



WIDP Monte Carlo Simulation Model



15 Stratford Place
London W1C 1BE
Tel: +44.20.7659.8500
Fax: +44.20.7659.8501



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Read Me

This sheet explains the working of the Waste Capacity Forecast Model, including the use of Monte Carlo simulation methods.
A separate report is available which goes into greater detail.

Values in yellow are user inputs. These define the distribution of the random variables and allow entry of historical data.

Values in blue are calculations - please do not edit.

Values in pale green are links to other cells or sheets - please do not edit.

WIDP Monte Carlo Simulation Model

Objectives

The objective of this model is to provide WIDP with a forecast of the waste infrastructure capacity operational by 2020.

Diversion capacity is needed by 2020 in order to ensure that England meets its EU Directive target for the diversion of biodegradable municipal solid waste (BMW) from landfill.

Methods Used

1 An estimate of the municipal solid waste (MSW) arising in 2020 is provided by Defra colleagues. From this, the assumed tonnage of recycling is deducted giving the residual MSW arising.
The BMW % of MSW is specified. This gives the residual BMW arising.

A forecast of BMW diversion capacity is then deducted from this, to give a figure for BMW consigned to landfill. This is compared to the 2020 target to give a surplus/(deficit) of diversion capacity.

2 An alternative method is also used to forecast surplus/(deficit) capacity. This method can be updated each year using actual outturn data.

The most recent year when data is available is selected. Arisings in that year are compared to the BMW consigned to landfill to give an implied BMW diversion capacity.

Diversion capacity in 2020 is calculated as implied diversion in base year + expected future additions. This is compared to forecast arisings in 2020 to calculate surplus/(deficit) capacity.

Monte Carlo Simulation

NERA Economic Consulting were commissioned to adapt the model to allow random simulation of likely outcomes. This simulation is referred to as a "Monte Carlo" model.

Examining the result of this simulation will allow Defra to understand the probability of achieving the 2020 target, *conditional* on no further action being taken to develop infrastructure.

Random simulation of different inputs also allows Defra to examine the sensitivity of surplus/deficit capacity to certain inputs.

Using The Model

Using the Monte Carlo features of this model requires the Excel add-in @Risk. This add-in allows the simple manipulation of random variables and simulation runs.

Using Excel 2010, @Risk appears as a separate ribbon. Toggle between static (i.e. mean) and random values by clicking the "dice" icon.

To run the model, and examine the likely values of the outputs in 2020, select a cell containing =RiskOutput() and click "Start Simulation".

To examine changes to input variables, vary the mean and range of the random variables, all highlighted in yellow.

To alter the distribution of a random variable, click it and select "Define Distribution" from the @Risk ribbon.

Different random variables are likely to be correlated, for example waste arising from households and C&I. These correlations may be varied between -1/1.

Date	Change
22/11/2012	BMW content to landfill changed from 11.38 to 12.22MT
26/11/2012	LA waste arisings forecasts updated (central = mean of model A and model B)
26/11/2012	C&I waste arisings forecasts updated
26/11/2012	Ranges for LA and C&I updated
26/11/2012	Correlation changed to zero for "arising to projects" and "projects to projects"
27/11/2012	LA ranges extended to include Model A+1s.d. and Model B-1s.d.
27/11/2012	Household recycling rate updated to reflect latest data
27/11/2012	C&I recycling rate updated to use 2009 figure of 52%
27/11/2012	Positive shocks to arisings given a probability of 20%
28/11/2012	C&I recycling rate updated to use 2010 estimate of 62%
29/11/2012	C&I min and max updated to draw from MSW% variable
29/11/2012	LA recycling rate: mean 51.4% from LAWRRD model, min and max 5% either side
29/11/2012	MSW% of industrial to 4% either side of mean
29/11/2012	MSW% of commercial to 5% either side of mean
29/11/2012	BMBT to EfW changed to 40-60%
29/11/2012	LFMBT efficiency min to 50%
29/11/2012	MT to EfW range introduced of 70-90%
29/11/2012	Outages to 100% (to avoid double counting of adjustments made elsewhere)
30/11/2012	Project inclusion switches added for 4 non-closed PFI projects
30/11/2012	Correlation assumptions changed for recycling-arising for household (15%) and C&I (35%)
05/12/2012	C&I max forecast increased to use (3,2,1) forecast
05/12/2012	Correlation assumptions changed for recycling-arising for household (0%) and C&I (0%)
05/12/2012	BMW % changed to range of 55% to 75% with mid of 68%
05/12/2012	Utilisation rates for technologies other than EfW all given max of 100% as based on throughput estimates
06/12/2012	Updated C&I forecasts to use final published OBR growth determinants (makes no difference)
07/12/2012	C&I recycling rate range increased to 8 percentage point either side of centre
10/12/2012	DARs reverted to original rates, except for operational projects which are 100% because outages are captured by utilisation rates
13/12/2012	Red DAR for merchants changed to 3%
13/12/2012	Programme level risk introduced at uniform 90-100% DAR
13/12/2012	Formula for programme level risk under method 2 amended in output sheet
14/12/2012	Distribution for BMW waste amended
21/12/2012	DAR Option changed from 5% to 0% for projects yet to close
03/01/2013	Mean, 10th percentile and 90th percentile output boxes added

changes
from
IMAG
meeting
29/11/12

changes following
Chief-Econ meet 4/12

Modelling

The following worksheets are used to perform the modelling.

No.	Name	Description
1	Outputs	This is where all the outputs that are affected by the Monte Carlo process are affected.
2	Inputs	This is where all the input assumptions that are randomised by the Monte Carlo process are defined.
3	Correlations	This sheet contains a covariance matrix for certain random variables which are model inputs. Please do not edit this sheet manually.
4	Empirical Correlations	This sheet contains a covariance matrix for modeled outputs. This sheet demonstrates the consequence of the input assumptions made on correlations.

Outputs

This sheet summarises the model's outputs. Cells in blue are all assigned a distribution by each simulation run of the model.

The only user inputs on this sheet are the landfill target, which should not vary from 10.16 Mt, and the most recent financial year for which data is available in the case of Method 2.

Simulation Results require the user to run a simulation using @Risk to populate the cells.

Method 1		Method 2		2011
	Mt		Mt	
Waste Arising	#####	Waste Arising	#NAME?	
Waste Recycled	#####	Waste Recycled	#NAME?	
Residual Waste	#####	Residual Waste	#NAME?	
Residual BMW	#####	Residual BMW	#NAME?	
Landfill Target	10.16	Landfill Target	10.16	
Diversion Capacity	#####	Diversion Capacity	#NAME?	
BMW to Landfill	#####	BMW to Landfill	#NAME?	
Surplus/(deficit) capacity	#####	Surplus/(deficit) capacity	#NAME?	

Simulation Results for Surplus/(Deficit) Capacity

Mean	#####	Mean	#####
Maximum	#####	Maximum	#NAME?
Minimum	#####	Minimum	#NAME?
Standard Deviation	#####	Standard Deviation	#NAME?
Probability of hitting target	#####	Probability of hitting target	#####

Mean	Mt	Mean	Mt
Waste Arising	#NAME?	Mean Waste Arising	#NAME?
Waste Recycled	#NAME?	Mean Waste Recycled	#NAME?
Residual Waste	#NAME?	Mean Residual Waste	#NAME?
Residual BMW	#NAME?	Mean Residual BMW	#NAME?
Landfill Target	#NAME?	Landfill Target	#NAME?
Diversion Capacity	#NAME?	Mean Diversion Capacity	#NAME?
BMW to Landfill	#NAME?	Mean BMW to Landfill	#NAME?
Surplus/(deficit) capacity	#NAME?	Mean Surplus/(deficit) capacity	#NAME?
90th Percentile	Mt	Waste Arising	#NAME?
Waste Arising	#NAME?	Waste Recycled	#NAME?
Waste Recycled	#NAME?	Residual Waste	#NAME?
Residual Waste	#NAME?	Residual BMW	#NAME?
Residual BMW	#NAME?	Landfill Target	#NAME?
Landfill Target	#NAME?	Diversion Capacity	#NAME?
Diversion Capacity	#NAME?	BMW to Landfill	#NAME?
BMW to Landfill	#NAME?	Surplus/(deficit) capacity	#NAME?
10th Percentile	Mt	Waste Arising	#NAME?
Waste Arising	#NAME?	Waste Recycled	#NAME?
Waste Recycled	#NAME?	Residual Waste	#NAME?
Residual Waste	#NAME?	Residual BMW	#NAME?
Residual BMW	#NAME?	Landfill Target	#NAME?
Landfill Target	#NAME?	Diversion Capacity	#NAME?
Diversion Capacity	#NAME?	BMW to Landfill	#NAME?
BMW to Landfill	#NAME?	Surplus/(deficit) capacity	#NAME?
Surplus/(deficit) capacity	#NAME?		

END

Inputs

This sheet defines the parameter values and distributions of the key inputs to the Monte Carlo model.
 TRIANGULAR - to remove the random component, set max = min = mode.
 NORMAL - to remove the random component, set std deviation = 0.
 UNIFORM - to remove the random component, set max = min.

Forecast Inputs

Waste Arisings	Baseline	2020	Distribution	Static Value	Parameter 1	Parameter 2
LA Arising (Central)	22.62	#NAME?	Triangular	Mode 22.62	Min. 20.31	Max. 24.93
C&I Arising (Central)	#NAME?	#NAME?	Triangular	Mode #####	Min. #####	Max. #####
LA Arising (Alternative)	0.00	#NAME?	Triangular	Mode 0.00	Min. 0.00	Max. 0.00
C&I Arising (Alternative)	#NAME?	#NAME?	Triangular	Mode #####	Min. 0.00	Max. 0.00
Model Selection						
LA Arising (Model Input)	#NAME?	#NAME?				
C&I Arising (Model Input)	#NAME?	#NAME?				
LA Arising (Post- Shock)	#NAME?	#NAME?				
C&I Arising (Post- Shock)	#NAME?	#NAME?				

Input Parameters

Recycling Rates	Baseline	2020	Distribution	Static Value	Parameter 1	Parameter 2
LA Recycling Rate	41.5%	#NAME?	Triangular	Mode 51.4%	Min. 46.4%	Max. 56.4%
C&I Recycling Rate	62.0%	#NAME?	Triangular	Mode 62.0%	Min. 54.0%	Max. 70.0%
BMW Content						
BMW Content of MSW	68.0%	#NAME?	Triangular	Static 68.0%	Min. 55.0%	Max. 75.0%
MSW Content						
MSW % of Industrial Waste	19.1%	#NAME?	Uniform	Static 19.1%	Min. 15.1%	Max. 23.1%
MSW % of Commercial Waste	84.3%	#NAME?	Uniform	Static 84.3%	Min. 79.3%	Max. 89.3%

Plant Level Assumptions

Utilisation Rates	Baseline	2020	Distribution	Static Value	Parameter 1	Parameter 2
BMBT Utilisation	80.0%	#NAME?	Triangular	Mode 80.0%	Min. 75.0%	Max. 100.0%
EfW Utilisation	100.0%	#NAME?	Triangular	Mode 100.0%	Min. 90.0%	Max. 105.0%
LFMBT Utilisation	80.0%	#NAME?	Triangular	Mode 80.0%	Min. 75.0%	Max. 100.0%
MT Utilisation	80.0%	#NAME?	Triangular	Mode 80.0%	Min. 75.0%	Max. 100.0%
Diversion Efficiency						
BMBT Efficiency	#NAME?	#NAME?	Triangular	Mode #####	Min. 70.0%	Max. 90.0%
EfW Efficiency	100.0%	#NAME?	Triangular	Mode 100.0%	Min. 100.0%	Max. 100.0%
LFMBT Efficiency	#NAME?	#NAME?	Triangular	Mode #####	Min. 50.0%	Max. 90.0%
MT Efficiency	0.0%	#NAME?	Triangular	Mode 0.0%	Min. 0.0%	Max. 0.0%
Tonnes to EfW						
BMBT to EfW	50.0%	#NAME?	Triangular	Mode 50.0%	Min. 40.0%	Max. 60.0%
EfW to EfW	100.0%	#NAME?	Triangular	Mode 100.0%	Min. 100.0%	Max. 100.0%
LFMBT to EfW	0.0%	#NAME?	Triangular	Mode 0.0%	Min. 0.0%	Max. 0.0%
MT to EfW	85.0%	#NAME?	Triangular	Mode 85.0%	Min. 70.0%	Max. 90.0%
Adjustment to plants						
Programme Contingency	95.0%	#NAME?	Uniform	Static 95.0%	Min. 90.0%	Max. 100.0%

Correlation Between Inputs

LA Arisings and C&I Arisings	
Coefficient	0.25
LA Recycling and C&I Recycling	
Coefficient	0.25
LA Arising and LA Recycling	
Coefficient	0.00
C&I Arising and C&I Recycling	
Coefficient	0.00
Arisings and Project Delivery	
Coefficient	0.00
Between Different Projects	
Coefficient	0.00

Forecast Shocks

Shock to LA Arisings	Probability	Magnitude (%)	Random Draw	Effect
Positive shock	20%	20%	#NAME?	#NAME?
Negative shock	0%	20%	#NAME?	#NAME?
"Shock"	#NAME?			
Shock to C&I Arisings	Probability	Magnitude (%)	Random Draw	Effect
Positive shock	20%	20%	#NAME?	#NAME?
Negative shock	0%	20%	#NAME?	#NAME?
"Shock"	#NAME?			

Model Risk

Weight on central forecast	Weight	Random Draw	Indicator
LA Arisings	100%	#NAME?	#NAME?
C&I Arisings	100%	#NAME?	#NAME?

END

Correlations

This sheet contains tables which @Risk uses to define the correlation between different random variables.
These values are driven by the Monte Carlo sheet - please do not edit this sheet.

LA and C&I Arisings	
0.25	
LA and C&I Recycling	
0.25	
LA Arising and Recycling	
0.00	
C&I Arising and Recycling	
0.00	
Arisings and Project Delivery	
0.00	
Between Different Projects	
0.00	

@RISK Correlations	LA Arisin	C&I Arisi
LA Arisings Cent in [4892001_1.XLSX]Inputs!\$E\$9	1	
C&I Arising Cent in [4892001_1.XLSX]Inputs!\$E\$10	0.25	1
LA Recycling Rate in [4892001_1.XLSX]Inputs!\$E\$21	0.00	0.00
C&I Recycling Rate in [4892001_1.XLSX]Inputs!\$E\$22	0.00	0.00
North London Waste Authority (NLWA) - Edmonton in [4892001_1.XLSX]Projects!\$P\$23	0.00	0.00
Nottingham City Council - Eastcroft in [4892001_1.XLSX]Projects!\$P\$24	0.00	0.00
Coventry Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$25	0.00	0.00
South East London Combined Heat and Power (SELCHP) in [4892001_1.XLSX]Projects!\$P\$26	0.00	0.00
Birmingham Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$27	0.00	0.00
Bolton Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$28	0.00	0.00
Council of the Isles of Scilly Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$29	0.00	0.00
Sheffield Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$30	0.00	0.00
Stoke on Trent Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$31	0.00	0.00
Hartlepool BC (Tees Valley Lines 1 and 2 (Hartlepool)) Cleveland Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$32	0.00	0.00
Dudley MBC Energy from Waste Facility in [4892001_1.XLSX]Projects!\$P\$33	0.00	0.00
Wolverhampton MBC waste to energy plant in [4892001_1.XLSX]Projects!\$P\$34	0.00	0.00
NE Lincolnshire Energy from Waste Project in [4892001_1.XLSX]Projects!\$P\$35	0.00	0.00
Kirklees Waste Management Project in [4892001_1.XLSX]Projects!\$P\$36	0.00	0.00
Project Integra Energy from Waste Basingstoke in [4892001_1.XLSX]Projects!\$P\$37	0.00	0.00
Newcastle-upon-Tyne City Council Waste Management in [4892001_1.XLSX]Projects!\$P\$38	0.00	0.00
Project Integra Energy from Waste Marchwood in [4892001_1.XLSX]Projects!\$P\$39	0.00	0.00
Leicester City Council Integrated Waste Management Project in [4892001_1.XLSX]Projects!\$P\$40	0.00	0.00
Whites Pit Waste Management Project in [4892001_1.XLSX]Projects!\$P\$41	0.00	0.00
Project Integra Energy from Waste Portsmouth in [4892001_1.XLSX]Projects!\$P\$42	0.00	0.00
Durham County Council Waste Management Project in [4892001_1.XLSX]Projects!\$P\$43	0.00	0.00
East London Waste Authority Integrated waste Management (ELWA) in [4892001_1.XLSX]Projects!\$P\$44	0.00	0.00
Kent County Council Waste Management Project in [4892001_1.XLSX]Projects!\$P\$45	0.00	0.00
Merseyside - Huyton Knowsley in [4892001_1.XLSX]Projects!\$P\$46	0.00	0.00
Isle of Wight Waste Management Project in [4892001_1.XLSX]Projects!\$P\$47	0.00	0.00
Northumberland Waste Management Project in [4892001_1.XLSX]Projects!\$P\$48	0.00	0.00
Lakeside Energy From Waste in [4892001_1.XLSX]Projects!\$P\$49	0.00	0.00
Leicestershire County Council Waste Management Project in [4892001_1.XLSX]Projects!\$P\$50	0.00	0.00
Lancashire Waste Partnership - 1 in [4892001_1.XLSX]Projects!\$P\$51	0.00	0.00
Lancashire Waste Partnership - 2 in [4892001_1.XLSX]Projects!\$P\$52	0.00	0.00
New Earth Solutions Waste Management Project - gloucs in [4892001_1.XLSX]Projects!\$P\$53	0.00	0.00
Cumbria Waste PPP Project (North) in [4892001_1.XLSX]Projects!\$P\$54	0.00	0.00
North Lincolnshire in [4892001_1.XLSX]Projects!\$P\$55	0.00	0.00
East Sussex County Council and Brighton & Hove City Council - New waste partnerships in [4892001_1.XLSX]Projects!\$P\$56	0.00	0.00
Western Riverside WDA in [4892001_1.XLSX]Projects!\$P\$57	0.00	0.00
London Borough of Southwark Integrated Waste Management Solutions Project in [4892001_1.XLSX]Projects!\$P\$58	0.00	0.00
Cambridgeshire County Council Waste Management Project in [4892001_1.XLSX]Projects!\$P\$59	0.00	0.00
Merseyside in [4892001_1.XLSX]Projects!\$P\$60	0.00	0.00
Cumbria Waste PPP (South) in [4892001_1.XLSX]Projects!\$P\$61	0.00	0.00
Greater Manchester WDA - Manchester Waste in [4892001_1.XLSX]Projects!\$P\$62	0.00	0.00
Dorset - Dorset Green (Avonmouth) in [4892001_1.XLSX]Projects!\$P\$63	0.00	0.00
Lincolnshire CC in [4892001_1.XLSX]Projects!\$P\$64	0.00	0.00
West Sussex County Council Waste Management in [4892001_1.XLSX]Projects!\$P\$65	0.00	0.00
Wiltshire Council Waste PPP Project in [4892001_1.XLSX]Projects!\$P\$66	0.00	0.00
Staffordshire Waste Management Project in [4892001_1.XLSX]Projects!\$P\$67	0.00	0.00
North Lincolnshire Waste Management Project in [4892001_1.XLSX]Projects!\$P\$68	0.00	0.00
Peterborough City Council in [4892001_1.XLSX]Projects!\$P\$69	0.00	0.00

Peterborough City Council in [4892001_1.XLSX]Projects!\$P\$70	0.00	0.00
Devon, Exeter Energy From Waste in [4892001_1.XLSX]Projects!\$P\$71	0.00	0.00
South Tyne and Wear Waste Management Partnership (STWP) in [4892001_1.XLSX]Projects!\$P\$72	0.00	0.00
West of England - Avonmouth in [4892001_1.XLSX]Projects!\$P\$73	0.00	0.00
South West Devon Waste Partnership (SWDWP) Waste Management Project in [4892001_1.XLSX]Projects!\$P\$74	0.00	0.00
Suffolk Waste Management Project in [4892001_1.XLSX]Projects!\$P\$75	0.00	0.00
Derbyshire Waste Mnagement Project in [4892001_1.XLSX]Projects!\$P\$76	0.00	0.00
Derby City - Sifin Lane in [4892001_1.XLSX]Projects!\$P\$77	0.00	0.00
Leeds - Former Skelton Grange Power Station in [4892001_1.XLSX]Projects!\$P\$78	0.00	0.00
Oxfordshire County Council PPP Waste Project in [4892001_1.XLSX]Projects!\$P\$79	0.00	0.00
Norfolk Waste Management Project in [4892001_1.XLSX]Projects!\$P\$80	0.00	0.00
Wakefield Semi Integrated Waste Management in [4892001_1.XLSX]Projects!\$P\$81	0.00	0.00
Wigan Council Waste to Energy project in [4892001_1.XLSX]Projects!\$P\$82	0.00	0.00
Shropshire Integrated Waste Partnership Contract in [4892001_1.XLSX]Projects!\$P\$83	0.00	0.00
Essex County Council and Southend on Sea in [4892001_1.XLSX]Projects!\$P\$84	0.00	0.00
Nottinghamshire Sustainable Waste Solutions in [4892001_1.XLSX]Projects!\$P\$85	0.00	0.00
Hertfordshire County Council Waste Management Project in [4892001_1.XLSX]Projects!\$P\$86	0.00	0.00
Buckinghamshire County Council RW (EfW) in [4892001_1.XLSX]Projects!\$P\$87	0.00	0.00
West London Waste Authority (WLWA) in [4892001_1.XLSX]Projects!\$P\$88	0.00	0.00
South Yorkshire waste (BDR) in [4892001_1.XLSX]Projects!\$P\$89	0.00	0.00
Cornwall Council Semi-Integrated Waste Management Project in [4892001_1.XLSX]Projects!\$P\$90	0.00	0.00
Herefordshire and Worcestershire Waste Management Project in [4892001_1.XLSX]Projects!\$P\$91	0.00	0.00
Surrey Quest waste Disposal Project in [4892001_1.XLSX]Projects!\$P\$92	0.00	0.00
London Sustainable Industries Park in [4892001_1.XLSX]Projects!\$P\$93	0.00	0.00
Milton Keynes Waste Management Project in [4892001_1.XLSX]Projects!\$P\$94	0.00	0.00
Merseyside Waste Management Project (MWDA) in [4892001_1.XLSX]Projects!\$P\$95	0.00	0.00
Bradford Waste Treatment Services Project in [4892001_1.XLSX]Projects!\$P\$96	0.00	0.00
North London Waste Authority (NLWA) in [4892001_1.XLSX]Projects!\$P\$97	0.00	0.00
Leeds Residual waste Treatment Project in [4892001_1.XLSX]Projects!\$P\$98	0.00	0.00
South London Waste Partnership (SLWP) in [4892001_1.XLSX]Projects!\$P\$99	0.00	0.00
North Yorkshire Council and City of York Waste Management Project in [4892001_1.XLSX]Projects!\$P\$100	0.00	0.00
Kent in [4892001_1.XLSX]Projects!\$P\$101	0.00	0.00
Gloucestershire County Council Residual Waste in [4892001_1.XLSX]Projects!\$P\$102	0.00	0.00
Avonmouth North - Viridor in [4892001_1.XLSX]Projects!\$P\$103	0.00	0.00
Avonmouth South in [4892001_1.XLSX]Projects!\$P\$104	0.00	0.00
Avonmouth South in [4892001_1.XLSX]Projects!\$P\$105	0.00	0.00
Birmingham - Tyseley Extension waste Project in [4892001_1.XLSX]Projects!\$P\$106	0.00	0.00
Bradford in [4892001_1.XLSX]Projects!\$P\$107	0.00	0.00
Bradford in [4892001_1.XLSX]Projects!\$P\$108	0.00	0.00
Cheshire Energy from Waste in [4892001_1.XLSX]Projects!\$P\$109	0.00	0.00
Covanta Energy Cheshire - Middlewich in [4892001_1.XLSX]Projects!\$P\$110	0.00	0.00
Cheshire Waste Management Project in [4892001_1.XLSX]Projects!\$P\$111	0.00	0.00
Darlington in [4892001_1.XLSX]Projects!\$P\$112	0.00	0.00
Derby City in [4892001_1.XLSX]Projects!\$P\$113	0.00	0.00
Derbyshire - Dunston Road in [4892001_1.XLSX]Projects!\$P\$114	0.00	0.00
Devon - Hill Barton in [4892001_1.XLSX]Projects!\$P\$115	0.00	0.00
Devon in [4892001_1.XLSX]Projects!\$P\$116	0.00	0.00
Doncaster in [4892001_1.XLSX]Projects!\$P\$117	0.00	0.00
Durham - PARC in [4892001_1.XLSX]Projects!\$P\$118	0.00	0.00
East London in [4892001_1.XLSX]Projects!\$P\$119	0.00	0.00
East London in [4892001_1.XLSX]Projects!\$P\$120	0.00	0.00
East Sussex Waste to Energy Project in [4892001_1.XLSX]Projects!\$P\$121	0.00	0.00
Essex in [4892001_1.XLSX]Projects!\$P\$122	0.00	0.00
Essex in [4892001_1.XLSX]Projects!\$P\$123	0.00	0.00
Essex in [4892001_1.XLSX]Projects!\$P\$124	0.00	0.00
Gateshead in [4892001_1.XLSX]Projects!\$P\$125	0.00	0.00
Gloucestershire - Moreton Valence in [4892001_1.XLSX]Projects!\$P\$126	0.00	0.00
South Gloucestershire in [4892001_1.XLSX]Projects!\$P\$127	0.00	0.00
Hertfordshire - Westmill in [4892001_1.XLSX]Projects!\$P\$128	0.00	0.00

Hertfordshire - Ratty's Lane in [4892001_1.XLSX]Projects!\$P\$129	0.00	0.00
Kent - Blaise Farm Quarry in [4892001_1.XLSX]Projects!\$P\$130	0.00	0.00
Kingston-upon-Hull in [4892001_1.XLSX]Projects!\$P\$131	0.00	0.00
Medway Council in [4892001_1.XLSX]Projects!\$P\$132	0.00	0.00
Merseyside - Halton (facility at Widnes in Cheshire) in [4892001_1.XLSX]Projects!\$P\$133	0.00	0.00
Merseyside - Halton in [4892001_1.XLSX]Projects!\$P\$134	0.00	0.00
Merseyside - Ince Marshes in [4892001_1.XLSX]Projects!\$P\$135	0.00	0.00
Merseyside - Wirral (Hooton Park) in [4892001_1.XLSX]Projects!\$P\$136	0.00	0.00
Middlesbrough in [4892001_1.XLSX]Projects!\$P\$137	0.00	0.00
Newcastle in [4892001_1.XLSX]Projects!\$P\$138	0.00	0.00
North London - Brent Cross in [4892001_1.XLSX]Projects!\$P\$139	0.00	0.00
North Yorkshire - Marston in [4892001_1.XLSX]Projects!\$P\$140	0.00	0.00
North Yorkshire and York City in [4892001_1.XLSX]Projects!\$P\$141	0.00	0.00
Wilton International Site - Teeside in [4892001_1.XLSX]Projects!\$P\$142	0.00	0.00
Northamptonshire in [4892001_1.XLSX]Projects!\$P\$143	0.00	0.00
Northamptonshire - Blackridge Farm in [4892001_1.XLSX]Projects!\$P\$144	0.00	0.00
Runcorn Phase 2 - Halton in [4892001_1.XLSX]Projects!\$P\$145	0.00	0.00
Staffordshire - Kingswood EfW in [4892001_1.XLSX]Projects!\$P\$146	0.00	0.00
Sunderland in [4892001_1.XLSX]Projects!\$P\$147	0.00	0.00
Sutton - Beddington Lane in [4892001_1.XLSX]Projects!\$P\$148	0.00	0.00
Thurrock Council - Tilbury Green Power in [4892001_1.XLSX]Projects!\$P\$149	0.00	0.00
Warwickshire - Rugby in [4892001_1.XLSX]Projects!\$P\$150	0.00	0.00
West London - Park Royal in [4892001_1.XLSX]Projects!\$P\$151	0.00	0.00
Buckinghamshire - PHASE I Rookery Pit in [4892001_1.XLSX]Projects!\$P\$152	0.00	0.00
Buckinghamshire - PAHSE II Rookery Pit in [4892001_1.XLSX]Projects!\$P\$153	0.00	0.00
Central Bedfordshire Waste in [4892001_1.XLSX]Projects!\$P\$154	0.00	0.00
Blackburn with Darwen in [4892001_1.XLSX]Projects!\$P\$155	0.00	0.00
Dorset - Canford, Poole in [4892001_1.XLSX]Projects!\$P\$156	0.00	0.00
Kent in [4892001_1.XLSX]Projects!\$P\$157	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$158	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$159	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$160	0.00	0.00
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INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$162	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$163	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$164	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$165	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$166	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$167	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$168	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$169	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$170	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$171	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$172	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$173	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$174	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$175	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$176	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$177	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$178	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$179	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$180	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$181	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$182	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$183	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$184	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$185	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$186	0.00	0.00
INSERT NEW PROJECT HERE in [4892001_1.XLSX]Projects!\$P\$187	0.00	0.00

Correlation

This sheet contains tables which @Risk uses to define the correlation between different random variables. These values are driven by the Monte Carlo sheet - please do not edit this sheet.

Empirical Correlations

Correlations entered in the "Inputs" sheet will not be perfectly reflected in the actual run of the model.

This sheet indicates the correlations between model outputs that are an *outcome* of the last simulation run. Pearson correlation coefficients are reported.

Use this sheet to check what correlation between diversion capacity and waste arisings is implied by the correlation coefficients entered in the "Inputs" sheet.

Method 1	Waste Arising	Waste Recycled	Residual Waste	Residual BMW	Diversion Capacity	BMW to Landfill	Surplus/(deficit) capacity
Waste Arising	#####						
Waste Recycled	##### #NAME?						
Residual Waste	##### #NAME? #NAME?						
Residual BMW	##### #NAME? #NAME? #NAME?						
Diversion Capacity	##### #NAME? #NAME? #NAME? #NAME?						
BMW to Landfill	##### #NAME? #NAME? #NAME? #NAME? #NAME?						
Surplus/(deficit) capacity	##### #NAME? #NAME? #NAME? #NAME? #NAME? #NAME?						

Method 2	Waste Arising	Waste Recycled	Residual Waste	Residual BMW	Diversion Capacity	BMW to Landfill	Surplus/(deficit) capacity
Waste Arising	#####						
Waste Recycled	##### #NAME?						
Residual Waste	##### #NAME? #NAME?						
Residual BMW	##### #NAME? #NAME? #NAME?						
Diversion Capacity	##### #NAME? #NAME? #NAME? #NAME?						
BMW to Landfill	##### #NAME? #NAME? #NAME? #NAME? #NAME?						
Surplus/(deficit) capacity	##### #NAME? #NAME? #NAME? #NAME? #NAME? #NAME?						

Infrastructure

The following worksheets all deal with infrastructure.

No.	Name	Description
1	Projects	Lists the waste diversion infrastructure that is already installed or is projected to come online. Edit project risk, delivery date, operational capacity and plant type here.
2	Diversion Efficiency	Calculates the diversion efficiency of BMBT and LFMBT plants. Edit moisture loss, recycling, residues to landfill etc. here.
3	Delivery Adjustment	Lists the delivery adjustment for different types of project, by stage of completion. Edit adjustment rates here.
4	Sum Capacity	Calculates the sum of infrastructure capacity in different years. No user entry.

Projects

This sheet is a key data input sheet. It lists all of the projects that WIDP is aware of. The relevant data fields are described below. Input cells driving calculations are highlighted in yellow - other than RAG status cells colour coded as per Delivery Adjustment sheet. The cells labelled "Random Draw" are random variables that @risk uses to determine whether a project is delivered or not in each simulation run.

Field	Comment
Location	Brief Project identifier. Further details are held in a contact database
Classification	Describes the project as PPP (local authority driven Public Private Partnership); or PFI (local authority driven Private Finance Initiative; or M (private sector driven Merchant plant)
Status	Describes the life cycle stage of the project - see drop down list for descriptors
Operational Date	The date on which the plant became or will become operational
FY Completed	The fiscal year (end) in which the plant became or will become operational. Plants already operational by March 2010 have been assigned as FY(End) 2010 regardless so the actual operational date
Operational Capacity	The operational throughput capacity of the plant NB. Not the permitted capacity or the design capacity which will tend to be higher. In the case of operational plant the entered figure should be the average of the past years throughput as reported by Environment Agency data
Plant Type	Plant is (user) classified as: Energy from Waste (EfW); Biodrying Mechanical Biological Treatment (BMBT); Landfill Mechanical Biological Treatment (LFMBT); or Mechanical Treatment (MT)
Proj. RAG	The Red, Amber, Green (RAG) status of the plant - user input as per colour coding in Assumptions sheet
Utilisation	Calculation - adjusts operational capacity depending on inputs in the Assumptions sheet
Tonnes to EfW if MBT	Calculation - where an MBT plant estimates the tonnage of waste that will be treated at an efw plant based on inputs in the Assumptions sheet
BMW Content	Calculates the BMW content of the input waste depending on inputs in Assumptions sheet
BMW Diverted from Landfill	Calculates the BMW diverted from landfill depending on inputs in the Assumptions sheet - based on type of technology
BMW Diverted	
Proj Risk Adjusted	Applies a project risk adjustment (see Assumptions) to the calculated BMW diversion from landfill
Comment	Notes any specific comments on the plant

Location	Classification - PFI, PPP or M	Status	Operational Date	FY (End) Completed	Operational Capacity (ktpa)	Plant Type - efw, bmbt, lfmbt, mt	Proj. RAG	Delivery Adjustment Rate	Utilisation (ktpa)	Tonnes to EfW (if MBT)	BMW Content (ktpa)	BMW Diversion Capacity (ktpa)	Random Draw (-1 to 0)	Project Delivery Dummy	BMW Capacity Delivered (ktpa)	BMW Capacity Net of Outages (ktpa)	Comment
Merseyside Waste Management Project (MWDA)	PFI	In-procurement	01-Jun-2016	2017	450	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Bradford Waste Treatment Services Project	PFI	In-procurement	01-Apr-2016	2017	193	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Leeds Residual waste Treatment Project	PFI	Financial Close	01-Jul-2016	2017	165	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
North Yorkshire Council and City of York Waste Management Project	PFI	In-procurement	01-Mar-2017	2017	300	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
New Earth Solutions Waste Management Project - gloucs	M	Operational	01-Apr-2011	2012	120	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Merseyside	M	TBC	01-Jan-2013	2013	80	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Dorset - Dorset Green (Avonmouth)	M	TBC	01-Jun-2013	2014	42	LFMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Peterborough City Council	M	In-procurement	01-Jan-2014	2014	65	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Peterborough City Council	M	In-Construction	01-Jan-2014	2014	200	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
West of England - Avonmouth	M	In-Construction	01-Mar-2014	2014	80	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Leeds - Former Skelton Grange Power Station	M	TBC	01-Jan-2015	2015	300	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
London Sustainable Industries Park	M	TBC	01-Jul-2016	2017	120	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Kent	M	TBC	31-Dec-2016	2017	550	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Avonmouth North - Viridor	M	TBC	01-Dec-2018	2019	350	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Avonmouth South	M	TBC	01-Dec-2018	2019	75	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Avonmouth South	M	TBC	01-Dec-2018	2019	70	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Birmingham - Tyseley Extension waste Project	M	TBC	01-Dec-2018	2019	400	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Bradford	M	TBC	01-Dec-2018	2019	160	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Bradford	M	TBC	01-Dec-2018	2019	0	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Cheshire Energy from Waste	M	TBC	01-Dec-2018	2019	0	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Covanta Energy Cheshire - Middlewich	M	TBC	01-Dec-2018	2019	370	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Cheshire Waste Management Project	M	TBC	01-Dec-2018	2019	180	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Darlington	M	TBC	01-Dec-2018	2019	50	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Derby City	M	TBC	01-Dec-2018	2019	100	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Derbyshire - Dunston Road	M	TBC	01-Dec-2018	2019	75	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Devon - Hill Barton	M	TBC	01-Dec-2018	2019	72	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Devon	M	TBC	01-Dec-2018	2019	273	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Doncaster	M	TBC	01-Dec-2018	2019	120	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Durham - PARC	M	TBC	01-Dec-2018	2019	62	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
East London	M	TBC	01-Dec-2018	2019	500	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
East London	M	TBC	01-Dec-2018	2019	100	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
East Sussex Waste to Energy Project	M	TBC	01-Dec-2018	2019	95	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Essex	M	TBC	01-Dec-2018	2019	120	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Essex	M	TBC	01-Dec-2018	2019	510	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Gateshead	M	TBC	01-Dec-2018	2019	305	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Gloucestershire - Moreton Valence	M	TBC	01-Dec-2018	2019	32	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
South Gloucestershire	M	TBC	01-Dec-2018	2019	400	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Hertfordshire - Westmill	M	TBC	01-Dec-2018	2019	400	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Hertfordshire - Ratty's Lane	M	TBC	01-Dec-2018	2019	100	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Kent - Blaise Farm Quarry	M	TBC	01-Dec-2018	2019	100	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Kingston-upon-Hull	M	TBC	01-Dec-2018	2019	240	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Medway Council	M	Financial Close	01-Dec-2018	2019	0	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Merseyside - Halton (facility at Widnes in Cheshire)	M	TBC	01-Dec-2018	2019	200	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Merseyside - Halton	M	TBC	01-Dec-2018	2019	100	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Merseyside - Ince Marshes	M	TBC	01-Dec-2018	2019	300	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Merseyside - Wirral (Hooton Park)	M	TBC	01-Dec-2018	2019	400	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Middlesbrough	M	TBC	01-Dec-2018	2019	500	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Newcastle	M	TBC	01-Dec-2018	2019	120	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
North London - Brent Cross	M	TBC	01-Dec-2018	2019	130	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
North Yorkshire - Marston	M	TBC	01-Dec-2018	2019	60	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
North Yorkshire and York City	M	TBC	01-Dec-2018	2019	76	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Wilton International Site - Teeside	M	TBC	01-Dec-2018	2019	400	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Northamptonshire	M	TBC	01-Dec-2018	2019	120	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Northamptonshire - Blackridge Farm	M	TBC	01-Dec-2018	2019	50	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Runcorn Phase 2 - Halton	M	TBC	01-Dec-2018	2019	375	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Staffordshire - Kingswood EfW	M	TBC	01-Dec-2018	2019	400	EfW			#NAME?	0	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Sunderland	M	TBC	01-Dec-2018	2019	300	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Sutton - Beddington Lane	M	TBC	01-Dec-2018	2019	110	BMBT			#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?	
Thurrock Council - Tilbury Green Power	M	TBC	01-Dec-2018	2019	300	BMBT		</									

Diversion Efficiency

This sheet is used to calculate the diversion efficiencies of different plant types.
These parameters are assigned a distribution in the Monte Carlo sheet.

Diversion Assumptions for residual waste technologies

Technology Classification	Utilisation Rate %	Tonnes to EfW	Diversion Efficiency	Technology Example
BMBT	#NAME?	#NAME?	#NAME?	Bio drying MBT e.g. ELWA
EfW	#NAME?	#NAME?	#NAME?	EfW
LFMBT	#NAME?	#NAME?	#NAME?	LF MBT e.g. Lancs, Cambs
MT	#NAME?	#NAME?	#NAME?	Mechanical treatment
Comments				
The MBT and MT technologies generally do not operate at the reported operational capacity - hence 80% assumed				
It is assumed that for BMBT and MT processes the out put (rdf) is not consigned to landfill				

BMBT type generic process - biodrying - Ecodeco type

	%	BMW %	Comment
Waste input	100.00	#NAME?	
Moisture loss plus some carbon loss	25.00		Typical value for this type of process - Source - [REDACTED]
Recycling (metals,paper,plastics)	10.00		Typical value for this type of process - Source - [REDACTED]
residues to landfill	15.00	#NAME?	Typical value for this type of process - Source - [REDACTED]
RDF	50.00		Typical value for this type of process - Source - [REDACTED]
BMW diverted =		#NAME?	
BMW diversion efficiency		#NAME?	

LFMBT type generic process - compost like output to landfill - lancs,cambs type

	%	BMW	Comment
BMW of treated waste	35%		
Waste input	100.00	#NAME?	
Moisture loss plus carbon loss	45.00		Typical value for this type of process - Source - [REDACTED]
Recycling (metals,paper,plastics)	10.00		Typical value for this type of process - Source - [REDACTED]
residues to landfill	15.00	5.25	Typical value for this type of process - Source - [REDACTED]
CLO	30.00	10.50	Typical value for this type of process - Source - [REDACTED]
BMW diverted =		#NAME?	
BMW diversion efficiency		#NAME?	

END

Delivery Adjustment

This sheet outlines the project delivery adjustment rates that are used in the model.

Note that the values used seem slightly unintuitive - this is because a 0.95 adjustment for project outages has been applied.

Project Risk Adjustment - (adjustment for outages removed)				Project Status
	PFI	PPP	M	
B	100%	100%	100%	Fully operational
G	90%	90%	90%	Commissioning
AG	80%	80%	80%	Financial close, with planning
A	70%	70%	40%	Financial close, no planning
AR	60%	60%	20%	In procurement, no planning
R	20%	20%	3%	Unlikely to go live by 2020
n/a	0%	0%	0%	Cancelled Project

END

Sum Capacity

This sheet summarises the BMW diversion. All projects pre-March 2010 are included in the 2010 financial year.
Projects becoming operational in subsequent years are recorded in the year they become operational
Random Delivery will report a different capacity each time the dice icon is toggled on/off in @Risk.

Project Delivery

Date	FY (End)	(Randomly Delivered) Capacity (mt)	PFI	PPP	M	Additional Capacity by Mar-2020 (mt)
31-Mar-10	2010	#NAME?	#NAME?	#NAME?	-	#NAME?
31-Mar-11	2011	#NAME?	#NAME?	#NAME?	-	#NAME?
31-Mar-12	2012	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
31-Mar-13	2013	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
31-Mar-14	2014	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
31-Mar-15	2015	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
31-Mar-16	2016	#NAME?	#NAME?	#NAME?	-	#NAME?
31-Mar-17	2017	#NAME?	#NAME?	#NAME?	#NAME?	#NAME?
31-Mar-18	2018	-	-	-	-	#NAME?
31-Mar-19	2019	#NAME?	-	#NAME?	#NAME?	#NAME?
31-Mar-20	2020	#NAME?	-	#NAME?	#NAME?	-
Total	Total	#NAME?	#NAME?	#NAME?	#NAME?	

END

Arisings

The following worksheets all deal with arisings and the factors that influence them.

No.	Name	Description
1	Forecasts	Collects the most recent forecast values of LA and C&I waste arisings. Historical values can be entered when forecasts are updated.
2	Outturn	Collects historical data on BMW to landfill and recycling rates. Update as new data become available.

Forecasts

This sheet collates the waste arising forecast data (MSW).

Data for 2011 are actual out turns reported by Waste Stats colleagues. Actual figures are in **bold**.

Data on forward projections are derived from Waste Economists

Forecasts (Central - SARIMA and GVA Method)

Date	FY (End)	Household MSW Arising (Mt)	C&I MSW Arising (mt)
31-Mar-10	2010	23.37	#NAME?
31-Mar-11	2011	23.13	#NAME?
31-Mar-12	2012	23.21	#NAME?
31-Mar-13	2013	23.09	#NAME?
31-Mar-14	2014	23.04	#NAME?
31-Mar-15	2015	22.95	#NAME?
31-Mar-16	2016	22.89	#NAME?
31-Mar-17	2017	22.82	#NAME?
31-Mar-18	2018	22.75	#NAME?
31-Mar-19	2019	22.69	#NAME?
31-Mar-20	2020	22.62	#NAME?

Industrial Arising (mt)	Commercial Arising (mt)
24.04	23.65
23.67	22.91
22.73	22.19
21.76	21.37
21.19	20.86
20.87	20.66
20.89	20.89
21.05	21.32
21.17	21.77
21.25	22.19
21.31	22.58

MSW(%) #NAME? #NAME?

Minimum C&I Arisings

FY (End)	Industrial	Commercial
2010	23,944	23,561
2011	23,214	22,465
2012	21,941	21,425
2013	20,679	20,305
2014	19,816	19,513
2015	19,187	18,994
2016	18,868	18,865
2017	18,866	19,109
2018	18,973	19,508
2019	19,050	19,885
2020	19,100	20,238

Forecasts (Alternative)

Date	FY (End)	Household MSW Arising (Mt)	C&I MSW Arising (mt)
31-Mar-10	2010		#NAME?
31-Mar-11	2011		#NAME?
31-Mar-12	2012		#NAME?
31-Mar-13	2013		#NAME?
31-Mar-14	2014		#NAME?
31-Mar-15	2015		#NAME?
31-Mar-16	2016		#NAME?
31-Mar-17	2017		#NAME?
31-Mar-18	2018		#NAME?
31-Mar-19	2019		#NAME?
31-Mar-20	2020		#NAME?

Industrial Arising (mt)	Commerical Arising (mt)

MSW(%) #NAME? #NAME?

Maximum C&I Arisings

FY (End)	Industrial	Commercial
2010	24,099	23,711
2011	24,040	23,266
2012	23,621	23,066
2013	23,326	22,904
2014	23,418	23,061
2015	23,663	23,427
2016	23,874	23,872
2017	24,054	24,364
2018	24,191	24,873
2019	24,289	25,353
2020	24,353	25,804

Min Mun #NAME?
Max Mun #NAME?

END

Local Authority: Stata Quarterly Output

Year	quarter	FY end	total	househ	pA	pB
2009	2009q2	2010	6407.346	6349.701	6410.903	
2009	2009q3	2010	6331.908	6220.503	6174.855	
2009	2009q4	2010	5542.081	5437.737	5384.079	
2010	2010q1	2010	5384.205	5426.56	5341.408	
2010	2010q2	2011	6346.689	6277.207	6268.765	
2010	2010q3	2011	6151.61	6202.542	6213.523	
2010	2010q4	2011	5287.374	5434.756	5395.969	
2011	2011q1	2011	5668.021	5174.882	5288.031	
2011	2011q2	2012	6138.207	6302.045	6163.557	
2011	2011q3	2012	6039.962	6243.396	6029.536	
2011	2011q4	2012	5392.618	5116.664	5438.313	
2012	2012q1	2012	5324.322	5640.976	5493.444	
2012	2012q2	2013		6191.848	6077.291	
2012	2012q3	2013		6044.39	6071.609	
2012	2012q4	2013		5427.063	5252.502	
2013	2013q1	2013		5657.113	5452.456	
2013	2013q2	2014		6219.152	6064.729	
2013	2013q3	2014		6064.883	5959.827	
2013	2013q4	2014		5451.709	5216.104	
2014	2014q1	2014		5679.227	5414.953	
2014	2014q2	2015		6242.811	5973.746	
2014	2014q3	2015		6087.599	5921.363	
2014	2014q4	2015		5475	5165.549	
2015	2015q1	2015		5702.167	5338.087	
2015	2015q2	2016		6265.964	5931.074	
2015	2015q3	2016		6110.623	5864.662	
2015	2015q4	2016		5498.104	5097.672	
2016	2016q1	2016		5725.221	5291.169	
2016	2016q2	2017		6289.049	5871.974	
2016	2016q3	2017		6133.689	5802.176	
2016	2016q4	2017		5521.181	5047.276	
2017	2017q1	2017		5748.292	5231.532	
2017	2017q2	2018		6312.124	5812.525	
2017	2017q3	2018		6156.761	5749.232	
2017	2017q4	2018		5544.254	4987.905	

SD 2019-20 0.96 0.95

Local Authority: Annual Aggregation

FY (End)	Model A	Model B	Mean	Mean ('000s)
2010	23,435	23,311	23,373	23.37
2011	23,089	23,166	23,128	23.13
2012	23,303	23,125	23,214	23.21
2013	23,320	22,854	23,087	23.09
2014	23,415	22,656	23,035	23.04
2015	23,508	22,399	22,953	22.95
2016	23,600	22,185	22,892	22.89
2017	23,692	21,953	22,823	22.82
2018	23,785	21,723	22,754	22.75

2018	2018q1	2018	5771.365	5173.669
2018	2018q2	2019	6335.197	5757.854
2018	2018q3	2019	6179.834	5690.383
2018	2018q4	2019	5567.328	4930.787
2019	2019q1	2019	5794.438	5117.901
2019	2019q2	2020	6358.27	5699.528
2019	2019q3	2020	6202.907	5633.554
2019	2019q4	2020	5590.401	4874.361
2020	2020q1	2020	5817.511	5060.002
2020	2020q2	2021	6381.343	5642.762
2020	2020q3	2021	6225.98	5576.758
2020	2020q4	2021	5613.474	4816.774

Source: SARIMA Models (Nov 2012)

Outturn

This sheet collects actual outturn data on recycling and waste to landfill.

Entering values into yellow cells that are currently blank will replace values that are currently forecasts elsewhere in the spreadsheet, if applicable.

Landfill data is from the EA. Recycling data is actually reported outturn.

BMW to Landfill

Date	FY (End)	EA Reported BMW to Landfill (mt)	Residual BMW (mt)	BMW Diversion Implied (mt)
31-Mar-10	2010	13.46	#NAME?	#NAME?
31-Mar-11	2011	12.22	#NAME?	#NAME?
31-Mar-12	2012		0.00	0.00
31-Mar-13	2013		0.00	0.00
31-Mar-14	2014		0.00	0.00
31-Mar-15	2015		0.00	0.00
31-Mar-16	2016		0.00	0.00
31-Mar-17	2017		0.00	0.00
31-Mar-18	2018		0.00	0.00
31-Mar-19	2019		0.00	0.00
31-Mar-20	2020		0.00	0.00

Recylcing Rates

Date	FY (End)	Household	C&I	Household (forecast)	C&I (forecast)
31-Mar-10	2010	39.7%	62.0%	41.5%	62.0%
31-Mar-11	2011	41.5%	62.0%	41.5%	62.0%
31-Mar-12	2012	43.0%		43.0%	#NAME?
31-Mar-13	2013			#NAME?	#NAME?
31-Mar-14	2014			#NAME?	#NAME?
31-Mar-15	2015			#NAME?	#NAME?
31-Mar-16	2016			#NAME?	#NAME?
31-Mar-17	2017			#NAME?	#NAME?
31-Mar-18	2018			#NAME?	#NAME?
31-Mar-19	2019			#NAME?	#NAME?
31-Mar-20	2020			#NAME?	#NAME?
P.p. change/year		#NAME?	#NAME?		

END