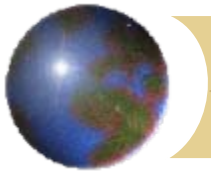


US EPA ARCHIVE DOCUMENT



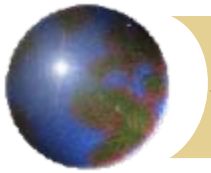
EPA – Region 4

RFID Technology:

A Foundation to Improve Tracking, Education, and Participation in the Recycling Industry

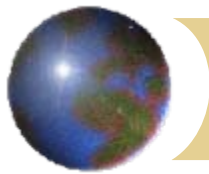
Scott Schimming

Rehrig Pacific Company

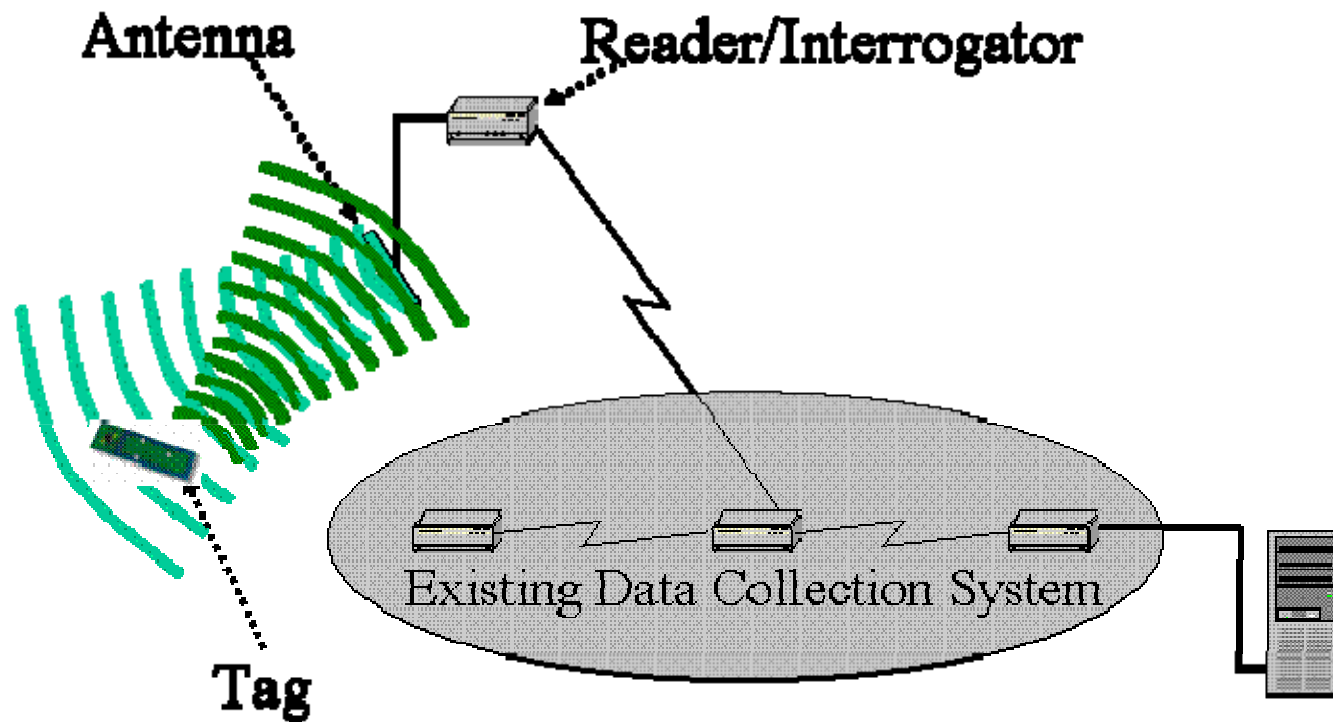


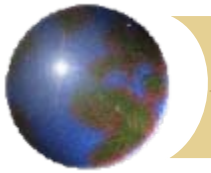
Presentation topics

- Overview of RFID Technology
- RFID in Recycling
- Tracking: What Does RFID Data Provide?
- Education: How Does Data Help?
- Participation: Incentive Programs
- Review of Existing Recycling Cart and RFID Programs



How RFID Technology Works???

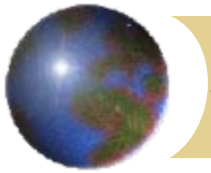




RFID Tag Classifications

- Active vs. Passive
- Frequency Range
 - Low Frequency (LF)
 - High Frequency (HF)
 - Ultra High Frequency (UHF)

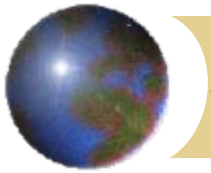
Application dictates type of RFID tag...



RFID Tag Applications

- Material Handling – pallets, bins, crates, totes, dollies
- Tracking everything from missiles to cattle to perishables to medical supplies
- Used in security for retail applications
- Used in recycling and refuse

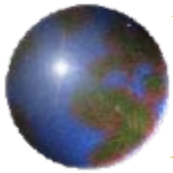
And many more.....



RFID in Recycling and Refuse



- Collection data tracking
- Pay As You Throw Programs
- Incentive Based Recycling Programs
- Asset management programs

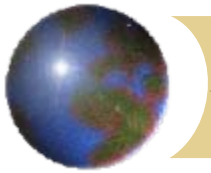


Visible or Invisible RFID Solutions



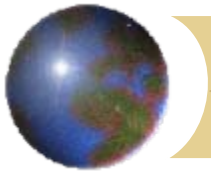
- Visible - Driver Interaction using an On-Board Computer
- Invisible - No driver interaction using a Smart Reader





Tracking: What does RFID data provide?

Tracking ID	RFIDTagID	TXType	Latitude	Longitude	ReadTime	PCID	ReaderID
279	7001471	Cart Tip	39.2272	-76.79458	12/19/07 11:45	TruckPC235	TruckXR235
280	7003952	Cart Tip	39.227318	-76.794687	12/19/07 11:45	TruckPC235	TruckXR235
281	7001469	Cart Tip	39.227453	-76.794765	12/19/07 11:45	TruckPC235	TruckXR235
282	7001007	Cart Tip	39.227462	-76.79476	12/19/07 11:45	TruckPC235	TruckXR235
283	7003123	Cart Tip	39.227712	-76.794877	12/19/07 11:46	TruckPC235	TruckXR235
284	7001474	Cart Tip	39.227848	-76.794978	12/19/07 11:46	TruckPC235	TruckXR235
285	7004000	Cart Tip	39.228003	-76.795155	12/19/07 11:46	TruckPC235	TruckXR235



What does RFID data bring?

- **Recycling and Refuse Participation**
- In Transit Visibility
- Route Optimization
- Vehicle Maintenance and Control
- Resource Optimization
- Inventory Asset Optimization
- Work Order Management
- Dispatch Operations



Managing Data is Paramount!



Howard County, MD Tipping Participation

StartDate: 6/15/2009

EndDate: 6/16/2009

ZIP Code: ALL

Route: Monday

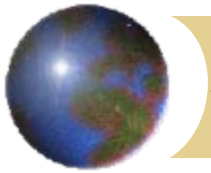
Participation Summary

Total of possible residents for participation: 916

Participations	# Residents	Percentage
1 time(s) of participation	495	54.04%

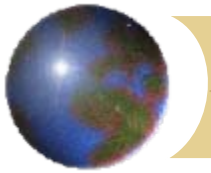
Participation Detail

Serial #	RFID	Address	Street #	Suffix	Street Name	Unit #	City	State	ZIP	Curb Date
65R000661	000109484F07941526500295	6420 ABEL ST	6420		ABEL ST		Elkridge	MD	21075	6/15/2009 11:17:59 AM
65R026557	000109484F079415265067BD	6433 ABEL ST	6433		ABEL ST		Elkridge	MD	21075	6/15/2009 11:17:23 AM
65R025931	000109484F0794152650654B	6437 ABEL ST	6437		ABEL ST		Elkridge	MD	21075	6/15/2009 11:17:44 AM
65R002387	000109484F07941526500953	6441 ABEL ST	6441		ABEL ST		Elkridge	MD	21075	6/15/2009 11:18:05 AM
65R000682	000109484F079415265002AA	6448 ABEL ST	6448		ABEL ST		Elkridge	MD	21075	6/15/2009 11:18:59 AM
65R002693	000109484F07941526500A85	6452 ABEL ST	6452		ABEL ST		Elkridge	MD	21075	6/15/2009 11:19:26 AM
65R001794	000109484F07941526500702	6453 ABEL ST	6453		ABEL ST		Elkridge	MD	21075	6/15/2009 11:19:14 AM
65R000678	000109484F079415265002A6	6456 ABEL ST	6456		ABEL ST		Elkridge	MD	21075	6/15/2009 11:19:41 AM
65R000001	000109484F07941526500001	6472 ABEL ST	6472		ABEL ST		Elkridge	MD	21075	6/15/2009 11:26:41 AM
65R000782	000109484F0794152650030E	6476 ABEL ST	6476		ABEL ST		Elkridge	MD	21075	6/15/2009 11:26:29 AM
65R001293	000109484F0794152650050D	6484 ABEL ST	6484		ABEL ST		Elkridge	MD	21075	6/15/2009 11:26:47 AM
65R000039	000109484F07941526500027	6485 ABEL ST	6485		ABEL ST		Elkridge	MD	21075	6/15/2009 11:28:02 AM
65R001296	000109484F07941526500510	6488 ABEL ST	6488		ABEL ST		Elkridge	MD	21075	6/15/2009 11:27:14 AM
65R000780	000109484F0794152650030C	6492 ABEL ST	6492		ABEL ST		Elkridge	MD	21075	6/15/2009 11:27:35 AM
65R000042	000109484F0794152650002A	6493 ABEL ST	6493		ABEL ST		Elkridge	MD	21075	6/15/2009 11:28:35 AM
65R000680	000109484F079415265002A8	6496 ABEL ST	6496		ABEL ST		Elkridge	MD	21075	6/15/2009 11:28:14 AM
65R000041	000109484F07941526500029	6501 ABEL ST	6501		ABEL ST		Elkridge	MD	21075	6/15/2009 11:35:44 AM
65R000776	000109484F07941526500308	6505 ABEL ST	6505		ABEL ST		Elkridge	MD	21075	6/15/2009 11:35:08 AM



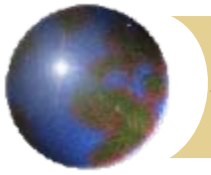
Education: How does data help?

- RFID technology provides reliable participation data
- Full visibility of recycling participation – by route, neighborhood, etc.
- Tailored educational programs target non-participation and low-performing residents or areas
- Municipalities can more effectively use educational \$\$\$\$



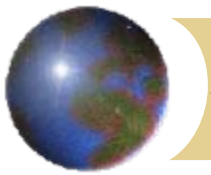
Participation: Incentive Programs

- With participation data, Municipalities can get creative to increase participation
- Incentive Based Recycling Programs:
 - Credits for participation
 - Community based incentive programs
 - Individual weight-based programs
- As Participation **INCREASES.....**
 - Recycling Tonnage **INCREASES.....**
 - Land Fill Diversion **INCREASES !!!**



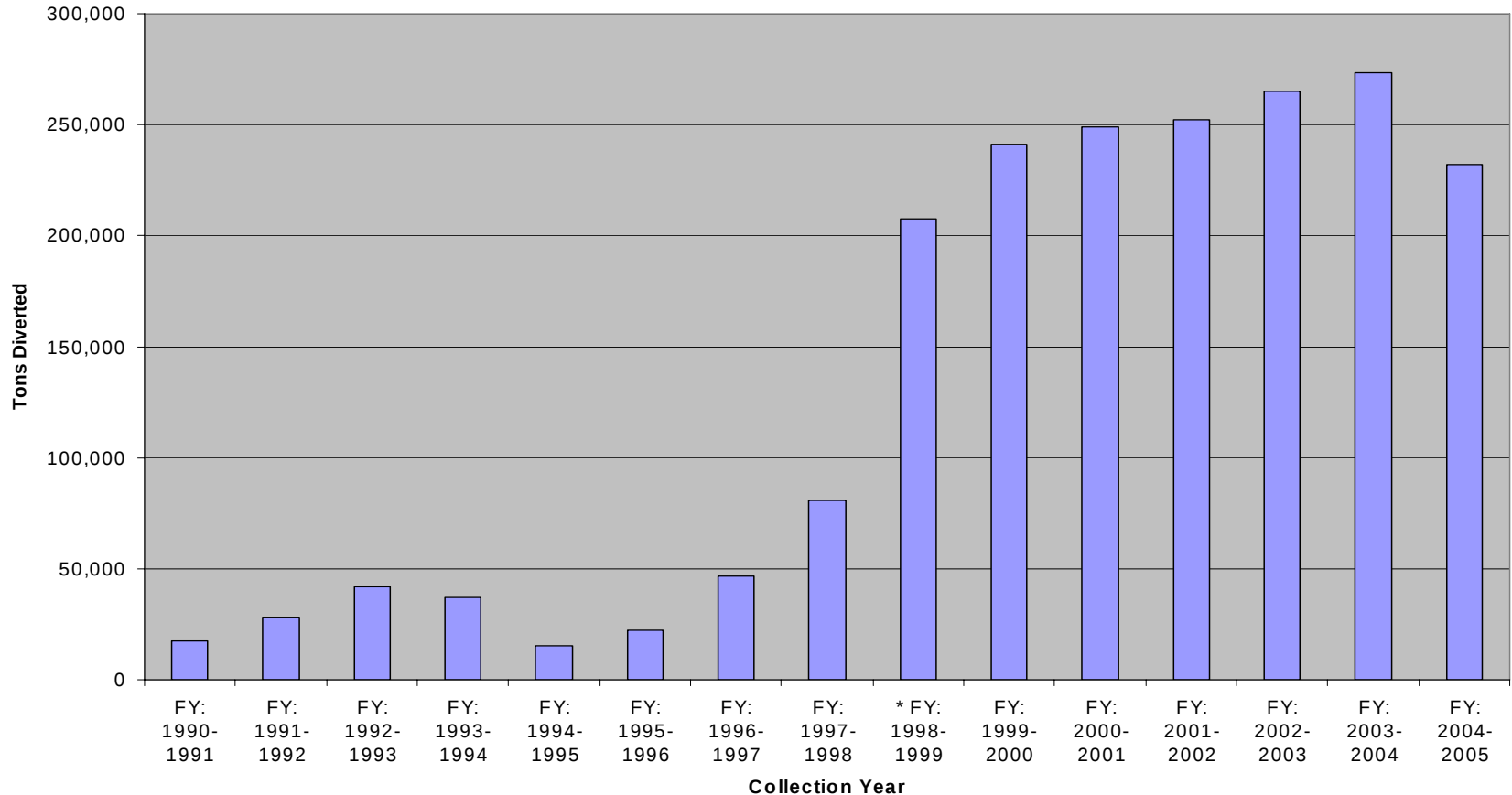
Review of Recycling Cart Programs

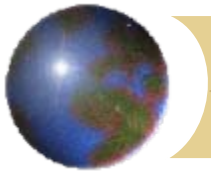
- Los Angeles
- Long Beach, CA
- Denver



Los Angeles – Diversion w/ carts

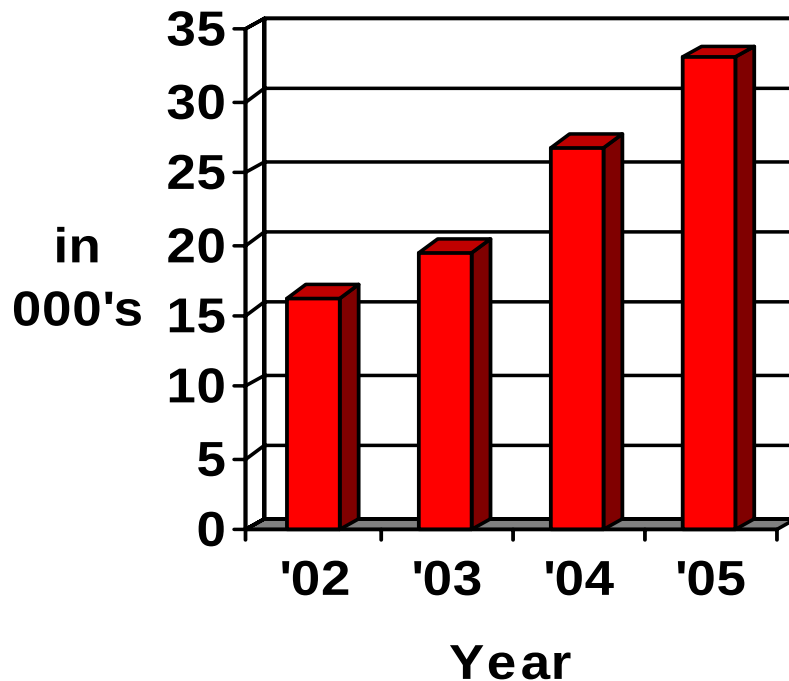
City of Los Angeles Diversion Rates



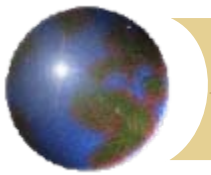


Long Beach – Diversion w/ carts

Tons Recycled

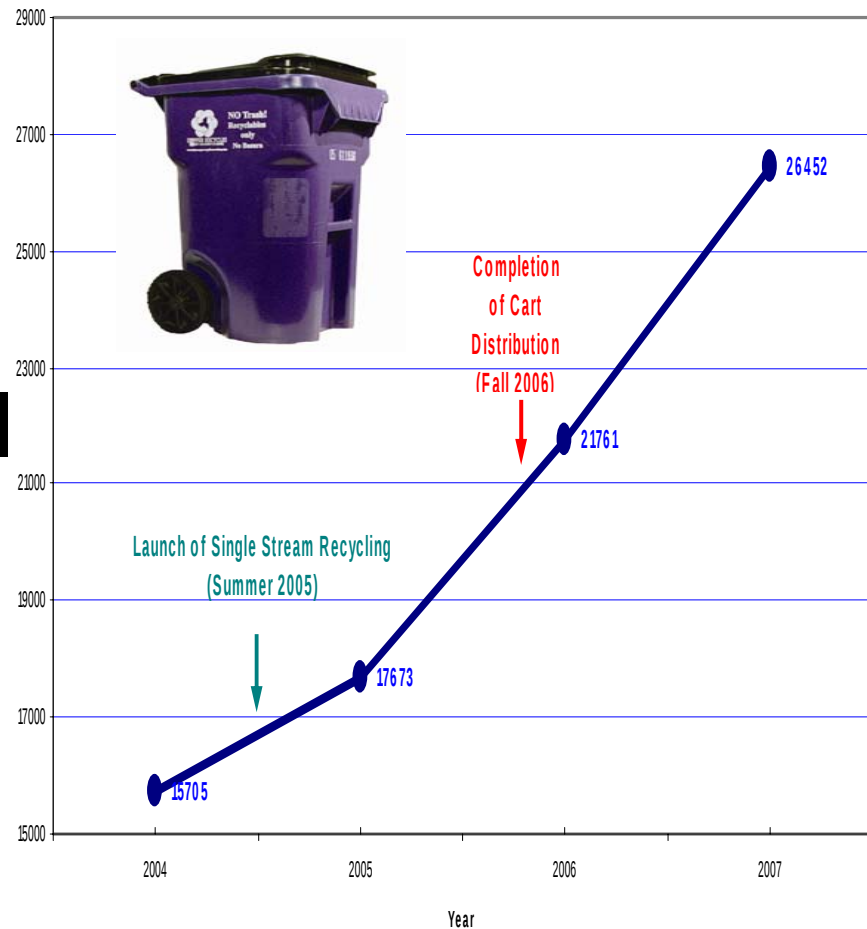


- Diversion rates were stagnate with bins
- Began 95 gallon cart pilot in 2000
- Expanded program in 2002
- Increased weekly participation from 55% to 76%

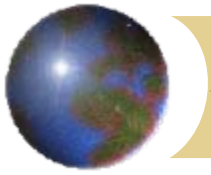


Denver – Diversion w/ carts

Tons of Recycling Collected by Year (2004-2007)

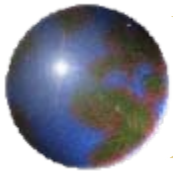


- Launched single stream in 2005 (green text)
- Full recycling cart roll out in 2006
- Landfill diversion has nearly doubled in three years.



Review of RFID Cart Programs

- Toronto, Ontario
- Frederick County, MD
- City of North Miami
- City of Atlanta



Questions and Comments