When Life Gives You Fruit Salad…

_Perspectives on Organics Diversion/Conversion into Beneficial Products_

Presentation to NYSAR3 Annual Conference

November 7, 2014

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Background

- **Kendall Christiansen, Gaia Strategies**
  - Founding Asst. Dir. Of NYC’s recycling system (‘89)
  - Chaired Citywide Recycling Advisory; member, Brooklyn and Manhattan SWABs
  - Consultant to InSinkErator since 1997 – NYC-focused; Plumbing Foundation
  - Since 2005 - US/Canada
  - Lead public/environmental affairs
    - US Composting Council; American Biogas Council
    - National Assoc. of Clean Water Agencies/Water Environment Federation
    - State/Province recycling associations
    - U.S. Conf of Mayors; Federation of Canadian Municipalities
    - U.S. Greenbuilding Council, EcoDistricts Institute

- **InSinkErator**
  - World’s leading manufacturer of food waste processing equipment
  - 75 yrs; 100 countries; 5 million/yr.
Three Themes

● Define Organics – broader than you think

● Who Cares – more than you think

● Broaden Perspective & Opportunities for Collaboration – beyond composting
What Are Organics?

Organics are organics
(organic = contains C)
What Are Organics?

Organic* matter is organic matter...

- Food waste
- Animal manures
- Wastewater solids
- Grass, green crop waste
- Leaves, stalks

* containing carbon (C)

Lower C:N ratio
Less putrescible

Lower C:N ratio
More putrescible
What Are Organics?

Organic Residuals GENERATED in New England, NJ, & NY

% of the 19,794,000 wet tons total organics

- 30% Food Waste
- 26% Other Organics
- 44% Biosolids
What Are Organics?

Organic Residuals RECYCLED in New England, NJ, & NY

% of the 5,480,000 wet tons organics recycled

- Biosolids: 33%
- Food Waste: 62%
- Other Organics: 5%
What Are Organics?

Organic Residuals NOT RECYCLED
New England, NJ, & NY

% of 14,314,000 wet tons of organics not recycled

- Biosolids: 23%
- Food Waste: 17%
- Other Organics: 60%

InSinkErator Confidential
Who Cares?

- Too much food waste
  - NRDC says 40%
  - Mostly consumer-generated
  - Energy, water, etc.

- Calgarian...
  - lived as “freegan” in Bed-Stuy

- President Ford’s “WIN” in 1974 (Whip Inflation Now)
  - Implored Americans to “reduce food waste by 5%.”
Organics management challenges shared by all:

- **Odors / stability** – wastewater solids, manures, & food residuals are putrescible and can stink
- **Wet, gunky stuff** - wastewater solids, some manures, & food waste are mostly water
- **Pathogens / Vectors** – wastewater solids (and some manures) have more and need more treatment (required for biosolids use)
- **Contaminants** – heavy metals, chemicals, and plastics/trash contamination is a challenge for all organic residuals recycling (biosolids contaminants are strictly regulated based on scientific risk assessment)
- **Nutrient-rich** – wastewater solids. Manures, & food waste, more than other organics, have considerable N and P – a good thing, except that end product use may be restricted by nutrient management restrictions
- **Regulatory challenges for final products & uses**
- **Public acceptance of final products & customer education on proper uses**
Who Cares?

- Food waste prevention
  - LoveFood/HateWaste (UK; Metro Vancouver)
  - LeanPath

- Food recovery
  - Second Harvest
  - Food Banks
  - City Harvest

- National enviros
  - NRDC

- EPA/States/Cities (@ 200)
  - VT, CT, MA, RI + California
  - NYC
Who Cares?

- **Industry**
  - Food Waste Recovery Alliance (NRA, GMI, FMA)

- **Traditional trade associations**
  - U.S. Composting Council
  - National/Regional Biosolids Management Associations (NEBRA, MABA, NBMA)

- **New Players:**
  - American Biogas Council
  - Wastewater sector
Leverage “Utilities of the Future”

- **NACWA**
  - National Association of Clean Water Agencies
- **WEF**
  - Water Environment Federation
- **WERF**
  - Water Environment Research Foundation
- **CWWA**
  - Canadian Water & Wastewater Association

*Water Resource Recovery Facilities:*

*It’s not “wastewater” anymore!*
Expanding Options

Options for Organic Waste Management

Slide courtesy D. Parry, CDM Smith
Water Resource Recovery Facilities (WRRFs)

Resource Centers Convert Wastes into Valuable Products

- Wastewater
- Fuel
- Reclaimed Water
- Energy (Heat, Power)
- (Fertilizer) Biosolids
- Food Waste
- FOG
- Other Organic Waste

Slide courtesy D. Parry, CDM Smith
What WRRFs Do…. 

...and at Boston, they make energy from anaerobic digestion and 100 dry tons of heat-dried pellets per day: *Bay State Fertilizer*...

*Bay State Fertilizer* is used...  
As fertilizer on turf farms (photo)  
As fertilizer for corn and hay crops  
To fertilizer sports fields, parks, and golf courses  
As a fertilizer to revegetate sand & gravel mines  
As part of packaged fertilizers  
As a renewable fuel in cement kilns

- 15 wastewater utilities accept other feedstocks  
- 1,200 produce biogas/+ 2,400 that could  
- 500 use biogas for combined heat/power or other energy uses
WRRFs w/AD-to-Biogas Systems
2014 Energy Specialty Conference

Many of New York State’s water resource recovery facilities (aka, wastewater treatment plants) are moving in the direction of becoming Utilities of the Future (UotF). This conference will highlight some of these facilities; individual projects and technologies that can be components of UotFs; as well as mechanisms for funding such projects.

Utilities of the Future go far beyond traditional public health and environmental objectives by:

- Generating renewable energy using open space and other horizontal assets;
- Capturing waste heat and latent energy from biosolids and liquid streams;
- Reclaiming and finding commercial uses for nutrients and other constituents;
- Using green infrastructure to manage stormwater and protect urban waterways; and
- Reclaiming and reusing water.
American Biogas Council View
Biogas Opportunities Roadmap

Voluntary Actions to Reduce Methane Emissions
and Increase Energy Independence

August 2014

Biogas is a proven source of energy used in the United States and around the world for decades. The United States currently has more than 2,000 sites producing biogas. The Roadmap found that with the proper support, more than 11,000 additional biogas systems could be deployed in the United States. If fully realized, these biogas systems could produce enough energy to power more than 3 million American homes and reduce methane emissions equivalent to 4 to 54 million metric tons of greenhouse gas emissions in 2030, the annual emissions of between 800,000 and 11 million passenger vehicles.
In-Sink Household Disposers

- Standard appliance
  - 50+ million in daily use; U.S. made (Racine, WI)
  - Commitment to Environmental Research/Best Practice
  - Dozens of technical/best-practice research

- Extensive technical/best practice research
  - Research partnerships – commission and support
  - Filling knowledge gaps
  - Hosted cross-sectoral research symposia

- Life Cycle Assessment – assessed twelve systems

- Water Environment Research Foundation (WERF) “Sustainable Food Management”

- Localized cost analyses (NYU Capstone project)

- Demonstration projects in partnership w/cities
How About Food Waste Disposers?

- 75 years; 50 million installed; standards/codes adopted 1960’s
- Standard appliance many areas of U.S. (80% in California)
- Essential function: convert food scraps (70% water) into liquid slurry
- Advantages: convenience, reliability, consumer satisfaction, eliminate odors, reduce vermin, safe

- System benefits: no containers, no trucks, no collection mess; biosolids easier to manage/compost than curbside-collection material
- Major trends: water resource recovery facilities (WRRFs) – clean water, biogas production, biosolids (near-zero waste)
- Life-cycle analysis: diverting food scraps from landfills is best way to decrease GHG emissions; centralized composting and disposers-to-AD-to-biosolids are in same range of GHG reductions
NYC’s Experience

- **Since 1950s:** Legal in newer non-combined sewer areas
- **Early 1990’s:** Consideration re use in older combined sewer areas
  - 1992: First modern-day CSWMP – *compost 10% of MSW*
  - 1993: Letter to DEP from then-DSNY Commissioner Lloyd – help!
  - DEP response: then-DEP Commissioner Appleton – “multi-media opportunity for inter-agency collaboration”; ocean-dumping of sludge stopped; plants upgrading; biosolids infrastructure
  - 1995: City Council compelled DEP to study/report; three pilot apartment complexes
  - 1997: DEP report recommended citywide legalization – stopped short of mandates, incentives; but projected minimal impact at @ 30,000 disposers installed annually for 30 years

- **Adoption slow, but steady**
  - **NYCHA:** pest management (1,500 pilot installs); now standard appliance in kitchen renovations
  - **Battery Park City Authority:** required in last six apartment buildings
  - **Major developers:** most installing
  - **Consumer expectations:** people from elsewhere in U.S. expect
In 1993, following adoption of the City’s first Comprehensive Solid Waste Management Plan in 1992, then-Sanitation Commissioner Emily Lloyd wrote to then-DEP Commissioner Al Appleton re the SWMP’s aggressive organics recycling goal:

“I am writing to urge you to approve and to promote the use of in-sink disposals in City residences. Disposals have the potential of making a valuable contribution to the City’s solid waste management system by reducing the amount of refuse that the City must collect and dispose of, by increasing the amount of residential waste composted or otherwise put to beneficial re-use, by eliminating the adverse environmental impacts of landfilling organic material, and by allowing the Department of Sanitation to avoid significant costs associated with the collection of source-separated food waste.”
DEP Commissioner’s Response

Coming just one year after ocean-dumping of the city’s sewage sludge had finally ended – said in part:

“I believe we have an important opportunity for environmental innovation and possibly major cost savings to the city if we take a multi-media approach instead of looking at this problem from an individual Departmental perspective.

Our internal reviews of drain carry and water consumption issues plus DOS’ arguments lead me to conclude that we should conditionally expand the permitted use of this technology to be able to review the issue on the basis of real world experience and determine how best to use a coordinated multi-media approach to this problem.”
Beyond Waste
A Sustainable Materials Management Strategy
for New York State

8.4.1 (e) In-Sink Food Scrap Disposers

Many communities manage some food scraps in combination with biosolids by allowing or encouraging the use of kitchen sink food disposers or “garbage disposals” in both commercial and residential settings—essentially, sending it to the local treatment facility along with other wastewater. Encouraging or requiring these “garbage disposals” in certain circumstances can further recycling goals.
Other Cities – International, Canada

- International interest/acceptance growing
  - Stockholm, Shanghai, Sao Paolo, greater London, Odense

- Canada
  - Archaic bans reversed (Ontario: London, York Region, Markham)

- Demonstration projects underway
  - Philly
  - Chicago, Milwaukee, Tacoma
  - Boston
  - Calgary
Municipal Partnerships:
Philly, Chicago, Tacoma, Milwaukee, Boston + Calgary

- **Basic Premise: Here to help**
  - Convenient, safe, sanitary
  - Reposition disposers as environmental tool
  - Food scraps managed as liquid resource
  - Answer “banana peel” question

- **Cities w/sustainability goals**
  - Increase landfill diversion
  - Increase renewable energy
  - Decrease GHG

- **Target ‘best in class’ advanced water resource recovery facilities**
  - AD w/biogas CHP
  - Class A biosolids
  - All have combined sewers
  - Variety of governance structures

- **Initiated demonstration projects**
  - Affirm existing research
  - Affirm efficacy as waste management tool
Municipal Partnerships (2)

- **Research protocol**
  - Target discrete areas
  - Enlist 60 to 100 homes without disposers; arrange installation
  - Educate/train/nudge homeowners to use

- **Evaluate**
  - Waste reduction/waste composition (independent consultants)
  - Social/behavioral research (SERA)

- **Next Phase**
  - On-going policy/program initiatives, e.g., building code, incentive programs, etc.
  - Growing list of interested cities

- **Comprehensive report**
  - Early 2015; inform municipal policy
  - Preliminary results both encouraging and reinforce the challenge
Current Partnerships

- PHILADELPHIA
  - Two neighborhoods/173 disposers

- TACOMA
  - 60 homes in Wapato Lake subdivision

- MILWAUKEE
  - 100 homes on south side

- CHICAGO
  - 60 homes in Maple Park

- BOSTON
  - 48-unit rental in Roxbury (LEED-Gold)

- CALGARY
  - 65-unit condo
Initial Results – Philly, Tacoma, Milwaukee

- Near-100% participation
  » High rate of consumer satisfaction (no adverse impacts)
  » Property management happy

- Significant quality-of-life improvement
  » Less odors, pests, trash

- Diversion of 30% to 40% of total food waste
  » Still-packaged food @ 25% of food waste

To Be Modeled:

- Potential savings – waste collection/disposal
- Potential energy production (biogas)
- Potential GHG emission reductions
So...How to Turn This Into That
Biosolids – the “other” recycled food waste

- EPA regulated processes/products
- Ex: Heat-dried pellets
- Pathogen-free
- Nutrient content: 5–4–3 (5% nitrogen, 4% phosphorus, 3% potassium)
- Land-applied – farms, road-sides, mine reclamation
- Most composters also manage biosolids
When NYOFCO Operated….

New York City: From Sludge to Fertilizer

From Sludge to Fertilizer: Roughly half of the city’s biosolids presently move to a pelletization facility in Hunts Point operated by the New York Organic Fertilizer Company, a subsidiary of Wheelabrator Technologies.

1. Biosolids move to the plant via dump trucks or barges. Once at the plant, the material is subject to a "hopping zone" where it is damped into pits for storage.

2. First, it goes to the pin mixer, where it is mixed with recycled pellets from previous batches.

3. It then moves to a dryer drum, where an air heater heats it to between 1,000 and 1,500 degrees Fahrenheit, evaporating any water. The material goes through the drum three times, eliminating any pathogens.

4. Hot air and pellets come out of the dryer at about 300 degrees Fahrenheit and are separated.

5. The pellets move to a vibrating screen where a sieve separates different-sized pellets and removes over- and undersized ones.

6. Roughly 30 tons of pellets each day are transported to a site for storage until requested by a customer; from here, they are generally transported by rail.

THE WORKS: Anatomy of a City
Kate Ascher
Penguin Press, 2005
How it Pays To Use Your Disposal

“Food waste fuels lower sewer bills. Food scraps produce methane gas that MMSD captures and turns into power to run our facilities. We also use food scraps to help make a fertilizer called Milorganite sold around the country.”

Clean Water + Renewable Energy + Fertilizer
Wastewater to Water Resource Recovery

“Don’t be the cat throwin’ food scraps in the trash.”
Use a disposal instead.
“We can turn your food waste into energy.” For more information, go to www.mmsd.com
Partnering with Cities

The Philadelphia Project
Philadelphia / InSinkErator Partnership

- **City’s Interest in Disposers - a Means to Support City’s Greenworks Goals**
  - Less Food Waste in Trash
  - Lower Greenhouse Gas Emissions
  - More Renewable Energy

- **Other Benefits**
  - Save City Money
  - Promote Overall Neighborhood Cleanliness
  - Assess Alternative to Truck Based Collection
  - Leverage PWD’s Investment in Biosolids & Biogas System Upgrades

Messy food waste in the trash creates multiple problems disposers help ease.

Mayor Nutter and Commissioners gave out quips along with the disposer prizes.
Two Overall Program Thrusts

- Two Neighborhoods
  - Installed Disposers in 20% of Homes on Collection Routes
  - Measured Food Waste in Garbage Before, During & After
  - Wrapped Two Trucks As Part of City-wide Messaging

- Citywide Encouragement of Disposers
  - $20 Rebate on Purchase of InSinkErator Disposers June 1-Sept 30 (Visa® Prepaid Card)
  - Rebate Offer Featured in InSinkErator Radio and Print Ads and on Streets Dept. Web Site
Problem Solving via Public/Private Partnership

- May 24, 2012 Press Conference

- Generated Numerous Print, Broadcast & Online Stories
  - Philadelphia Inquirer
  - Most Philly TV and Radio Stations
  - Coverage in National Plumbing, Recycling and Waste Trade Publications
Program highlighted on Philadelphia Streets Dept. web site home page

Benefits of disposer use

Disposer rebate offer

“Where does food waste go?” video
Participant Engagement and Education

- Used Local Community Groups for Signups
- City Sent Emails
- Assistance from Elected Officials
- Retail Signage and Local Print Ads Promoted Disposer Rebate
- Summer Street Festivals and Picnics to Gather Signups and Distribute Rebate Forms
- Enlisted Services of Ceisler
Survey of Disposer Households and Focus Groups*

- Participants Overwhelmingly Happy with Disposer
  - Reduced Trash Thrown Away
  - Made Kitchen Cleanup Easier
  - Reduced Odors and Smells in House and Neighborhood
  - Limited Vectors and Pests
- 75% Reported Putting All Food Scraps Down Disposer
- Trash Bags Set Out Decreased From 2.4 to 1.5 per HH per Week
- Reported Reduction in Putting FOG down Drain Due to Education

*75 surveys completed; by SERA statistically valid (+/- 10% at 95% confidence.). Two focus groups with 10 participants each representing both neighborhoods.
Philadelphia – Municipal Benefits

- **33%**: Reduction of Food Waste Sent to Landfills
- **58K**: Annual Tons of Residential Solid Waste Reduced* (4.3 lbs. per Household per Week)
- **$3M**: Annual Reduction of Landfill Fees
- **Increased Biogas Production by PWD**

*Potential Results if Applied to Entire City
Citywide Program Would Offset GHG Emissions from 60 Million+ Auto Miles*

Reduced Pests and Odors in Home & Neighborhood

Participants Reported Easier Kitchen Clean Up Using Approximately One Less Trash Bag Per Week

Residents LOVE Their Disposers and Say They Will Definitely Keep and Replace Them

*Potential Results if Applied to Entire City
Conclusion

- Plenty (too much) of food waste
- Interest expanding to reduce/manage as resource
- Variety of approaches possible/useful
  - Co-digestion for enhanced biogas production
  - Co-composting for improved/added products
- Diverting food scraps to WRRFs - practical, convenient and effective
  - Diverts organics from landfills
  - Promotes beneficial reuse of biosolids to improve soils
  - Captures methane for renewable energy
  - Reduces greenhouse gas emissions
For More Information

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