

What's Really in Your Waste Stream? Developing new tools for data-driven decision making

BETH CODDINGTON CONSULTANT | RESOURCE RECYCLING SYSTEMS OUR QUESTION



WHAT'S IN THERE...





...AND HOW MUCH?











STATE/LOCAL LEVEL - SELF REPORTED DATA

Michigan Department of Environmental Quality Office of Waste Management and Radiological Protection

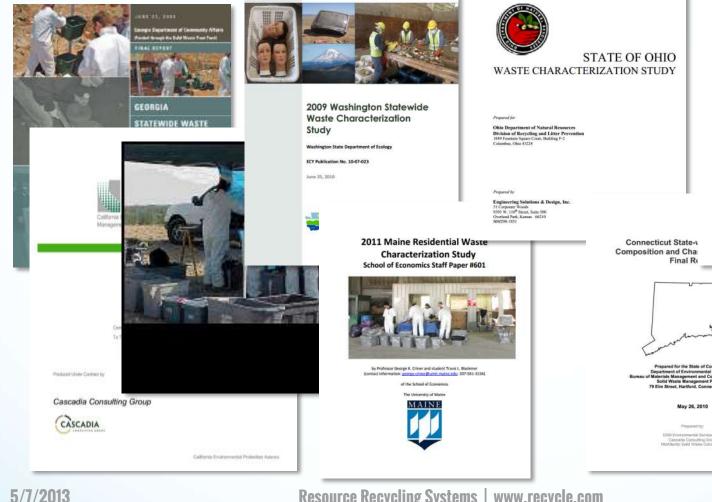
COMBINED SOLID WASTE LANDFILL WASTE RECEIPT REPORT

As required by Section 15507a of Plan 115, Solid Vaste Management, of the Natural Resources and Environmental Protection Act, USH PA 451, as amended Failure to submit this form may repair in enforcement actions pursuant to Sections 1566 or 1568 of Plan 115.

PAF	T1- Facility Informa	ation					20140303044								
LEGAL NAME OF FACULTY			VASTE DATA SYSTEM NUMBER		REPORTING YEAR 2012-2013		Attachment 1 – Reporting Table ATION AND ASSESSMENT PROGRAM REPORTING TABLE - FORM DEQ 50-25								
SITE ADDRESS 7			TOWNSHIP		COUNTY		3 Date Submitted to DEQ 4 Annual Reporting Period								
	10000							Middle	Last Name				6 Telephone		
SITE CITY / TOWNSHIP	STATE	SPCODE	TELEPHONE			Address or Telephone Number? 7Yes 7N o									
							Last Name Contact Phone								
FACILITY OWNER		TYPEI	TYPE III TYPE III Segregated CAPTIVE NONCAPTIV			<u> </u>		State			E-Mail Zip Code				
		-			Yards	If a facility's permitted capacity is reported in tons, please note this below in Facili Comments. DEQ will apply conversion factors based on the type of waste in orde					v in Facility te in order l	to calculate			
WASTE RECEIPT AT GATE DOES THIS FACILITY RE	EPORT IN TONS?		FACILITY DOES NOT REPORT IN TO						the volume an	d the number of	years of perr	nitled capacity	available in th	e state.	
Report Capacity data in 4th Qtr ONLY	Cubic Yards		Est. Years			Total amount landfilled in cubic yards.									
	Cubic Tarus	_	L.St. Tea	- NO	TE: The "Cubic Yands" orted here are "air	-			Server and the	a too a too a strong out		1000 The 1000 Co. 11	10.10.00		
Total Permitted Capacity:			yds.	spa	cof and will, therefore.	vis measure	Use the supplied in : ? Tons	iemontal form or 7 Cubic	to provide the fail	sility from which	ash was rece	ived and the a	mount.		
Est. Capacity at start of state fiscal year (October 1):			yds	not be the same as the yards reported on the attached sheet which are i "pote yards."	Recycled Composi			incinerated On-Site (e)	Sent Off-Site to be: (f)		Stored On-Site:(g)		Othe	er (h)	
t. Capacity at end of state fiscal year (September 30) Est. Capacity used during this reporting year			yds vds			On-site			Recycled	Treated, Stored, Disposed	Beginning of Reporting Period	End of Reporting Period	Mulched	Other Than Mulched	
SEE INSTRUCTIO	N SHEET FOR CO	MPLET								2		Period			
TABLE 1. Automatically calculated from the data re	ecorded in PART II	- Waste	Report Informatio	n		_				-			a a		
	f Waste Received		Surcharge Du							2					6 6
Tons	Cubic Ya	ards									<u></u>				-
1: October 1 - December 31 0.0	tons 0.	0 yds	\$ -	\$	응 분명					3	2				Ś.
22 January 1 - March 31 0.0	tons 0.	0 yds	\$ -	\$	4		- 8			<u>3</u>	<u> </u>			_	<u>}</u>
Q3: April 1 - June 30 0.0	tons 0	0 yds	S -	\$	+										
14: July 1 - September 30 0.0	tons 0.	0 yds.	s .	\$		-				25	8		2 3		<u>0</u>
Total 0.0	tons 0.	0 yds.	s -	\$	(*)	-	8		\$	2	2	-	8 8		ŝ
TABLE 2: Information directly inserted by facility.								Facility Con	nments			•			
If any corrections were made for a "quarter"	Record the arr	nount(s) a	actually submitte	d for ear	ch quarter:	s provided fo	r the optional Stat	lement of Econo	mic Benefits.			Ret	rised 12/01/2011		
after the original submittal, please state so in the			Surcharge		PCF Deposit										14



STATE/LOCAL LEVEL - WASTE CHARACTERIZATION STUDIES





Wiscomin Statewide Waste Characterization Study



Final Report May 2003

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Property in **Cascada** Consulting Gamp. In:

> fifth antilement from S.M. Bark URL Analysis



NATIONAL LEVEL - BIOCYCLE

17th NATIONWIDE SURVEY OF MSW MANAGEMENT IN THE U.S.

THE STATE OF GARBAGE IN AMERICA

A joint study by BioCycle and the Earth Engineering Center of Columbia University

data on municipal solid waste management find estimated generation is 389.5 million tons in 2008 -69 percent landfilled, 24 percent recycled and composted, and 7 percent combusted via waste-to-energy.

Latest national

Rob van Haaren. Nickolas Themelis and Nora Goldstein

DCYCLE, is sellaboration with the Earth Engineering Center (EEC) of Columbia Uni-versity, conducts the Islennial State of Garbage In America survey on the generation and management of municipal solid waste (MSW) in the United States. The State of Garbage In America Report, launched by *Biot* yels in 1999, is unlapse in that artical tunnage data is collected from each individual state, with waste characterization studies selely used for validation of the numbers. This is the 17th nation-

wide aurvey, reporting data from calendar year 2008. The data was gathered during the spring of 2010, using an Excel form that was e-mailed to the solid wante management departments in all 50 states and the District of Columbia. All entries were checked and validated using results of former State of Garliage in America reports, EPA waste sharocherisation studies, and also a survey of Materials Betovery Facil-ities (MRF) carried out by Eileen Berenyi of Government Advisory Associates (GAA). We greatly appreciate the time spent and the contributions made by the solid waste and recycling officials listed at the end of this report. Thanks to their help and expertise, we can present the 2010 edition of "The State of Garbage in America." All tunnages are reported in U.S. tone (1.1 U.S. ton a 1 metric ton).

SUBVET METRODOCOSY

In 2004, the EEC was invited by BieCyole to collaborate on a science-based version of the State of Garbage survey. The State of Garbage methodology uses the principles of space balance: all MSW genreated is equal to the MSW landfilled, com-basted in waste-to-energy (WTE) planta, remposted and/or recycled. This relies on the newumption that all management methode employed for municipal solid waste are quantified/includ and reported to the state agencies. According to our survey results, at least 15 states require waste management companies and local geverament agreeies to report annual tannages. Ninctors states reported that there was no

each requirement and another 12 states did not required to this question. Only five states did not emplote the 2010 State of Garbage survey. For states where companice and local agencies are not required to report to the state, disposal data can and, in most ones, see still collected from waste management facilities. This is especially true for landfills and waste-to-energy



plants, some they track all of the dispose waste by simply weighing incoming and sutgoing tracks. Composting and materials encycling facilities, however, may not have scales and/or are commercial or public enterprises that are not obligated to report tunnages monived and processed to fogal or state government agencies.

An important part of MSW accounting in the State of Garbage survey is "filtering out" non-MSW materials that may be ingluded in the states' responses. The BirCycle/KEC survey uses the US EPA definition of Monicipal Solid Waste, which includes

residential and commercial wastes like paper, plastic packaging, bottles and cans, lines, yard treamings, batteries, furniture, applications, etc. Typical "non-MSW" matterial weaters, construction and densition (C&D) debris, automobile scrap and shadge from wastswater treatment plants. To account for three non-MSW materials, survey reopendents were asked to provide a more specific breakdown of the waste streams being reported. This was done either by estimate or from measured tonnages. The ann-MSW tonnages were automatically subtracted in the Excel spreadabeet from the total generation reported.

Over the past aix years (with the survey conducted every two years), the methadalogy developed by EEC has been forther refined. In the 2008 State of Garbage In America Report (December 2008), MSW

cotegories: Landfilling, Wasto-to-Energy

and Beyyding. After much discussion and

with input from survey participants, it was decided to divide the "recycling" category

into materials recycling (i.e., recovery of

paper, metale, glass, plastice) and organics recruling via composing (which includes

multh production). The tounage sent to

posted tonnages are reported in separat estumns in Table 2. It is quite likely that some smaller composting operations have, inadvertently, not been included and, therefore, the total MSW comported may he somewhat higher than reported.

In the 2010 survey, an additional "filter" on the reported composting/recycling rates for the reported composing processing takes for different materials was introduced. The total amount of MSW generated was esti-mated using the 2008 State of Garbage national number of per capita presention 11.35 tenstropits, 2006 data) and the population of the state. KEC then used EPA's MSW Facts And Figures waste characterization report (EPA, 2000) of the average (U.S.) percent composition of MSW times the popula-tion of the state to estimate how many tanof each material were generated in the the state. On the basis off this ardiernation, we were able to "lifter sur" reported receiving tananagos that were "through the root," and likely due to the inclusion of ann-MDW materials (e.g., notomobile scrap). Reported recycling tormages that were higher than the estimated waste generation of a particular material were decreased to 100 percent of the estimated wante procention.

PROTOCOL USED FOR RECYCLING TONRAGES

For a consistent determination of the tinnages to report in the survey, the fol-lowing protocol was established. Use reported townage unless any of the following factors were evident:

1. States did not report a recycled mate-rial tanaage: The GAA MEF survey reported MRF-processed tunnages that in gener-al were one half of the recycling tennages reported by the states. Therefore, EEC out-cluded that approximately 60 percent of all

An important part of MSW accounting in the State of Garbage is filtering out non-MSW materials that may be included in the states' responses.

> National estimated MSW generation dropped between 2006 and 2008, from 413 million tons to 389.5 million tons.

> > Octoped Man

Table 1. State of Garbage in America survey data 1989-2000: Reported and actim MEW generation and raise of MEW recycling, wante-to-energy and landitting

Year DY Claim	Reported MSW Generation* (tanadyr)	Estimated MDW Generated* (tonsk(yr)	Alson Alsoyclist* (%)	MSW Watte-To-drivingr (%)	AUSIV Land Mint (%)
-080	369.000.000		8.0	4.0	815
\$90	298,613,000		11.5	11.5	77.0
1981	280,675,000		14.0	10.0	76.0
1982	291,472,808		17.0	0.17	72.0
1412	306,894,308		19.0	10.6	114
1998	102.879.858		23.8	10.0	\$2.8
995	326,706,000		17.0	10.0	63.0
1996	321,406,500		28.0	10.0	62.8
1987	340,466,900		38.8	2.6	818
996	378,631,808		31.0	7.5	61.8
1999	382,594,808		22.9	7.8	46.0
CORO.	409,075.900		32.8	7.4	01.8
1000	11 m	348.387,411	28.7	3.7	45.8
1084		367,855,861	18.5	2.4	64.0
2086	-	410,054,732	28.5	6.5	64.5
7088		388,488,026	24.1	47	05.3

emposting facilities appears to be tracked in many states, and EEC believes that it is CORE, 2004, 2008 and 2008 estimated MEW Generation, MEW Response, NYTE and Landmard Inco Service adjusted to evolute non-MEW. "Reported MEW Generation is reported values calculated by RoCycle priuseful to distinguish composting and mulching from other material resevery or to collaboration with Calorettia University and use of context methodology. RDBmailed MSW General methods. As a result, recycled and sumad is sum of NEW Respond, MTE and LandMind, MIEW Receipt motions compositing and incycling

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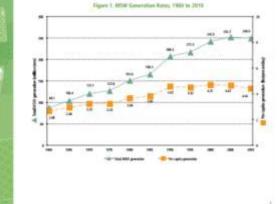
NATIONAL LEVEL - EPA



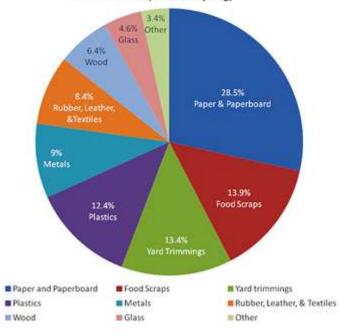
Municipal Solid Waste Generation, Recycling, and Disposal in the United States:

The U.S. Environmental Protection Agency (EPA) has collected and reported data on the generation and disposal of masse in the United States for more than 30 years. We size this information to measure the success of waste reduction and tweything programs across the country. These facts and figures are current through calendar year 2010.

In 3010, Americans generated about 250 million tone of truth and recycled and composed over 85 initian tenu of this material, represent to a 34.1 process recycling nate (see Figure 3 and Figure 2). On average, we recycled and composited 1.31 pounds om of our individual wante generation of 4.43 younds per person per day



2010 Total MSW Generation (by Material) 250 Million Tons (Before Recycling)

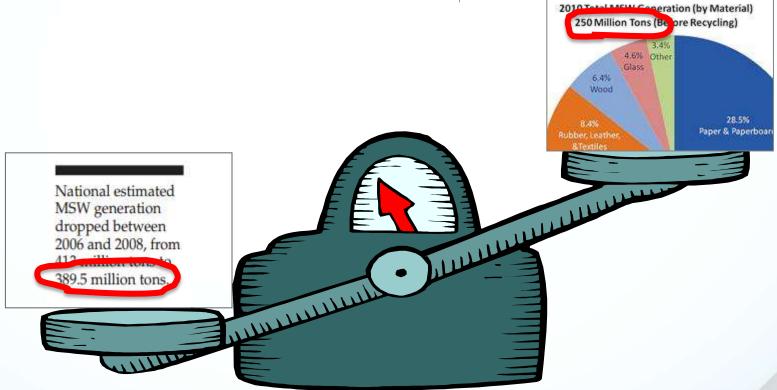


...BUT MORE QUESTIONS



DATA REALITY CHECK

- » Different methods \rightarrow Very different results
- » National estimates vs local experience



IS EVERYTHING BEING COUNTED?

- » EPA/Mass Balance:
 » Imports & exports
 » Materials flow methodology and assumptions around product usage
- » Self Reported Data
 - » Commercial
 - » Self Haul



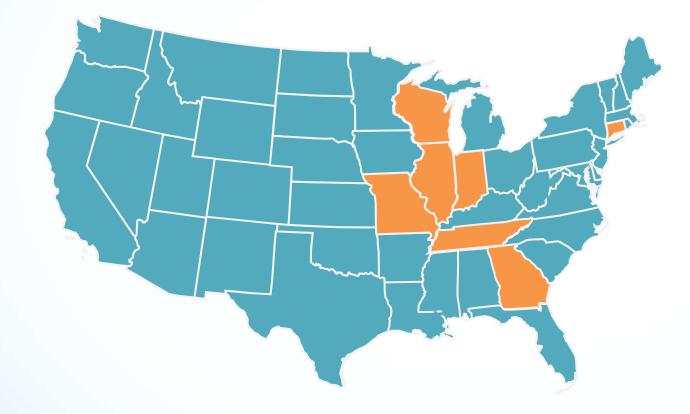


EXAMPLE - OCC





EXAMPLE - OCC



5/7/2013

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IS TOO MUCH BEING COUNTED?

- Self-Reported Data
 C&D, Industrial included in MSW
 - Industrial scrap, etc included in municipal recycling

IS THE COUNT ACCURATE?

- » Waste Characterization Studies
 - » Scientific sample
 - » Still limited by sample location, timing, etc.
- » Self Reported Data
 - » Data entry errors
 - » User confusion/inconsistencies





IS IT FEASIBLE?

- » Time
- » Money
- » Information available
- >> How long does information stay useful?





OUR APPROACH



COMBINING MULTIPLE SOURCES & APPROACHES





SOURCE DATA

- » 27 waste characterization studies from last 10 years
- » Residential and commercial waste streams

A -----



FOCUS MATERIALS - PACKAGING, PRINTING & WRITING PAPER

High Grade Office	Mixed Office	Low Grade – General & Other Recyclable	ONP	Magazines & Catalogs
Paper Bags	Phonebooks and Directories	Hard Bound Books	OCC	Paperboard/ Boxboard
Aseptic/ Cartons	Polycoated Paper	PET Bottles	PET Containers Non Bottles	HDPE Bottles
3-7 Rigid Plastics	Aluminum Cans	Tin/Steel Cans	Glass Bottles/ Jars	





VARIATION BETWEEN STUDIES

Less Important

More Important

Residential – Commercial State By State Variation

Regional Variation

Diversion Rate

Mix



High Diversion Areas More "Other" waste Few common recyclables (OCC, newspaper, office paper, bottles and cans...

Low Diversion Areas Lots of common recyclables Less "Other" waste



PROFILES - COMMERCIAL AND RESIDENTIAL



Typical High Diversion Profiles



Typical Medium Diversion Profiles

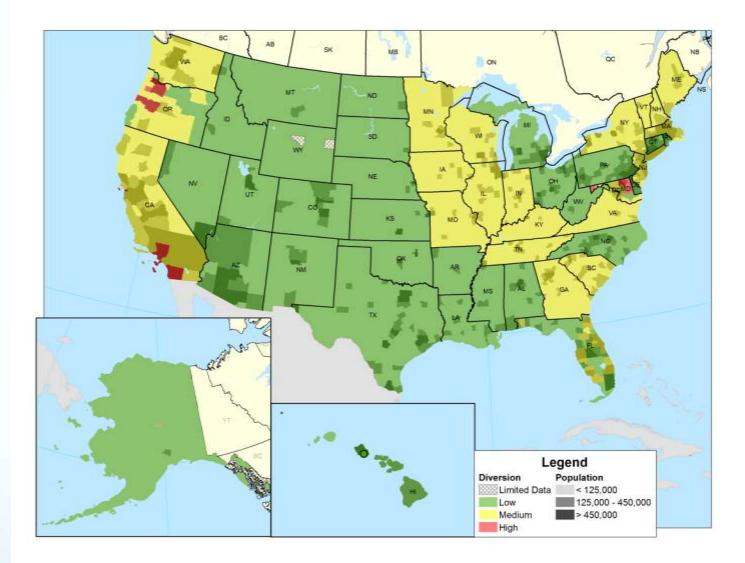
Typical Low Diversion Profiles

Waste Disposed Per Capita/Per Employee

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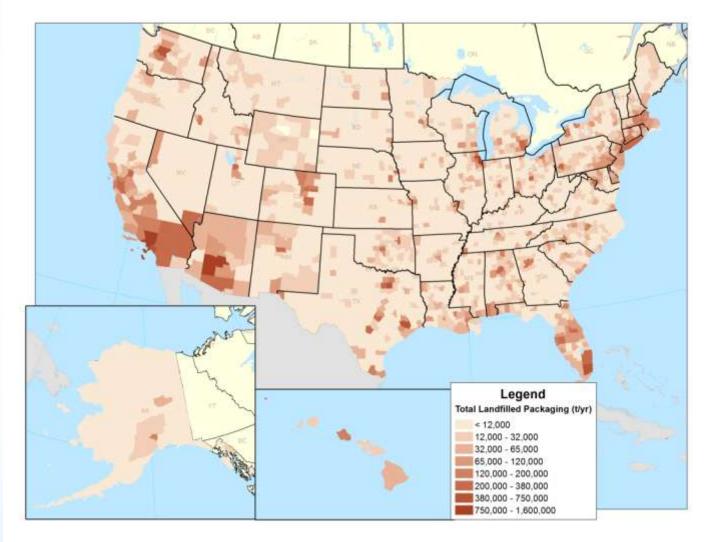
PROFILE APPLICATION



5/7/2013



RESULTS - DATABASE OF LANDFILLED MATERIAL BY COUNTY



5/7/2013

APPLICATIONS

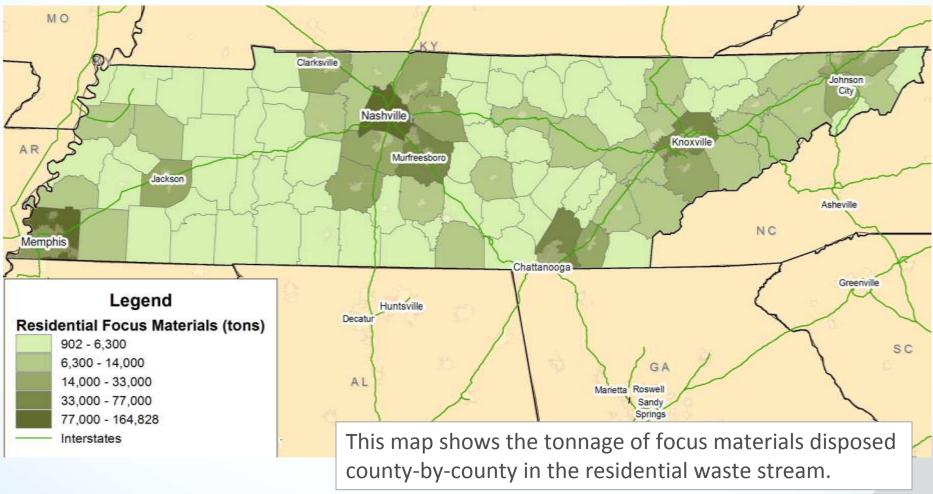


APPLICATIONS

- » Database model applied at local level
- » Fact checked in targeted areas against state and local data sources and known disposed/ recovery volumes



RECYCLING MARKETS DEVELOPMENT





VALUE OF POTENTIAL RECYCLING INVESTMENTS

Focus Material	Regional Average (1-year) \$/lb	% of Disposed Waste (state average)	Market Value
Aluminum Cans (Sorted, Baled \$/lb)	\$0.764	0.90%	\$51,482,500
Glass (Mixed)	\$0	4%	\$0
Paper (Soft Mixed Paper)	\$0.043	14%	\$29,743,100
Paper (OCC)	\$0.064	6%	\$24,275,700
Paper (Newsprint)	\$0.029	7%	\$9,861,700
Plastics (PET price)	\$0.273	3.1% (#1 & #2 bottles)	\$61,111,200
Steel Cans (Sorted, Loose Price)	\$0.041	1.70%	\$3,854,600
Total		36.4%	\$180,328,800

Annual residential disposal of 3.3 million tons was converted to pounds. This equals **6.6 billion lbs/year** of residential disposal. The pricing data was calculated using \$/lb averages for 2012. Pricing Data was accessed through *Recycling Data Management Announced Recovered Material Prices*.

OTHER APPLICATIONS

- » Cost curve for recycled vs virgin feedstock
- » Prioritization of pilot areas
- » Opportunities to improve recycling infrastructure and make investments
- » Comparison/backup for self-reported local data

THANK YOU!