994,000 tonnes**	Separate source collection 18% **179,000 tonnes**	Separate source collection and composting 12% **119,000 tonnes**	Residual waste for energy recovery - **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**586,000 tonnes** residual collected household waste produces loss to air & sewer 25% - **139,000** RD Fuel 50% -**278,000** Recyclables 5% **- 28,000** Residual waste for landfill 20% - **111,000**	MBT residues **111,000** tonnes residual collected plus **33,000** tonnes TRF residues **144,000 tonnes**
Civic Amenity **374,000 tonnes**	Soil rubble and hardcore 5% (non counting) 19,000 tonnes **355,000 tonnes** Recyclables 35% **124,000 tonnes**	Green Waste Composting 20% **71,000 tonnes**		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste **40,000 tonnes** loss to air and sewer 25% - **10,000** RD Fuel 50% - **20,000** Recyclables 5% - **2,000** MBT residues for landfill 20%-**8,000**	Residual waste for landfill **128,000 tonnes**
Bulky Waste **167,000 tonnes**					Residual waste for landfill 100% **166,000 tonnes**
Totals **1,535,000 tonnes**	Recyclables **303,000 tonnes**	Compost **190,000 tonnes**	Energy Recovery **408,000 tonnes**		Biodegradable landfill **405,000 tonnes** **(**1m. tonnes permitted) Total Landfill **438,000 tonnes**

Total Recycled and Composted 523,000 = 34% of MSW (38% of Household Waste)
Total Recovery (Gross408,000) = 26.5% of MSW

Total Landfill (inc TRF residues) 438,000
Biodegradable landfill 405,000 tonnes - LATS permitted amount 819,000 (Total as managed - biodegradable + non biodegradable)

Scenario 4 - 2010 Waste arisings @2% growth 33% source segregated recycling and composting, Residual waste treatment by Mass Burn Energy from Waste

Waste Arisings	Recycling	Composting	Residual waste Bolton	**Residual waste treatment by Mass**	Residual waste Landfill

1,535,000 Tonnes			TRF	**Burn Energy from Waste**	
Collected Household waste (HHW) **994,000 tonnes**	Separate source collection 18% **179,000 tonnes**	Separate source collection and composting 12% **119,000 tonnes**	Residual waste for energy recovery - 12.0% of collected HHW, (7.0%o MSW) **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**556,000 tonnes** residual collected household waste produces Aggregate/metals 12% - **66,000** Residual waste landfilled 10% - **57,000** (treated non biodegradable)	residues **57,000** tonnes residual collected plus **33,000** tonnes TRF residues **90,000 tonnes** (treated non biodegradable)
Civic Amenity **374,000 tonnes**	Soil rubble and hardcore 5% (non counting) 19,000 tonnes **355,000 tonnes** Recyclables 35% **124,000 tonnes**	Green Waste Composting 20% **71,000 tonnes**		Assumes waste capable of treatment by EfW 25% of residual Civic Amenity waste **40,000 tonnes** Aggregate/metals 12% - **5,000 tonnes** Residual waste landfilled 10% - **4,000** (treated non biodegradable)	Residual waste for landfill **128,000 tonnes** **4,000 tonnes** (treated non biodegradable)
Bulky Waste **167,000 tonnes**					Residual waste for landfill 100% **167,000 tonnes**
Totals **1,535,000 tonnes**	Recyclables **303,000 tonnes**	Compost **190,000 tonnes**	Energy Recovery Gross 7.0% (Net figure 4.9%) **656,000 tonnes**		Biodegradable landfill **295,000 tonnes** **(**1m. tonnes permitted) Total Landfill **389,000 tonnes**
Total Recycled and Composted 493,000 = 32% of MSW (36% of Household Waste) Total Recovery (Gross 656,000) = 42% of MSW Total Landfill (inc treated non biodegradable residues) 389,000 Biodegradable landfill 295,000 tonnes - LATS permitted amount 819,000 (Total as managed - biodegradable + non biodegradable)					

Scenario 3- 2015 Waste arisings, 35% recycling of source segregated kerbside with residual waste treatment by MBT

Waste Arisings Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & production of RDF (tonnes)	Residual waste Landfill

Collected Household waste (HHW) **1046,000 tonnes**	Separate source collection 20% **209,000 tonnes**	Separate source collection and composting 15% Green Waste **157,000 tonnes**	Residual waste for energy recovery – **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**570,000 tonnes** residual collected household waste produces loss to air & sewer 25% -**142,000** RD Fuel 50% -**285,000** Recyclables 5% **- 29,000** Residual waste for landfill 20% - **114,000**	MBT residues **114,000** tonnes residual collected plus **33,000** tonnes TRF residues Residual waste for landfill is **147,000 tonnes**
Civic Amenity **402,000 tonnes**	Soil rubble and hardcore 5% (non counting) 23,000 tonnes **382,000 tonnes** Recyclables 35% **133,000 tonnes**	Green Waste Composting 20% **76,000 tonnes**		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste **43,000 tonnes** loss to air and sewer 25% - **10,000** RD Fuel 50% **- 22,000** Recyclables 5% - **2,000** MBT residues for landfill 20% -**9,000**	Residual waste for landfill **139,000 tonnes**
Other Household & Non Household 168,000 tonnes	12% diverted from landfill (recycled – reuse)				Residual waste for landfill 88% **148,000 tonnes**
Totals **1,616,000 tonnes**	Recyclables **393,000 tonnes**	Compost **233,000 tonnes**	Energy Recovery **417,000 tonnes**		Biodegradable landfill **401,000 tonnes** Total Landfill **448,000 tonnes**
Total Recycled and Composted 626,000 = 38.6% of MSW (43.4% of Household Waste) Total Recovery (Gross 417,000) = 26% of MSW Total Landfill (inc TRF residues) 448,000 Biodegradable landfill 401,000 tonnes - LATS permitted amount 499,000 (Total as managed - biodegradable + non biodegradable)					

Scenario 4 - 2015 Waste arisings – 35% recycling with EfW residual waste treatment

Waste Arisings	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by EfW	Residual waste Landfill

Collected Household waste (HHW) **1046,000 tonnes**	Separate source collection 20% **209,000 tonnes**	Separate source collection and composting 15% Green Waste **157,000 tonnes**	Residual waste for energy recovery **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**570,000 tonnes** residual collected household waste produces Aggregate/metals 12% - **68,000** Residual waste landfilled 10% - **58,000** (treated non biodegradable	Residual waste landfilled **58,000** (treated non biodegradable) **33,000** tonnes TRF residues Residual waste for landfill is **91,000 tonnes**
Civic Amenity **402,000 tonnes**	Soil rubble and hardcore 5% (non counting) 23,000 tonnes **382,000 tonnes** Recyclables 35% **133,000 tonnes**	Green Waste Composting 20% **76,000 tonnes**		Assumes waste capable of treatment 25% of residual Civic Amenity waste **43,000 tonnes** Aggregate 12% - **5,000** Non bio-active landfilled 10% - **4,000**	Residual waste for landfill **130,000 tonnes** Non bio-active landfilled 10% - **4,000**
Other Household & Non Household 168,000 tonnes	12% diverted from landfill (recycled – reuse)				Residual waste for landfill 88% **148,000 tonnes**
Totals **1,616,000 tonnes**	Recyclables **342,000 tonnes**	Compost **233,000 tonnes**	Energy Recovery **680,000 tonnes**		Biodegradable landfill **336,000 tonnes** Total Landfill **387,000 tonnes**
Total Recycled and Composted **595,000** = 36.8% of MSW (41.0% of Household Waste) Total Recovery (Gross **478,000**) = 29.7% of MSW Total Landfill (inc TRF residues) **387,000** Biodegradable landfill **336,000** tonnes - LATS permitted amount 499,000 (Total as managed - biodegradable + non biodegradable) 183					

Scenario 3 - 2020-2030 Waste arisings with growth reduced to zero and 50% recycling & composting of household waste with residual waste treatment by MBT

Waste Arisings Tonnes	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by MBT & production of RDF (tonnes)	Residual waste Landfill

Collected Household waste (HHW) **1091,000 tonnes**	Separate source collection 30% **327,000 tonnes**	Separate source collection and composting 15% Green Waste **163,000 tonnes** 5% in vessel composted **55,000 tonnes** Total **218,000 tonnes**	Residual waste for energy recovery - 12.0% of collected HHW, (7.0%o MSW) **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**435,000 tonnes** residual collected household waste produces loss to air & sewer 25% -**108,000** RD Fuel 50% -**217,000** Recyclables 5% **- 21,000** Residual waste for landfill 20% - **87,000**	MBT residues **87,000** tonnes residual collected plus **33,000** tonnes TRF residues Residual waste for landfill is **120,000 tonnes**
Civic Amenity **420,000 tonnes**	Soil rubble and hardcore 5% (non counting) 18,000 tonnes **399,000 tonnes** Recyclables 35% **139,000 tonnes**	Green Waste Composting 20% **80,000 tonnes**		Assumes waste capable of treatment by MBT 25% of residual Civic Amenity waste **45,000 tonnes** loss to air and sewer 25% - **11,000** RD Fuel 50% - **23,000** Recyclables 5% - **2,000** MBT residue for landfill 20% -**9,000**	Total residual waste for landfill **143,000 tonnes**
Other Household & Non Household 168,000 tonnes	25% diverted from landfill (recycled – reuse)				Residual waste for landfill 80% **126,000 tonnes**
Totals **1,679,000 tonnes**	Recyclables **495,000 tonnes**	Compost **298,000 tonnes**	Energy Recovery **405,000 tonnes**		Biodegradable landfill **356,000 tonnes** Total Landfill **411,000 tonnes**

Total Recycled and Composted 829,000 = 49.3 % of MSW (54% of Household Waste)
Total Recovery (Gross 405,000) = 24.1% of MSW
Total Landfill (inc TRF residues) 411,000
Biodegradable landfill 356,000 tonnes - LATS permitted amount 380,000 (Total as managed - biodegradable + non biodegradable)

Scenario 4 - 2020-30 Waste arisings with growth reduced to zero, EfW residual waste treatment

Waste Arisings	Recycling	Composting	Residual waste Bolton TRF	Residual waste treatment by EfW	Residual waste Landfill
Collected Household waste (HHW) **1091,000 tonnes**	Separate source collection 30% **327,000 tonnes**	Separate source collection and composting 15% Green Waste **163,000 tonnes** 5% in vessel composted **55,000 tonnes** Total **218,000 tonnes**	Residual waste for energy recovery - 12.0% of collected HHW, (7.0%o MSW) **110,000 tonnes** Landfilled Residues 33,000 tonnes (non biodegradable)	**435,000 tonnes** residual collected household waste produces Aggregate/metals 12% - **50,000** Residual waste landfilled 10% - **43,000** (treated non biodegradable	residues **43,000** tonnes residual collected plus **33,000** tonnes TRF residues Residual waste for landfill non- biodegradable **74,000 tonnes**
Civic Amenity **420,000 tonnes**	Soil rubble and hardcore 5% (non counting) 18,000 tonnes **399,000 tonnes** Recyclables 35% **139,000 tonnes**	Green Waste Composting 20% **80,000 tonnes**		Assumes waste capable of treatment 25% of residual Civic Amenity - **43,000 tonnes** of residual waste produces: Aggregate/metals 12% - **5,200** Non bio-active landfilled 10% - **5,000**	Residual waste for landfill **129,000 tonnes** Non bio-active landfilled **5,000**
Other Household & Non Household 168,000 tonnes	25% diverted from landfill (recycled – reuse)				Residual waste for landfill **126,000 tonnes**
Totals **1,679,000 tonnes**	Recyclables **508,000 tonnes**	Compost **298,000 tonnes**	Energy Recovery **545,000 tonnes**		Biodegradable landfill **277,000 tonnes** Total Landfill **356,000 tonnes**

Total Recycled and Composted **806,000** = 45.1% of MSW (50.6% of Household Waste)
Total Recovery (Gross **545,000**) = 32% of MSW
Total Landfill (inc TRF residues) **371,000**
Biodegradable landfill **277,000** tonnes LATS permitted amount 380,000 (Total as managed - biodegradable + non biodegradable)

		Source Segregated recycling and composting plus EfW mass burn of residual waste
Does the option comply with legislation and national policy? Does the option deliver MWMS objectives and targets?	Meets long term and Landfill directive targets.	Meets long term and Landfill directive targets.
		+
What are the pollution impacts and what of emissions which are injurious to public health, air, water and land of each option?	There are significant emissions from the biological processes that require emission controls, bio-aerosols/odours may form Spent emission control residues may be hazardous waste RDF combustion plants will have to meet Waste Incineration Directive controls	Waste Incineration Directive requires most stringent EU control of releases to air and water.
		+
What is the impact of each option on the landscape and character of the area?"	Processing plant consistent with industrial manufacturing process	Poor aesthetics as large-scale industrial-style plant required with chimney stack
		-
What is the effect on the local ecology?	Minimal impacts on local ecology subject to process emission controls. Biological processes present significant risk if emission controls inadequate or fail	Compliance with waste Incineration Directive results in minimal impacts on ecology subject to process emission controls
		0
What will be the global impact of each option i.e. the greenhouse gas impacts and quantity of emissions contribution to depletion of the ozone layer	Some concerns that if waste is not sufficiently bio-stabilised, could still methane be produced when landfilled.	Releases from combustion of the biogenic fraction of MSW are conducive with Climate Change policy. Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency, renewable CO2
		+
What are the positive and negative impacts of each option on the local environment i.e. noise, odour, dust, litter and vermin also minimise local transport impacts (congestion, severance, fear and intimidation, physical damage)	Processing plant consistent with industrial manufacturing process. Deliveries of residual waste will have similar traffic impacts. Additional traffic will be generated by removal of recyclate and haulage of RDF if fuel use for energy recovery	Processing plant consistent with industrial manufacturing process. Deliveries of residual waste will have similar traffic impacts. However this scenario will have the least traffic impact for removal of small quantities of recyclate and

	is sited at a different location.	residual ash.
		+
What is the use of non-renewable resource?	RDF use could help displace virgin fossil-fuel use and assist in reducing long distance transport/import of coal Limited landfill if resulting RDF is used for energy recovery.	Net energy recovery reduces overall use of non renewable resources
		+
What are the risks from accidents? (Environmental effects and health and safety)	Generic risks from failure of emission control. Safety and accident risk are subject to specific plant Health and Safety assessments and management measures.	Generic risks from failure of emission control. Safety and accident risk are subject to specific plant Health and Safety assessments and management measures.
		0
What is the total cost of each option?	Wide variation in costs (below EfW) depending on branded technology options and diverse outputs	High capital and operating costs Lack of flexibility once the commitment to EfW is made
		-
Is the project finance-able, affordable, deliverable, flexible and low risk? To ensure reliability of delivery, likelihood of planning permission being obtained (Operational flexibility/Risk in delivery)	See risk assessment Location of site and securing planning may attract significant public opposition	See risk assessment Public opposition to the location of the site and securing planning may be strongest of all scenarios.
		+
What are the impacts on the local economy?	Facilities may be unattractive to business neighbours if located in industrial/commercial area	EFW facilities will be unattractive to business neighbours if located in industrial/commercial area
		-
What will be the effect on local employment & diversity of skill levels?	Recovery of recyclate (additional to source segregation) and energy presents opportunities for new business and local employment	Minimal additional recovery of recyclate but potential produce uses for ash
		0
Are waste producers encouraged to take responsibility for their own waste?	Source segregation and minimisation of waste encourages producers to take responsibility for their waste.	Source segregation and minimisation of waste encourages producers to take responsibility for their waste. EfW may only discourage recycling and composting if oversized in capacity

		0
Will this meet with public approval?	Public largely unaware of the process technology and implications of RDF more acceptable than mass burn incineration	Public opposition particularly from green pressure groups to mass burn incineration to recover energy from waste
		-
What are the implications for the welfare of local people?	Minimal impacts subject to process emission controls and effective regulation	This technology suffers from poor public perception with public concern over dioxins and deterioration of local air quality. However risks to public health of exposure to pollutant releases regarded as insignificant in recent NSCA report
	0	0

BPEO/Sustainability Analysis Matrix

A series of 16 indicators

This BPEO assessment acknowledges the various tools that have been developed to aid in decision making. These include:

- Multi Criteria Assessment: A Manual, DETR February 2001;
- Best Practicable Environmental Option, SEPA September 2000;
- Guidance on Policies for Waste Management Planning, DTLR May 2002;
- WISARD (Waste Integrated Systems Assessment for Recovery and Disposal) a life cycle assessment tool, Environment Agency.
- CIWM Working Party on BPEO assessment

Risk Management Analysis

All Scenarios - Source segregated recycling and composting	
Proven to be effective but risks and uncertainties arise in securing high levels of participation and waste diversion with associated implications for costs	
	Risk Management Options
• Source segregated recycling and composting of collected household waste and civic amenity waste fails to reach projected diversion rates • Public participation fails to meet projected levels	• Increase investment in publicity campaigns, incentives and education to secure required participation rates • Increase or introduce minimisation, source separation and recycling and composting of commercial and "other waste" • Review waste collection and segregation systems to ensure these are in accordance with best practice.
• Difficulty in securing markets for recyclate and compost	• Investment in market development required

Scenario 1 - Residual waste treatment MBT or related processes output specification with RDF	
Uncertainties over the status of the technology which is not operationally proven in the UK (design specifications are based on total MSW) produce a significant risk to be addressed	
	Risk Management Options
Technology proven in mainland Europe with 70 plants in operation but mixed experience of attempts to develop similar technology in the UK. At least 7 different MBT processes suppliers are available each with specific process characteristics and outputs. Different waste characteristic may result in significantly different performance and or outputs.	Full evaluation of potential MBT outputs is required from the wide range of branded technologies to ensure that the specific process selected could deliver the required outputs based on the waste characteristics of residual source separated MSW of Cardiff
Implementation timescales: The status of RDF and whether this is burnt for energy recovery or landfilled could have a major impact on overall timescales, in particular if some form of energy recovery plant is co-located with the MBT plant	Implementation timescale, including securing site and permissions must be built into implementation project planning
If waste is not sufficiently bio-stabilised, potential for biological activity in residues will remain, in particular methane may be produced from these landfilled residues. Thus if MBT residues are landfilled this represents a significant investment that may only help comply with the Landfill Directive through volume reduction and residue disposal to landfill may	Select MBT process that enhances RDF production for energy recovery or alternatively select MBT that uses enhanced processes to produce more stable product (longer and more intensive processes will have significant cost implications as well as impacting on the scale of plant required)

exceed permitted landfill limitations	
Has significant emissions and requires emission controls, bio-aerosols/odours may form. The requirements of abatement technology could increase costs.	Biologically processed RDF combustion plants will have to meet Waste Incineration Directive controls spent emission control residues may be treated as hazardous waste
Difficulties in finding markets for recyclate produced	Market research and investment in market development required in advance of contract commitments
Difficulties in finding markets for RDF produced or ATT technology	Investment in market development for RDF and full evaluation of ATT (Advanced Thermal Treatment) options and implementation planning required to minimise risk of inadequate markets for RDF or inability to deliver recovery of energy through ATT
Costs - Capital and running costs may be higher than anticipated Un-proven technology in the UK with limited evaluation of treatment of source separated residues mean a wide envelop of certainty with regard to capital and operational costs may result.	Effective procurement and contract procedures will be required to ensure that costs are contained within projected budgets

Scenario 2- Source Segregated recycling and composting plus EfW	
Has status as proven technology; however there are significant risks in delivery of this option in terms of securing a site and planning permissions in the light of predictable public opposition.	
	Risk Management Options
Has significant emissions and requires emission controls. Any future additional requirements of abatement technology could increase costs.	EfW combustion plants will have to meet Waste Incineration Directive
Implementation timescales may be protracted in the light of generic public opposition to EfW plants and could have a major impact on overall timescales	Implementation timescale, including securing a site and permissions must be built into implementation project planning
Costs - Capital and running costs may be higher than anticipated Un-proven technology in the UK with limited evaluation of treatment of source separated residues mean a wide envelop of certainty with regard to capital and operational costs may result.	Effective procurement and contract procedures will be required to ensure that costs are contained within projected budgets

Evaluation of Scenarios – Business Drivers Analysis

This business drivers analysis is primarily focused on the practical business environment. The factors are considered both with respect to relevant individual technical options or approaches and the scenario as a whole include

- proven performance levels and overall delivery of strategy targets for recycling, composting, recovery and bi-diversion
- operational criteria, reliability and technical suitability to local circumstances
- Capital and revenue funding options
- Costs of operational with short, medium and long term projections
- Costs and practicality of change
- Procurement and contract policy implications e.g. analyse market stability for recyclables, and make recommendations to reduce risks and secure long-term contracts with reprocessors
- Consideration of securing waste management sites and infrastructure including land-use planning
- public and community participation in minimisation, recycling and composting,
- Key stakeholders and partnerships and any additional players in the delivery of new waste management options together with their roles and responsibilities
- Consultation including the public as well as key stakeholders
- Risk management analysis

Evaluation of Scenarios – Business Drivers Analysis

		Source Segregated recycling and composting plus EfW
Delivery of strategy targets for recycling, composting, and bi-diversion & compliance with policy and legislation	Meets long term and Landfill directive targets.	Meets long term and Landfill directive targets.
		+
Public participation rates.	Important to ensure source segregation is successful in meeting targets	Important to ensure source segregation is successful in meeting targets
		0
Technically proven and operational reliability	Operational in Europe but little experience in the UK although considerable interest by UK local authorities	Technically proven
	-	+
Costs capital, operational short, medium and long term	Capital costs and running costs are significant and typically require write off of capital investment over 20 year period	Highest cost option significant capital investment required
		-
Cost of change	Consistent with current plans for extended source segregation for recycling and composting Modular phased development possible	Consistent with current plans for extended source segregation for recycling and composting May lack flexibility in dealing with changing waste quantities and qualities
		-
Procurement and contract policy implications e.g. analyse market stability for recyclables,	Increased quantities of recyclates and compost from source segregation will require additional market development with some additional market development for recyclates from the MBT process	Increased quantities of recyclates and compost from source segregation will require additional market development. Recyclate from EfW residues should find ready markets
Securing site infrastructure & land-use planning	Processing plant consistent with industrial manufacturing process	Location of site and securing planning may attract significant public opposition
		-
Key stakeholders and partnerships	Public and other waste producers for source segregation, residue process providers, recyclate & compost markets	Public and other waste producers for source segregation, residue process provides, recyclate & compost markets Least requirement for partnership
		+

Overview of Waste Treatment and Processing Options

Technology	**Description and Assessment**	Typical Plant Capacity Tonnes /annum	Capital Costs £000 Typical (Range) ***Operating Costs £/tonne Typical (Range)***	Projected typical gate fee (£) based on operational cost plus notional repayment of capital over 10 year period @4% interest (excluding commercial return on capital and operational turnover investment)
Landfill	UK landfill sites are amongst the best engineered (making use of suitable geology) and managed in the world. This option provides containment and stabilisation of the wide range of Municipal Solid Waste (MSW) over extended timeframes. Landfill directive requirements will effectively rule out landfilling of crude untreated MSW in the medium to long term (2010 to 2020). However, landfill will be required as part of an integrated solution to waste well into the future and will become increasingly focussed on processed MSW residues **Technology status:** proven - traditionally favoured option. **Timescale:** Landfill Directive targets requires a 3-stage increase in BMW diversion from landfill commencing in 2010 (design to commissioning 1 to 5 years) **Economies of scale:** lowest cost option - current Landfill Tax level has had little impact on active waste diversion. Steep increases in Landfill Tax will be needed to sufficiently close the cost gap with other technologies **Advantages:** • Existing MSW collection infrastructure thus no additional collection costs • Convenience to householder as waste separation not required • Wide range of waste types currently permitted • Currently the low cost option **Disadvantages:** • Concerns about environmental and health effects • Perceived health effects • Risks of groundwater pollution • Effectively creates "contaminated land" with very long timescales for stabilisation • Poor use of materials and resources • Energy recovered from methane helps to reduce the global warming potential from		Economies of scale very significant Actual costs varies with local situation *25 plus landfill tax*	**20-30** plus tax Gate fees may increase significantly in future to reflect local scarcity of supply. Landfill tax at **35** in medium to long term and perhaps more

	landfill sites but is inefficient as energy recovery. • Loss of local amenity • Vehicle movements			
Recycling “Dirty MFRs”	‘Dirty’ MRFs process mixed MSW (and similar commercial airings) co-mingled with recyclates to recover usable material streams. A generic MRF facility will generally comprise the following stages: provision for weighing inbound and outbound materials, reception and storage of incoming materials, processing of wastes, and storage of recovered materials and process residues. A variety of equipment is used in MRFs: conveyors, shredders, crushers, magnetic separators, screens, and balers. **Technology status:** proven in UK, but Dirty MRFs would need to be combined with secondary treatment and processing options for the residual MSW (e.g. via MBT RDF production and composting etc.) **Timescales:** Increasingly difficult to secure planning **Economies of scale:** dirty MRFs: usually larger-scale: up to 200ktpa+, benefiting from economies of scale; with fewer more centralised facilities. Considerable economies can result from increasing plant size clean MRFs: **Advantages:** • Use of existing MSW collection infrastructure thus no additional collection costs • Convenience to householder as waste separation not required **Disadvantages** • Potentially recyclable material has high level of contamination and thus reducing delivery of recycling targets • Lower income streams from sale of recovered recyclates (lower quantity and quality) than with clean MRFs, although RDF produced could have a saleable value • Perception of dirty MRFs equating to poor environmental standards • Continued use of dirty MRFs does not encourage the general public to participate in source segregation • Residual waste stream requires secondary treatment and processing (e.g. composting) • Role for dirty MRFs will probably diminish/be eliminated as the take-up of various forms of BMT plant are used to manage and bio-stabilise residual mixed MSW streams • A state-of-the art "super" MRF for North London, capable of recycling 200ktpa has recently received criticism by the UK’s Community Recycling Network.	50-200,000	5,000 - 10,000 ***25-35***	**45** **plus costs for residue disposal**
Recycling	‘Clean’ MRFs process clean dry co-mingled recyclable materials (i.e. not putrescible or	25,000 -	2,500 -	27 operational

Source Separated Recyclate Mechanical Sorting	garden waste), source segregated by the householder and from similar commercial arisings; Clean MRFs are recyclate handling, sorting and bulking facilities to facilitate efficient transportation of recyclate for reprocessing industries rather that a waste treatment option per se. They increasingly use automated technology to separate clean co-mingled recyclate materials into separate streams. Kerbside sorting of recyclates is an alternative option but higher cost option, however some recyclate bulking and storage capacity will still be required. **Technology status:** proven in UK **Timescales:** probably the easiest waste management facilities on which to secure planning permission (design to commissioning 1 to 5 years) **Economies of scale:** considerable economies can result from increasing plant size clean MRFs: sizes are generally small: 5ktpa-50ktpa. **Advantages:** • Essential for sorting and bulking co-mingled recyclate • Supports 2 stream collection which is significantly lower in cost than kerbside sorting • Recover higher volumes and better quality materials for bulking and onward transfer to traditional material markets; • Increased process flexibility for supplying changing markets with recovered dry recyclates; • Automated clean MRFs can process co-mingled dry household recyclable materials (and similar commercial arisings); • Material presentation independent of MRF design therefore collected recyclate material can be separate, mixed together, or in a “green bag”; • Potential co-location with material processors removed double-handling. • Minimal aesthetic impact agricultural-style buildings **Disadvantages** • Collection of segregating dry recyclates is likely to increase collection costs; • Not a ‘one-stop’ shop solution for handling - sorting -bulking as wet biodegradable waste is excluded, but includes paper/card (albeit a composting plant taking source segregated wet BMW could be co-located on the same site as a clean MRF); • Economies of scale may not be realised with a larger number of smaller plants (although this may be offset by higher revenue streams from recovered recyclates); • Clean MRFs are unlikely to deliver recycling targets in isolation from composting • Health, safety aesthetic aspects of any manual sorting of waste	150,000	6,000 Automated sorting equipment can account for £1.3-£2M. ***27*** ***(19-35)***	15 capital Projected total **42** **plus costs for residue disposal**

Composting	Composting is the controlled aerobic degradation of organic material: providing stabilisation, sanitation and bulk reduction for source segregated kitchen waste, similar commercial arisings and other clean biodegradable wastes (e.g. green waste). Environmental and health concerns over biological contamination as implemented in the Animal By-Products Order are limiting the range of suitable waste types and are promoting higher technology in-vessel composting. **Technology status:** technology commercially developed. Most UK experience to date is on open-Windrow. In-vessel composting not now the low-technology solution sensitive receptor and Animal By-Product Order (ABPO) issues driving market towards higher tech/cost **Implementation timescales:** Medium timeframe for planning/licensing/design/build subject to securing prerequisite planning permission (design to commissioning 1 to 5 years) **Economies of scale:** open-Windrow has clear economies with increasing plant capacity. In-vessel is more modular requiring step change in capacity and has yet to find 'optimum UK configuration', as equipment requirements are still evolving. Some economies predicted as technology matures. **Advantages:** • Diversion of biodegradable waste from landfill • Compost can be used as soil conditioner, mulch, a growing medium, and for landscaping and land restoration • Helps to reduce topsoil erosion, reducing soil carbon losses • Compost displaces emissions-potent greenhouse gas-from the same waste sent to landfill • Assists in displacing the use of scare natural resources such as peat • composts ca be used to help build up soil fertility, due to slow release of N over many years (with the additional benefit that N leaching is significantly reduced as a result) • Compost has demonstrably been shown to improve crop yield by improving soil structure, drainage (in winter) and water holding capacity (in summer) **Disadvantages and Concerns** • Environmental and health concerns mainly centre upon sensitive receptor, 'by-pass' (cross-contamination) issues associated with the Animal By-Products Order and transport movements • High cost of source segregated collection • Contamination can compromise process or output product specification • In-vessel composting has similar cost to MBT	Windrow 20,000 50,000 In Vessel 20,000 50,000	1,000 (500-1,250) ***17*** ***(13-25)*** 1,850 (1,500-2,000) ***14*** ***(12-15)*** 2,400 (600-4,500) ***27*** ***(18-45)*** 5,500 (2,500-10,000) ***19*** ***(18-20)***	**25** **19** **45** **35**

	• Bio-aerosols are a concern with open-Windrow systems • Landfill of residues may be produced but are highly dependent upon input material quality N • Noise levels can be at times be high (e.g. shredding green waste)but are generally low-medium as with proximity to a typical farming operation (traffic and mobile plant) • Odour levels are medium to low but use of a bio-filter can help minimise releases			
Anaerobic Digestion	Anaerobic Digestion relies on a natural biological process of treating biodegradable waste by means of (anaerobic) bacterial action without oxygen. The process generates a useable (bio)gas. **Technology status:** technology proven on sewage sludge across UK water industry, but not as yet commercially proven for MSW. Considerable local authority interest, although a number of plant proposals have fallen through for various reasons, including issues of product (compost) quality from mixed waste. **Implementation timescales:** Subject to proving of technology medium planning/licensing/design/build subject to securing prerequisite planning permission(design to commissioning 1 to 5 years) **Economies of scale:** Requires step-change for capacity increase. **Advantages:** • Potentially significant role for BMW diversion (source segregated kitchen waste, similar commercial arisings and green waste) • Produces a renewable fuel in the form of biogas, helping to displace non-renewable CO2 during combustion as well as carbon-based fossil-fuel use. • CO2 (via decay) released to atmosphere from digestate occurs over several decades-prolonging short-carbon cycling • useful nutrients (nitrogen more available to plants) can be recycled to agricultural land helping to displace manufactured fertilisers **Disadvantages and Concerns :** • Not yet commercially proven on MSW in UK • Initial concerns likely to mirror those for composting and those generally for vehicle movements • subsequent use of biogas would result in products of combustion • Odour levels ammonia smell can result from the aeration stage of digestate treatment	30,000	4,000 ***25***	**45** **plus costs for residue disposal**
Mechanical-Biological	MBT is a generic name for a range of processes. In its simplest form waste is bio-stabilised followed by landfill. More complex plants provide bio-stabilisation followed by: recyclate	60,000	8,000 ***32.5***	**52**

Treatment (MBT)	recovery, (an)aerobic treatment of the organic fraction and energy recovery followed by landfilling of the residues **Technology status:** technology proven in mainland Europe. **Implementation timescales:** The status of Refuse Derived Fuel and whether this is burnt for energy recovery or landfilled could have a major impact on overall timescales, in particular if some form of energy recovery plant is co-located with the MBT plant **Economies of scale:** Considerable economies envisaged on larger plants on account of automation. Technology maturation also expected to lead to considerable economies on specialised buildings **Advantages:** • Treats residual MSW stream after targeted level of source segregated recycling and composting. Acts to bio-stabilise residual waste fraction and promotes bulk reduction through degradation and evaporation • Potential for significantly reduced landfill gas and leachate production due to bio-stabilisation. As a result the need for landfill should be substantially reduced • The quantity of residual waste disposed to landfill is reduced, particularly where RDF is beneficially utilised • RDF use could help displace virgin fossil-fuel use and assist in reducing long distance transport/import of coal **Disadvantages and Concerns :** • Concerns**:** bio-aerosols/odours and traffic movements • Some concerns that if waste is not be sufficiently bio-stabilised, methane production could still result in landfill. • RDF combustion plants will have to meet Waste Incineration Directive controls • Odour levels are low to medium but use of a bio-filter can help minimise releases • Residue disposal requirements to landfill may exceed permitted landfill limitations • Limited landfill if resulting RDF beneficially used.	200,000	***(15-50)*** 17,000 ***15*** ***(15-50)***	**27** **plus costs for residue treatment or disposal**
Physical Mechanical Treatment	Heat and pressure (autoclave)followed by mechanical treatment can be used to treat both mixed MSW and residual waste after source separation of dry recyclables and green waste. The process involves "cooking" the waste in a rotating vessel using high temperature and pressure steam. Paper and non woody organic materials are reduced to a fibre. The sterile product of this process is treated mechanically to separate recyclables from fibres and residues (trials indicate about 10%residual waste). The fibres produce a consistent and homogeneous RDF that may be use for energy recovery by gasification. The recovered fibres may have a number of potential uses other than RDF including fibre board production. **Technology Status:** An Operational scale plant (combined with Gasification of RDF) is			Quoted commercial gate fee inclusive of capital and operational expenditure and costs for residue disposal

	currently under evaluation in South Wales. Similar type processes are also under development in the USA. **Implementation timescales:** Subject to successful evaluation implementation timescales should be similar to those projected for MBT projects. **Economies of Scale:** The thermal processing vessels are batch process and thus modular but mechanical processing plant and ATT (gasification) elements will benefit from economies of scale. **Advantages:** • Can process both mixed MSW and residual waste after source separation • Relatively efficient in both recovery of recyclate and energy • Minimal residuals for disposal by landfill • Process products sterile and more efficiently separated than from crude or biologically treated processes • TS plus ATT could in theory be used as a 'one stop' shop approach to MSW waste target delivery under the Landfill Directive • Produces homogeneous RDF which may enhance the viability of ATT technologies in particular for gasification. • Competitive quoted costs **Disadvantages:** • New technology not yet routinely operational in the UK • Lack of availability independent evaluation and assessment • Mechanical treatment may requires further development • Markets for recyclate materials will require substantial development in order to make use of quantities and types of recyclate generated • Limited landfill still required for residues and ash, flue gas/gas scrubbing residues • Aesthetics are of industrial-style plants with chimney stack, but significantly smaller-scale than for mass-burn incineration			**45**
THERMAL Energy from Waste by Mass-Burn Incineration (EfW)	Energy from Waste (EfW) Mass-Burn incineration is the combustion of unsorted MSW under strictly controlled operating conditions, converting input material into energy (for power and/or heat recovery) and ash. Results in bulk reduction and stabilisation of MSW. EfW is not a substitute for recycling. Plants should be sized for residual waste stream after targeted level of source segregated material recycling and or composting. **Technology status:** This is the most developed waste treatment and processing technology and is used extensively in mainland Europe. **Implementation timescales:** Unpopularity results in long lead-times. As a result plants at	50,000 100,000	16 (13-19) ***50*** ***(35-55)*** 28 (25-36) ***45*** ***(35-50)***	**98** **86**

	design stage today are unlikely to meet 2010 commissioning. Smaller plant capacities may aid progress on grounds of proximity. (design to commissioning 1 to 5 years) **Economies of scale:** There are significant economies with large plant sizes. **Advantages:** • EfW could in theory be used as a 'one stop' shop approach to MSW waste target delivery under the Landfill Directive, but this approach is neither politically deliverable nor advantageous for nutrient and wider materials recovery. • Produces a stabile residual • Allows secondary recycling from (non-)ferrous metals and bottom ash (used as a secondary aggregate), displacing virgin raw resources • Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency, renewable CO2 • Beneficial outlets exist for bottom ash as a secondary aggregate • Risks to public health of exposure to pollutant releases regarded as insignificant in recent NSCA report (NSCA 2000) whilst Waste Incineration Directive requires most stringent EU control of releases to air and water. • Releases from combustion of the biogenic fraction of MSW are conducive with Climate Change policy **Disadvantages and Concerns :** • This technology suffers from poor public perception with public concern over dioxins and deterioration of local air quality. • Poor aesthetics as large-scale industrial-style plant required with chimney stack • May discourage recycling and composting if oversized in capacity • High capital and operating costs • Lack of flexibility once the commitment the EfW is made	150,000	41 (38-45) ***40*** ***(35-45)***	**80**
Advanced Thermal Treatment (ATT)	Advanced Thermal Treatment involves limited thermal conversion of waste into intermediate materials (gas and solids) allowing more processing flexibility for material recycling or energy recovery. Current focus is on pyrolysis and gasification. Pilot plants for mixed MSW have had very mixed results, however this technology may be significantly more successful when using homogeneous feedstock such as RDF produced by MBT or Thermal Sterilisation (TS). **Technology status:** relatively unproven in UK. Functions best with homogeneous waste streams, less proven worldwide on heterogeneous MWS. **Implementation timescales:** It is difficult to extrapolate from pilot plants. (design to commissioning 1 to 5 years) **Economics of scale:** With only a few commercial-scale reference plants, none of which are	mixed MSW UK source 32,000 European Environment Agency	8,000 ***25*** ***(20-55)***	**62**

	located in the UK at present, assessment of economies of scale are uncertain. **Advantages:** • In theory ATT could be used as a 'one stop' shop approach to MSW waste target delivery under the Landfill Directive, but to date pilot plants have been unconvincing in performance. Enable the total bio-stabilisation of residual BMW fraction • ATT may, in medium to long-term, offer the best environmental and economic means of recovering materials and energy from residual MSW. In the shorter-term, technology more likely to be used to manage RDF produced by MBT or Thermal Sterilisation (TS) processing. • Energy recovery – in the form of heat and/or power – can help to reduce fossil-fuel dependency, renewable CO_2 releases from combustion of the biogenic fraction of MSW and is conducive with "Climate Change" policy. **Disadvantages and Concerns :** • Relatively new technology on UK waste scene currently under trial • Public interest relatively low to date but concerns likely to mirror those for mass-burn incineration • Not a substitute for recycling, plants and should be sized for residual waste stream after targeted removal of source segregated materials for recycling &/or composting • Limited landfill still required for flue gas/gas scrubbing residues • Aesthetics are of industrial-style plants with chimney stack, but smaller-scale than for mass-burn incineration	20,000 50,000 100,000	9,300 ***25*** 18,000 ***16*** 32,000 ***13***	**94** **70** **60** **plus costs for residue disposal**