

Future of Solid Waste Management

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Caution

“Wisdom doesn’t necessarily come with age.
Sometimes age just shows up all by itself.” – Tom Wilson

The older I get the shorter the time frame I am willing to analyze

- My crystal ball grows quite dim after 5 to 10 years
- And there are plenty of possible disruptions that could occur even during this relatively short period of time

However, I don't think waste management will come to this....



Talk about the implications of the following broad themes

Changing nature of trash and recyclables

Materials recovery – single stream and climate change

The impact of away-from-home consumption

The push for organics diversion – cost and climate change implications

Renewed look at MSW processing to achieve “zero waste” goals

New emphasis on C&D and bulky wastes

The global plastic waste problem

Then I am going to finish with my wish list

Changing Nature of Trash and Recyclables

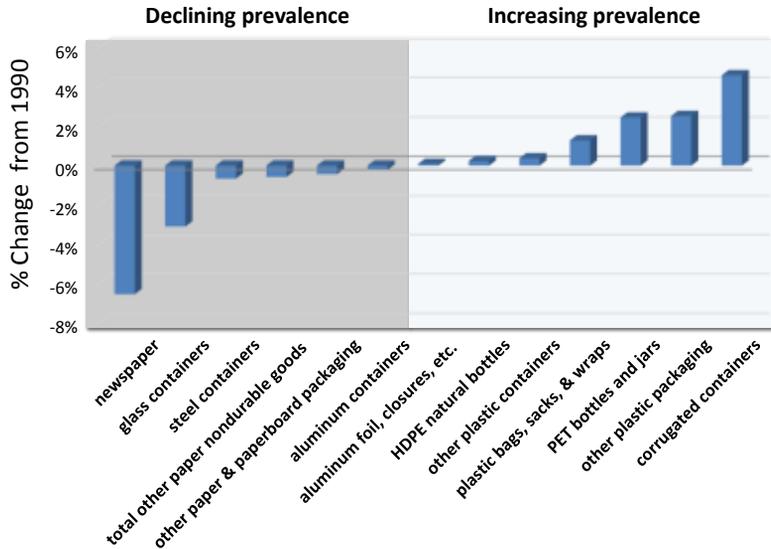
DSWA tons dropped from 1.28 million tons in 2007 to roughly 760,000 tons in 2014

Similar drop in tons in Rhode Island (based on RIRRC data)

Only a portion is due to increased diversion

- Lighter weight materials
- Reduced consumption with stagnant wages
- Bans on yard waste disposal
- Zero waste efforts at large manufacturing facilities

Change in Paper and Packaging in 2012 since 1990



SOURCE: Resource Recycling Systems, 2014

Environmental Drivers Fueling the Shift

Flexible Film Pouches & Packaging

Flexible Packaging Creates Less Footprint

Energy consumption and environmental impact during transportation is greatly reduced.

Truckloads needed to transport packaging for equal amounts of product[®]

26 truckloads of unfilled glass jars

1 truckload of unfilled flexible pouches

Flexible Packaging Uses Less Resources

Examples of packaging needed to package 60 pounds of beverage[®]

50 pounds of glass

6 pounds of Rigid PET

3 pounds of aluminum

1.5 pounds of flexible plastic



Flexible Packaging Association www.flexpack.org

“Zero Waste” at Manufacturing Facilities

(courtesy of Chaz Miller, National Waste & Recycling Association)

Hormel – 4 million less pounds of material use after implementing:

- 1.2 million less pounds by switching to tote bin without internal insert
- 800,00 pounds by reducing deli meat packaging from 8 to 6.55 inches
- 596,00 pounds by redesigning case packer and palletizer for cooked hams
- 364,000 pounds by optimizing shipping case design for 1-lb bacon
- 314,000 pounds by substituting printed film for paper carrier board in 1-lb turkey bacon

Implications

Steady or falling disposal prices

- Landfill and WTE facilities chasing fewer tons
 - Lined landfills remain a low cost option despite environmental controls
 - WTE facilities need the tons to generate electric revenues
- Surcharges on disposal generate less revenue
- PAYT programs with embedded recycling and special waste costs raise less revenue to support “free” services
- Disposal costs are less of a driver for diversion – especially for ICI generators
- Alternatives to landfills at WTE facilities become relatively more costly – e.g., compost, AD facilities

Less revenue for materials recycling facilities

- Paper down roughly 20% - one of the largest revenue sources

Increased Material Recovery is Essential for Reducing GHG Emissions

Often increasing recycling rates is the most cost effective way for a municipality to lower contributions to GHG emissions.

- Mining and manufacturing of new materials overwhelms costs of collecting, transporting and sorting recyclables

We have a long way to go as a country in terms of diverting more conventional recyclables from disposal

Much of the northeast is already doing a reasonably good job with residential and ICI recycling

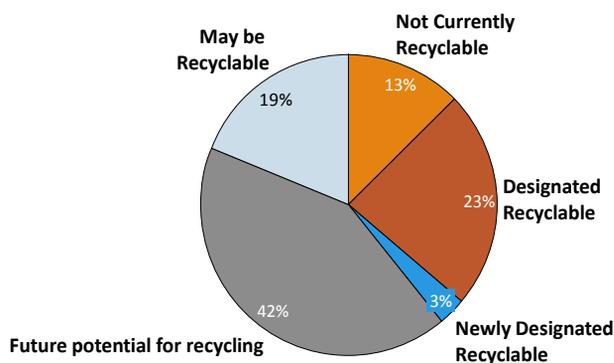
- The real low-hanging fruit for residential programs lies in the south and inter-mountain west

But we have a long way to go to implement away-from-home recycling

- Over 50 percent of meals are not cooked at home!
- We need to implement recycling where ever there are trash containers – that includes every convenience store!

Much of the material disposed could be recovered

CT 2009 What remains in the trash
(MSW Disposal Characterization Summary)



- What remains in the trash (waste characterization)

26 % is designated recyclables

- Another 40 – 60 % might be recyclable in the future

Single Stream is Here to Stay

While there will still be small transfer and drop-off based source separated facilities, the economies of scale associated with large SS facilities overwhelm the revenue gains of source separated facilities except in areas with very low or no-cost labor

We have shown that SS collection coupled with PAYT can result in materials recovery rates of 80 percent

- See January issue of Resource Recycling Magazine

Significant increases in organics collection will drive every-other week collection of MSW and recyclables with weekly food waste

- Costs are lowest if recyclables are collected single stream

Single Stream Issues on the Horizon

Paper markets

- Closure of North American recycled paper mills is driving revenues down
- Continued decline in newspaper quantities reducing valuable tons
- So far, OCC has stayed strong – but is plastic substitution on the horizon?

Contamination is a growing concern, increasing costs

- Especially as we move to cart based programs
- PAYT can exacerbate this issue
- Wide range of contaminants
 - Hoses, wire, magnetic tape, film bags, organics

Sorting equipment will need to evolve

- Increased use of optical sorters, not just for plastic containers
- Introduction of ballistic separators that may be able to handle film plastics much better than disc screens
- Increasing demand to add new materials – aseptic, all rigid plastics – much easier with large single stream MRFs

Are dirty MRF's Next?

Houston

Indianapolis

San Jose

I am not convinced – but time will tell

- Degradation of paper
- Conveyor power requirements to move all material
- Working conditions for manual sorters
- Actual diversion rates

What if we removed the organics?

Then dirty MRFs become essentially clean single stream MRFs

But how are we going to divert organics

- Don't ignore collection costs!
- Especially for residential organics – could add as much as \$5 - \$7 per month to the average household collection bill

Organics Processing

- Plastic contamination is a real issue
- Are there really enough markets for all the compost that could be produced?
- My prediction is that we will move to Anaerobic Digesters – but only if energy prices are subsidized

Caution – Claims of significant climate change benefits of diverting organics from landfills may not be credible

Beware of zero emission claims

While there has been recent growth in development of new waste-to-energy facilities, opposition to incineration has fueled a two decade's long push for non-incineration alternatives

- AD facilities
- Gasification
- Pyrolysis
- Plasma torch

I have yet to read a compelling analysis that shows significant environmental benefits over combustion

- Laws of thermodynamics are real!

My experience has been that the cheapest, lowest emission facilities are those that haven't been built!

- Regulatory officials have a responsibility to carefully question the costs and environmental impacts of new facilities at the same level of scrutiny as you have given to proposed WTE facilities

Those "Other Wastes"

C&D Wastes

- Significant quantities of C&D waste are going to landfills, some of which may be classified as MSW
- There is a need to expand C&D waste recycling, but recovery rates may not be very high with mixed C&D sorting, unless you count combustion as recovery

Bulky Wastes

- We need to do a better job of quantifying and classifying this waste stream – often mis-classified as C&D or MSW
- When it is classified as MSW it distorts waste composition estimates, inflating recycling potential
- Difficult to estimate composition – RIRRC is attempting this with current waste characterization study

E-Wastes

(courtesy of Chaz Miller and Dylan de Thomas)



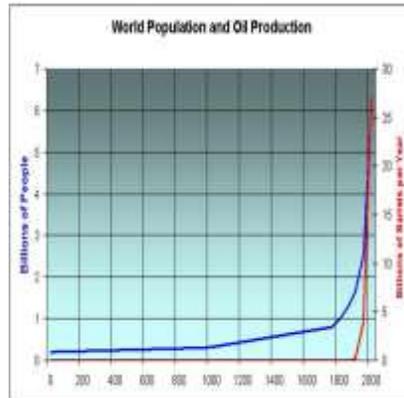
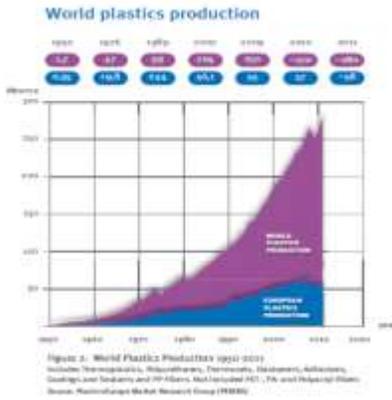
Take Away

Solid waste plans and regulations cannot assume static waste generation or composition

- MRFs are going to struggle with increasing quantities of plastic film and pouches
- Measuring diversion success in tons will become increasingly problematic
- CRT glass may be a large problem now, but eventually the curve will bend sharply
- Surcharges on waste disposal will continue to decline, while costs to divert recyclables, organics and special wastes will increase
- We need to look for more sustainable funding sources
- And better measurement tools

Which Brings Me to the Final Point

The world has a plastic waste problem!



Waste Management in Much of the World Collection



Disposal



What it leads to



Bottle Bills are 1970's Legislation

Where is similar pressure on the giant consumer product companies?



Some highlights: Brand Footprint at a glance

Coca-Cola is the world's most bought brand, chosen 5.3 billion times per year. Coca-Cola is also the brand leading in the highest number of countries (8 out of 32).

Colgate – number two in the ranking – is bought by 65% of the world's households, the highest penetration of all. It's the only brand bought by more than half the world's households.

There are 13 global brands being chosen by consumers more than one billion times in a year: Coca-Cola, Colgate, Nescafé, Pepsi, Lifebuoy, Maggi, Pantene, Knorr, Lay's, Dove, Lux, Palmolive and Tide.

Unilever is the leading manufacturer, placing 15 brands in the Top 50 followed by Procter & Gamble (P&G) with eight, PepsiCo with five and The Coca-Cola Company with four. There are 18 different manufacturers in the Top 50.

Take Away

We need to enact sustainable fees that help fund a sustainable world-wide solid waste and materials management system

One penny per pound of world-wide resin production would raise \$5 billion annually, and growing

A fee of less than one penny per package would raise large amounts of funds on a state-by-state basis to significantly increase materials recovery of plastics – both from residential programs, but also from public spaces.

And would add another pillar to the landfill surcharge and PAYT revenue streams which are both shrinking – in part due to material substitution of light weight plastic packaging

- Unless middle income wages begin to rise, the capacity for most households to absorb the types of charges necessary to substantially increase diversion will not be there

Finally, My Wish List For State Regulatory Agencies

More and better data collection and analysis at the state level

- Take the time to get away from your desks and meetings and out into the field collecting real data
- While it is possible to contract with consultants like DSM, there is no substitute for hands on data collection and observations
- It will also provide you with the knowledge necessary to prepare better scopes of work for contract data collection

Renewed emphasis on state employee training and analysis

- Just as it is important to undertake data collection, it is equally important for state agencies to develop the capacity in-house to critically analyze the data
- Efficient management depends on analytical capacity

Questions

