Social, Environmental & Economic Solutions (SOENECS) Ltd

Report for the London Waste and Recycling Board (LWARB) and the Greater London Authority (GLA)

INTERNATIONAL RECYCLING RATE COMPARISON PROJECT

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October 2016

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SOcial, ENvironmental & EConomics Solutions (SOENECS) Ltd provide strategic advice and consultancy to the public and private sectors. SOENECS specialise in the fields of waste management, resource management, circular economy, procurement, renewable deployment, carbon management and partnership delivery
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Introduction

Many commentators, including the Chartered Institution of Wastes Management (CIWM), regard the lack of consistency of data across Europe as being equally problematic across the world and a barrier to accurately comparing waste management practice and recycling rates. This research shows that cities use varying methods and include different waste streams in their recycling rate calculations resulting in large variations in their published recycling rates and ability to compare accurately. As such it also impedes in developing a circular economy and progress against targets set out in the Sustainable Development Goals. This report has been prepared using cities chosen by LWARB, the GLA and SOENECS to give a global perspective or because they are members of the C40 or city mayors list, many are capital cities.

Aim

To understand how cities calculate their recycling rates and to provide underpinning evidence for more robust measurement and reporting, LWARB and the GLA commissioned SOENECS Ltd to undertake research to assess the differences in reported recycling rates across major world cities. The aim of this research was to collate commonly published recycling rates to understand if London were able to compare its performance with other cities.

Results

The research sought to find tonnages and recycling rates for different waste streams; household and municipal solid waste (MSW). During the research it was found that many cities were reporting their recycling from household, Commercial & Industrial (C&I) and Construction & Demolition (C&D) as a single figure. It was decided to therefore include this stream as many of these cities did not distinguish between household, C&I and C&D wastes, therefore a new category was created by the author to reflect this, called total waste.

Data was collated through desktop research, sources included government, city, academic and press reports, articles and blogs. One of the main challenges for collecting data was the sporadic nature of reporting, alongside different interpretations and significant data anomalies, which may mean some data accurate and should be interpreted accordingly. Figure 1 shows the results of the research, the bar chart shows commonly reported recycling rates, the metric used to calculate that recycling rate and is arranged from the left to right, based upon the rank of highest recycling rate.
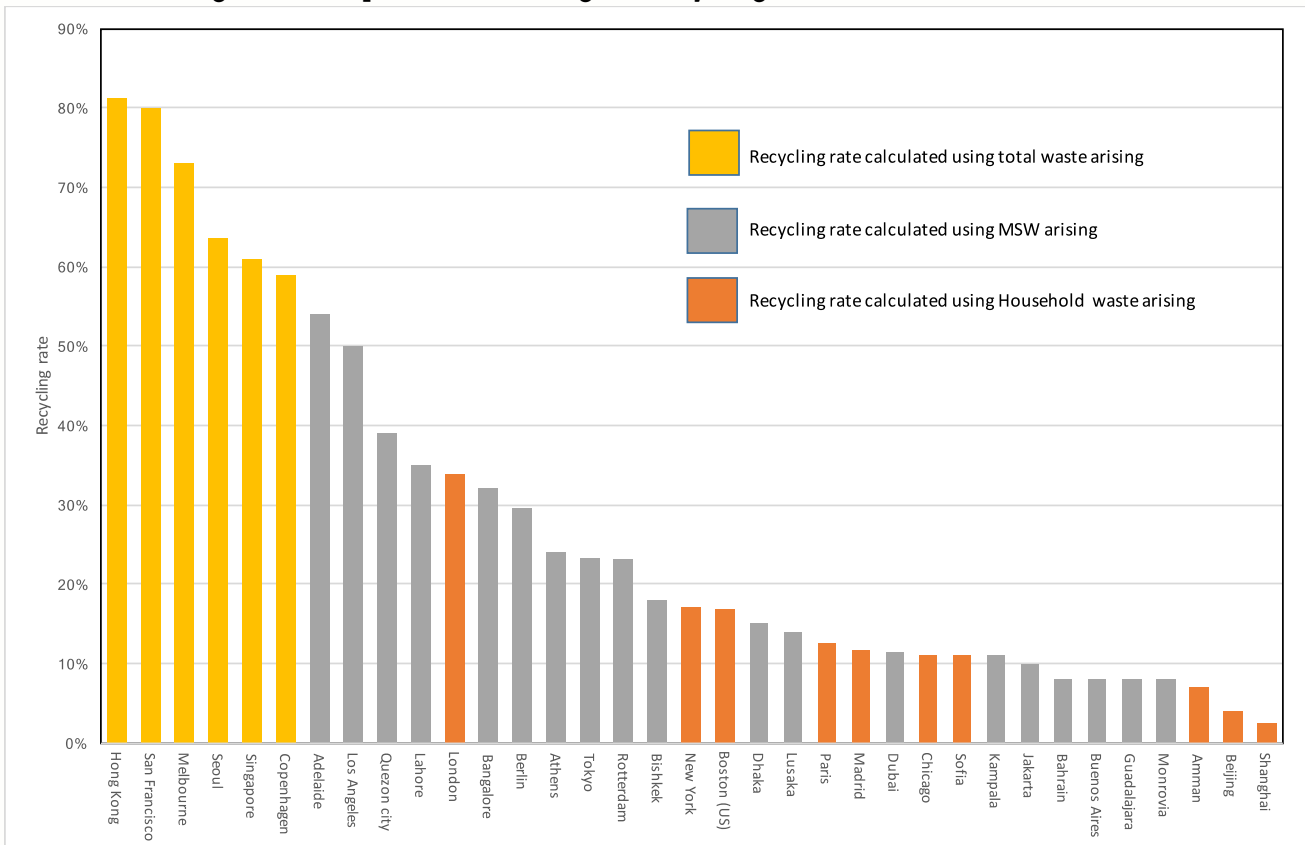

Figure 1: The commonly reported recycling rates indicating which stream was used for calculating the recycling rate

Interpretation of the graph shows that cities' recycling performance ranges from over 80% to under 8%, with London ranked at 11th. What is very clear however, is that the six cities that report total waste recycling figures have the highest recycling rate. One of the principle reasons for this is that total waste includes C&D recycling. As C&D is a large tonnage and the sector normally achieves recycling rates above 80%, the total recycling rate is blended which masks the household and MSW recycling performance. Many cities are also reporting either diversion from landfill of all waste generated in the city or the recycling rate of these. A full data set is shown in Appendix 1, but the high level data analysis showed that:

- 16 cities had available data classified as household recycling, of these 10, including London, reported this figure as their recycling rate.
- 30 cities had data available for MSW and of these, 26 reported this figure as their recycling rate
- 11 cities had data available for total recycling figures and of these, 7 reported this figure as their recycling rate.

After the data was collected, it was clear that because there was such a variation in which streams were used to calculate the recycling rate, a harmonisation assessment was required to allow London to understand how it compared to all cities using the same data.

Revised recycling ranking

This was undertaken by SOENECS using a similar methodology as the EU Compositional Assessment Tool (EUCAT)[1] commissioned by CIWM in 2015, which attempts to show recycling rates on a comparable basis. Because 30 cities had MSW data available, it was decided to use this as the comparison stream, although, there is still concern as to what cities include in their definition of MSW. For those cities that did not have a MSW recycling rate, a percentage was calculated from the tonnages that were found for individual cities. The cities that had a SOENECS calculated MSW recycling rate included London, Shanghai and Dubai (the EUCAT calculations are shown in Appendix 3).

Using this reclassification exercise, Figure 2 shows the ranking of recycling rates based upon MSW, compared to reported recycling rate. The full data set can be found in Appendix 2.
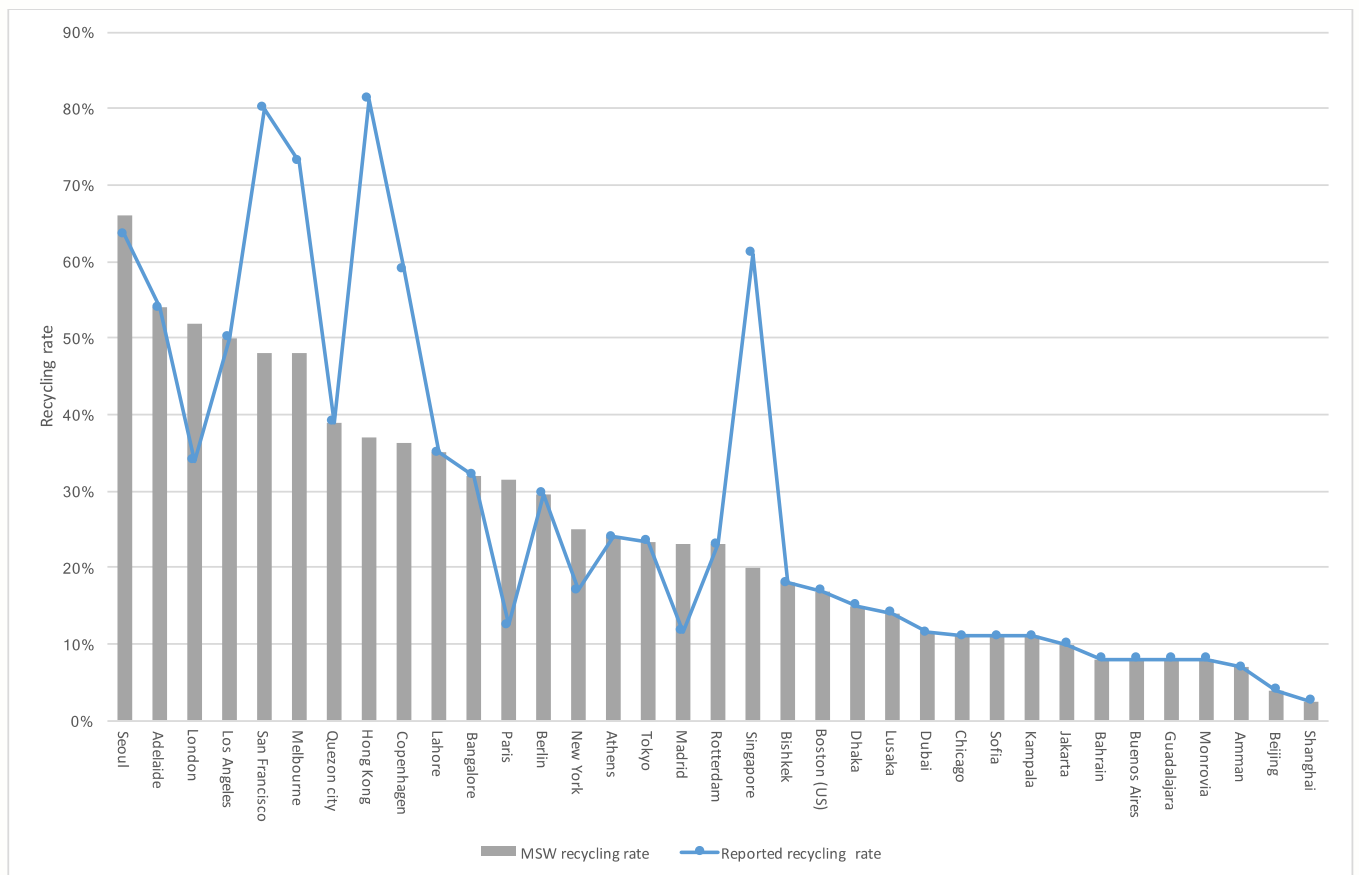
Figure 2: The revised ranking using MSW recycling rates.

There are some major changes in the ranking, for example, Hong Kong drops from 1st to 8th, Singapore drops from 5th to 19th, Copenhagen drops from 6th to 9th, Adelaide rises from 7th to 2nd and if London were to use MSW for calculating their recycling rate calculation, they would move from being ranked 11th to 3rd. This is comparable with the best reporting cities in the world and ahead of San Francisco, whose 80% total recycling rate Jeremy Irons, called a "source of hope" in his documentary, Trashed[2].

Assumptions
The data reflects the different interpretations by cities and governments as to what is recycling. For some cities data had to be sourced from multiple sources and should be acknowledged as calculated rather than official figures. It should also be noted that whilst the majority of the data is from 2014/15, in some cases, data was only available in the five years prior to that date and therefore some cities' performance may have improved, or indeed, declined. It should also be noted that interpretation of which materials were included in each stream was also variable and it is recommended that a separate report is undertaken on what materials are included within each stream.

Conclusion
This research has shown that what is commonly reported as recycling varies from city to city, due to different definitions of what wastes are included in the recycling calculation. This research suggests that perhaps the only way to understand performance is to compare MSW recycling figures. San Francisco is perhaps one of the better examples of how reporting recycling can be misinterpreted; they report their total recycling rate as 80%, including, it is believed, construction and demolition tonnages. From the high level research, it would indicate that they have to report diversion from landfill figures for all waste. If London were to report their total recycling rate, they would report 73.1% (excluding MSW recovery) for C&D, C&I and household wastes.

To conclude, it is clear that London can hold its head high as one of the higher performers in diverting waste away from landfill and is therefore amongst some of the world's best recycling cities; indeed, if comparing London using MSW recycling rate, they would rank as 3rd amongst the selected cities.

Recommendations
The research shows that the way the municipality records and reports its recycling rate is critical to allowing for comparability with other cities. It is recommended that further research needs to be undertaken to confirm many of these figures and indeed to understand the policies and interpretations of waste and recycling. It is recommended that London establish a city to city recycling comparison tool based upon the EUCAT and the Association of Cities and Regions (ACR+) DERC[3] methodologies.

Appendices

Appendix1: Full city data set

City	Reported recycling rate[1]	Household only RR	MSW recycling rate	Total waste recycling rate (TWRR)	Rank based upon report recycling rate	Rank if using HW	Rank if using MSW	Rank if using TWRR
Hong Kong	81.2%[4]	26.0%[5]	37%[6]	81.2%	1st	6th	8th	1st
San Francisco	80.0%[7]		48.0%[8]	80.0%	2nd		5th	2nd
Melbourne	73.0%[9]	58.0%	48.0%[10]	73.0%	3rd	1st	6th	5th
Seoul	63.5%[11]	48.8%[12]	66%[13]	63.5%	4th	2nd	1st	6th
Singapore	61.0%[14]	36.4%[15]	20.0%[16]	61.0%	5th	3rd	19th	7th
Copenhagen	59.0%[17]	32%[18]	36.4%[19]	59%	6th	5th	9th	8th
Adelaide	54.0%[20]			54.0%	7th		2nd	14th
Los Angeles	50.0%[21]		50.0%	76.4%[22]	8th		4th	3rd
Quezon city	39.0%[23]		39.0%		9th		7th	15th
Lahore	35.0%[24]		35.0%		10th		10th	16th
London	33.9%[25]	33.9%	51.9%[26]	73.1%[27]	11th	4th	3rd	4th
Bangalore	32.0%[28]		32.0%		12th		11th	17th
Berlin	29.6%[29]		29.6%	29.6%	13th		13th	11th
Athens	24.0%[30]		24.0%		14th		15th	18th
Tokyo	23.4%[31]		23.4%		15th		16th	19th
Rotterdam	23.0%[32]		23.0%		16th		18th	20th
Bishkek	18.0%[33]		18.0%		17th		20th	21st
New York	17.0%[34]	17.0%	25.0%[35]	52.0%[36]	18th	7th	14th	9th
Boston	16.9%[37]	16.9%	16.9%		19th	8th	21st	22nd
Dhaka	15.0%[38]		15.0%		20th		22nd	23rd
Lusaka	14.0%[39]		14.0%		21st		23rd	24th
Paris	12.5%[40]	12.5%	31.4%[41]		22nd	9th	12th	12th
Madrid	11.6%[42]	11.6%	23.1%[43]		23rd	10th	17th	13th
Dubai	11.5%[44]		11.5%		24th		24th	25th
Chicago	11.1%[45]	11.1%	11.1%		25th	11th	25th	26th
Sofia	11.0%[46]	11.0%	11.0%		27th	12th	26th	27th
Kampala	11.0%[47]		11.0%		26th		27th	28th
Jakarta	10.0%[48]	5%[49]	10.0%		28th	14th	28th	29th
Bahrain	8.0%[50]		8.0%		29th		29th	30th
Buenos Aires	8.0%[51]		8.0%		30th		30th	31st
Guadalajara	8.0%[52]		8.0%		31st		31st	32nd
Monrovia	8.0%[53]		8.0%		32nd		32nd	33rd
Amman	7.0%[54]	7.0%	7.0%		33rd	13th	33rd	34th
Beijing	4.0%[55]	4.0%	4.0%		34th	15th	34th	35th
Shanghai	2.5%[56]	2.5%	2.5%	38.5%[57]	35th	16th	35th	10th

[1] some figures are up to 5 years prior to 2014/15, please see references for actual dates

Appendix 2: The Household, MSW, total and reported recycling rates for 35 world cities
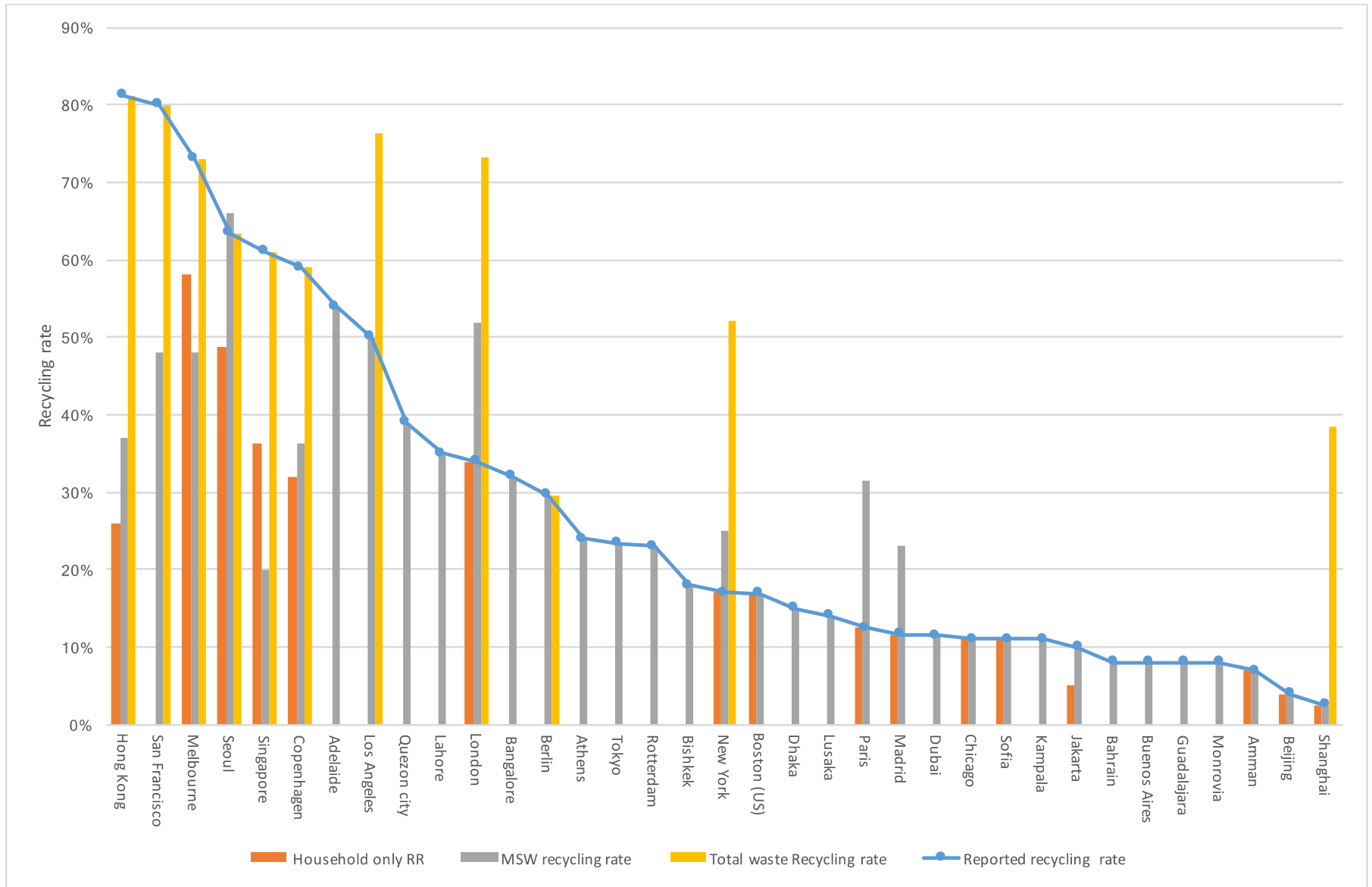
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Appendix 3: EUCAT calculations

London

Material	Household	C&I W	CDE waste	Total Household & C & I	Total all waste
Tonnage arising	3,115,000	4,654,000	7,510,000	7,769,000	15,279,000
Recycled 14-15	1,055,985	2,978,560	7,134,500	4,034,545	11,169,045
Recycling rate	33.9%	64.0%	95.0%	52%	73%
Household	3,115,000				
C&IW	4,654,000				
CDE waste	7,510,000				
	source	FALP table			
		Revised London Plan			
		Waste Arisings Study Review for the			
		Greater London Authority			
		Model Guide and Task 4 Findings			
		SLR Ref: 402-01183-00005			
		Jan-14			

Singapore

Material	Household	C&I W	CDE waste	Total Household & C & I	Total all waste
Tonnage arising	1,657,120	3,560,430	2,455,950	5,217,550	7,673,500
Recycled 14-15	603,680	1,640,470	2,435,350	2,244,150	4,679,500
Recycling rate	36.4%	46.1%	99.2%	43%	61.0%
	4,142,800	1,509,200			

Dubai

Material	Household	C&I W	CDE waste	Total Household & C & I	Total all waste
Tonnage arising				1,523,882	1,523,882
Recycled 11-12				175,000	175,000
Recycling rate	#DIV/0!	#DIV/0!	#DIV/0!	11.5%	11.5%
	source	http://en.envirocitiesmag.com/articles/pdf/waste_management_eng_art1.pdf			