IMPLEMENTING ACT 148

Research Needs and Opportunities

Presented by the Food Cycle Coalition of the Farm to Plate Network

Sept. 25, 2013
AGENDA

• **Overview of Act 148 and Research Needs:** Bryn Oakleaf, Environmental Analyst, ANR

• **Food Cycle Coalition and Organics Research Needs:** Noah Fishman, Program Manager, Highfields Institute

• **Food Rescue:** John Sayles, CEO, Vermont Foodbank

• **Question & Answer**

• **Next Steps**

• **Contact information to Join Research Groups**
FUTURE OF MATERIALS MANAGEMENT IN VERMONT UNDER ACT 148

COLLEGIATE RESEARCH OPPORTUNITIES
SEPTEMBER 25, 2013

Bryn Oakleaf – Environmental Analyst
VT Department of Environmental Conservation
Change in how we view “waste”

VT Goal (est. in 2001): divert 50% MSW by 2005
   Did not achieve this, only ~35% diversion

3 major reports on solid waste
   ANR Solid Waste Report to legislature (2008)

Propose Sustainable Materials Management approach
VT Act 148  Universal Recycling Law

- Most significant change to VT solid waste law since 1988
- Approved unanimously by legislature
- Focuses on recyclables and organics
- To provide more consistent services statewide, with convenience, choices, and incentives
- Phased approach to allow development of infrastructure
VT Act 148

- Bans disposal of
  - mandated recyclables by 2015,
  - leaf & yard residuals and clean wood by 2016,
  - food residuals by 2020

- Mandates parallel collection by facilities/haulers that collect MSW
  - mandated recyclables by 2014/2015 (at no additional charge for residential recyclables),
  - leaf & yard residuals by 2015/2016, and
  - food residuals by 2017
VT Act 148

- Phased in mandates for larger generators to divert food residuals, if there is a facility within 20 miles
  - 2014 for generators > 104 tons/yr
  - 2015 for generators > 52 tons/yr
  - 2016 for generators > 26 tons/yr
  - 2017 for generators > 18 tons/yr

- Municipalities must adopt Unit Based Pricing by 2015

- Recycling collection containers must be available in publically owned places by 2015
  - and the VT statehouse by 2012
Steps completed and in progress for Act 148

- **Conducted Statewide Waste Composition Study (Complete)**
  - Final report expected soon
  - Last completed 2001

- **Revise Solid Waste Plan Materials Management Plan (In progress)**
  - Focus on 5 main material types:
    - Recyclables & Printed Materials
    - Organics
    - C&D
    - HHW and other Toxic materials
    - Biosolids, Septage, and other Residuals

- **Systems Analysis (In Progress)**
  - Infrastructure
  - Local governance
  - Cost analysis of entire system
  - Bottle Bill and Single Stream Recycling
Residential MSW by percent & weight

Highest amount of materials sent to the landfill are:

- Organics – 28% or ~70,000 tons
  - Food scraps were 16.7% or ~41,500 tons
- Paper – 22% or ~55,000 tons
- Plastic – 11% or ~26,899 tons
- C&D – 10% or ~25,217 tons
- HHW – 0%
- Electronics – 2%
- Metal – 4%
ICI MSW
by percent and weight

Highest amount of materials sent to the landfill are:

- Paper – 28% or ~45,750 tons
- Organics – 18% or ~29,000 tons
  - Food scraps were 11.2% or ~18,600 tons
Recent or ongoing research

- PAHs
- Herbicides in compost
- Bioassays
- Dairy Comprehensive Nutrient Management Plan (NMP) Funding Program – Recycling Organics
  - through Cornell Waste Management Institute (CWMI)
Research Needs for Implementation

- Collection and hauling innovations
- Environmental education
- Social media and marketing
- Market development
- Effects on chickens
- Risk assessment on digestate
- Ability to improve food security
- Feedstock management
- Persistent herbicides
- Marginal land availability
- Assess third party certification standards for compost (non-organic as well as organic composts)
ANR – Solid Waste Program - in development (contact Bryn.Oakleaf@state.vt.us)

Agency of Agriculture (Contact: Alex.DePillis@state.vt.us at VAAFM)
- On farm projects specifically
- Mainstream energy conversion w/ broad applicability

Local solid waste management districts  For a list of local districts:
http://www.anr.state.vt.us/dec/wastediv/solid/swmdlist.htm

USDA
- Renewable Energy for America Program (REAP)
  http://www.rurdev.usda.gov/BCP_Reap.html
- Rural Business Enterprise Grant Program (RBEG)
  http://www.rurdev.usda.gov/BCP_rbeg.html

USEPA dedicated funds for Food: Too Good To Waste pilot projects
Chris Beling, US EPA Project Engineer, Assistance and Pollution Prevention Unit
office 617-918-1792  beling.christine@epa.gov
Website & Contact Details

For more information on Act 148 and VT DEC’s Waste Management & Prevention Division:
http://www.anr.state.vt.us/dec/wastediv/solid/home.htm

E-Mail
bryn.oakleaf@state.vt.us 802.522.5783
Noah Fishman - Highfields Center for Composting
www.highfieldscomposting.org
Vermont

- Pop. Of 626,000
- Burlington, Vermont’s most populous city has 42,000 people
- Leading producer of Maple Syrup in the USA
- 164 CSAs and 99 Farmer’s Markets
- #1 on the Locavore index
160,000 tons/year
= 12 Million Gallons of Gas
The Price We Pay...

- $2.5-$7.5M/year in tipping fees and compost sales
- Feed for 350,000 layer hens
- Fertility to produce 17,000 acres of mixed vegetables

...for Landfilling VT’s Food Scraps
Act 148

**Phased-in organics diversion mandate:**
- 2014 for generators of more than 104 tons/yr
- 2015 for generators of more than 52 tons/yr
- 2016 for generators of more than 26 tons/yr
- 2017 for generators of more than 18 tons/yr

*By 2020, all food residuals, including that from households, must be diverted*
GOAL ONE

Establish statewide **infrastructure** to recycle all of Vermont’s food-scrap by the end of **2017**
GOAL TWO

Empower all Vermonters with the knowledge, tools, and resources to *Close the Loop* in their homes, farms, and communities.
Develop Community-Based Compost Programs

- Food scrap generators
- Haulers
- Farmer/Composter

Compost Site Layout

- Composting Area
- Pile Combining Station
- Field Crops
- Forest
- Work Area
- Composting Site
- Curlicue Pad
- Compost Site Map
- Compost Shed
- Drop Off Area
- Work Area Width 50 ft
- Pile Dimensions 50 ft x 14 ft x 5 ft
- Work Area Width 50 ft
Highfields-Run Collection Programs
• CTL St Albans
• CTL Northeast Kingdom
• CTL Lamoille Valley
• Rural pilot projects

Partner-Run Programs
• Central Vt SWMD
• Chittenden SWMD

Emerging Programs
• TAM Inc in Bennington
• Brattleboro Curbside Pilot
• Addison Cty Feasibility Study
BUILD A STATEWIDE COALITION

- Composting Association of VT
- Highfields Center for Composting

- Vermont Food Bank
- Network of over 280 local partners

- Vermont Waste District Managers Association
- Agency of Natural Resources

- Farm to Plate Network
- Hundreds of farmers and food groups

Composting • Food Security
Resource Management • Local Food System Development
Highfields Research and Education Facility

“breaking trail”
Scale-Appropriate On-Farm Systems
• 30 acre mixed vegetable farm
• Will produce 2000 yards of finished compost
• Production will meet farm’s compost needs
• surplus compost will go to retail sale at farmstand
• Flexible finance and grant leverage model
Hudak Farm Compost Site Financing

- $35,000 total cost
- $15,000 covered through grants,
- Farm borrowed $20K from Vermont Community Loan Fund
- VCLF loan was backed by a foundation so farm did not have to put up collateral
- Principle payments deferred for 12 months to allow farm to create sales before paying on principle.
On-Site School Systems
Custom-built watertight tailgate

DownEaster TRC Dump Trailer
6’x12’ bed, 48” sidewall
5 ton load capacity

Leclerc Industrial Lifters
hydraulic candy-cane tipper capable of lifting 400lbs

Pressure relief valve moderates
hydraulic pressure settings to accommodate
both lifter and dump cylinder

8hp Honda gas-powered motor
in lieu of truck electrical connection
Community Composting Toolkit

► Open Source Designs
► Case Studies
► Recipe Calculators
► Business and School Compost Guides
► Marketing and Promotional Materials
► Training and Educational Materials
► Compost Video Series
# Compost Recipe Calculator

## Enter Data From Analysis

<table>
<thead>
<tr>
<th>Material</th>
<th>Cubic Yards</th>
<th>Moisture Content (%)</th>
<th>Total Carbon (% Dry Weight)</th>
<th>Total Nitrogen (% Dry Weight)</th>
<th>Bulk Density (Lbs/CY)</th>
<th>Carbon : Nitrogen Ratio</th>
<th>Material Weight (Lbs)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scraps</td>
<td>1</td>
<td>80</td>
<td>30</td>
<td>2</td>
<td>1200</td>
<td>15</td>
<td>1,200</td>
<td>*Ave Municipal Scraps (1 Yard)</td>
</tr>
<tr>
<td>Example: Beans</td>
<td>1</td>
<td>30</td>
<td>47.2</td>
<td>0.432</td>
<td>300</td>
<td>100</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Example: Trees</td>
<td>1</td>
<td>35</td>
<td>65</td>
<td>1.85</td>
<td>75</td>
<td>35</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Example: Alpacas</td>
<td>1</td>
<td>50</td>
<td>12</td>
<td>0.3</td>
<td>900</td>
<td>40</td>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

## Production Estimate

### Total Materials in Recipe

- **Cubic Yards**: 4

### Finished Compost

- **Cubic Yards**: 1.6

## Recipe Calculations

### Carbon : Nitrogen Ratio

- **Ratio**: 32

### Moisture Content (%)

- **Percentage**: 62

### Bulk Density (Lbs/CY)

- **Density**: 619

Ideal Parameters:
- **Carbon : Nitrogen Ratio**: 25-30 parts Carbon to 1 part Nitrogen
- **Moisture Content (%)**: 55-60%
- **Bulk Density (Lbs/CY)**: 700-1000 Pounds/Cubic Yard
Compost Recipes

Provided here are 4 recipes for achieving the conditions necessary for proper composting. These recipes should provide a balance of Carbon and Nitrogen, Moisture, Density, and Porosity.

To follow the recipes, decide upon a common volume unit, such as 1 five gallon bucket and follow any one of the recipes.

Example: In Recipe 1, for every 1 bucket of food scraps, add 1 1/2 buckets of horse manure, 1 bucket of leaves, and 1/2 bucket of wood chip or sawdust.

<table>
<thead>
<tr>
<th>Material</th>
<th>Recipe 1</th>
<th>Recipe 2</th>
<th>Recipe 3</th>
<th>Recipe 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scraps</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
<tr>
<td>Horse Manure</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
<tr>
<td>Leaves</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
<tr>
<td>Wood Chips/Sawdust</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
<tr>
<td>Mulch Hay</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
<tr>
<td>Shredded Paper</td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
<td><img src="image" alt="Plant" /></td>
</tr>
</tbody>
</table>
Step 3. Laying Out Your Bin System
Before you start designing, you should know the following:
1. The number of bins you need to build.
2. The dimensions of the bins.
3. If the system will be operated with a bucket loader.

Now you can think about the layout of the system. Start by laying out your bin system to get the rough dimensions of the structure. Figure 1 is an example of a layout that we've used and which works very well for a small hand turned system that is managed under cover. Give yourself plenty of working room, 5-6 ft wide if possible for hand turned systems.

Composting Tip: Chicken McNuggets are not good for you, so are probably better composted.
Social Marketing

Close the Loop

Compost your food scraps and make a difference!

**COMPOST**
- Meat & bones
- Milk, cheese & other dairy
- Fruits, vegetables & peels
- Soups & sauces
- Dressings & condiments
- Flour, bread & pastas
- Nuts and shells
- Coffee grounds & filters
- Oils & fats
- Eggs & egg shells
- Paper egg cartons
- Spices
- Fruits & vegetables
- **PLU Stickers**: Please remove PLU stickers. These are not plastic and do not compost. These are small stickers on fruits and vegetables used to identify price at the register.

**RECYCLE**
- Plastics with recycling logo
- Office paper
- Cardboard
- Cans
- Bottles
- **Trash**
- Straws, wrappers, packaging, bags, plastic utensils
- Paper
- Napkins, soiled paper, paper towels, sugar packets, juice & milk boxes
- Floral Products
- Any Other Items that can't be recycled

**Additional information**

This business/school is reducing its carbon footprint through composting!

In the landfill food scraps release methane, nitrous oxide, and toxic leachate. Over a 20 year period methane is 72 times more powerful as a greenhouse gas than carbon dioxide.

5 gallons of food scraps composted instead of landfilled prevents the release of greenhouse gas emissions equivalent to burning over one gallon of gasoline.

If all the food scraps in Vermont were composted instead of landfilled it would provide a carbon offset equivalent to not burning 12 MILLION gallons of gas!

Thanks for making a difference in climate change!

Close the Loop

A composting program of Highfields Center for Composting

www.highfieldscomposting.org
We can compost!

Join the COMPOST CREW
In your town!

www.HighfieldsComposting.org
Lower your carbon footprint by composting!

Diverting all of Harwood’s food scraps from the landfill will decrease greenhouse gas emissions by the same amount that would be saved by not burning about 600 gallons of gasoline.

Recycling your food scraps helps to keep our planet cool. Compost.
School and Business Trainings

- Systems-Thinking Compost Training
- Video-based, interactive, replicable
- Training of Trainers
- School Compost Toolkit
- School and volunteer ‘Compost Crew’
Research Needs

• Education and behavior change models
• Business models and case studies
• Compost production systems innovations
  • Heat recovery, ASP, animal feed
• Compost value added product development
  • Biological controls: disease suppression, amendments, blends
• Farm and field application, results
THANK YOU!

Noah Fishman
noah@highfieldscomposting.org
www.highfieldscomposting.org
John Sayles – Chief Executive Officer
Vermont Foodbank
Food Rescue

Amount of waste and diversion
In 1995, the Economic Research Service, USDA reported that more than 96 billion pounds of edible food was discarded by manufacturers, retailers, foodservice, and consumers each year.
Food Rescue

Since 2007, the number of pounds of perishable Vermont product that is captured by the Vermont Foodbank to feed Vermonters in need has increased steadily.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Pounds (in pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 07</td>
<td>700,000</td>
</tr>
<tr>
<td>FY 08</td>
<td>1,000,000</td>
</tr>
<tr>
<td>FY 09</td>
<td>1,300,000</td>
</tr>
<tr>
<td>FY 10</td>
<td>1,600,000</td>
</tr>
<tr>
<td>FY 11</td>
<td>2,100,000</td>
</tr>
<tr>
<td>FY 12</td>
<td>2,200,000</td>
</tr>
</tbody>
</table>

These numbers reflect rescued meats, fish, fruits and vegetables, bread product & dairy from Vermont producers, manufacturers and distributors.
Barriers to Food Rescue

The biggest barrier to food rescue is the **resources to pick up edible but unused food** and the **facilities to process and preserve** the food for future use.

Food safety and liability are also barriers, but ones that can be more easily overcome. Each food donor that works with the Vermont Foodbank is protected by the Bill Emerson Good Samaritan Food Donation Act of 1996. The Act promotes food recovery and gleaning by limiting the liability of donors to instances of gross negligence or intentional misconduct. The Vermont Foodbank is trusted partner to the farmers, manufacturers and retailers who donate to us, secure in our policies and procedure to keep the food safe, fresh and delicious for our neighbors.

Food shelves and meal sites around the state also work directly with retailers to rescue product. While the pounds rescued are not tracked by the Foodbank they all help to divert food from landfills.
Food Rescue Research Needs

- There are 270 network partners — food shelves, meal sites, senior centers, after school programs and shelters — that provide direct service food to our neighbors.

- These sites are mapped, but an inventory is needed of each network partner’s capabilities to access, store, process and serve rescued food.

- The mapped and inventoried sites then need to be cross-referenced with possible food rescue sources.
Food Rescue

- The Vermont Foodbank is already working with the VSJF on GIS layers to identify network partner locations and certain characteristics, such as dates and hours of operation.

- Act 148 will result in added costs for food-related businesses. Food rescue can be a cost-effective alternative to disposal, but we need additional data to identify cost-effective opportunities and make a strong business case.

- The Foodbank offers available expertise in logistics, food safety and distribution as a resource.
Next Steps

- Connect with others with shared Research Interests on listserves (details on next slide)
- Self-Convene Research Teams via listserves
- Summit at VT Tech GROUNDWORKS Series - Early Spring 2014
FOR MORE INFORMATION AND TO JOIN A RESEARCH INTEREST GROUP Listserv

RECYCLABLE & DIFFICULT TO RECYCLE MATERIALS

- Bryn Oakleaf, Agency of Natural Resources Bryn.Oakleaf@state.vt.us

ORGANICS:

- General inquiries on research related to organic materials: Pat Sagui, Compost Association of Vermont, pats@gaw.com
- Inquiries re: working with Highfields Center on Close the Loop Program, or utilizing their compost site: Noah Fishman noah@highfieldscomposting.org

FOOD RESCUE:

- Information relating to Farms: Michelle Wallace: mwallace@vtfoodbank.org
- Information relating to Retail Operations: Tom Abbiati: tabbiati@vtfoodbank.org
Thanks

Many people and organizations contributed to this webinar and the ongoing collaborative effort to plan and execute a comprehensive program of sustainable materials management within the State of Vermont in order to fulfill the intent of Act 148. In particular, we wish to acknowledge the following people whose support and ongoing work represents a pivotal effort:

Pat Sagui, Director, Composting Association of Vermont
Erica Campbell, Farm to Plate Program Director, Vermont Sustainable Jobs Fund
Doug Lantagne, Dean, UVM Extension and Director, UVM Food System Initiative
Alison Nihart, Assistant, UVM Food System Initiative

Moderators - Donna Barlow Casey, VTTech College & Ginger Nickerson, UVM Extension Center for Sustainable Agriculture

Implementing Act 148