Denver Composts Collection Program

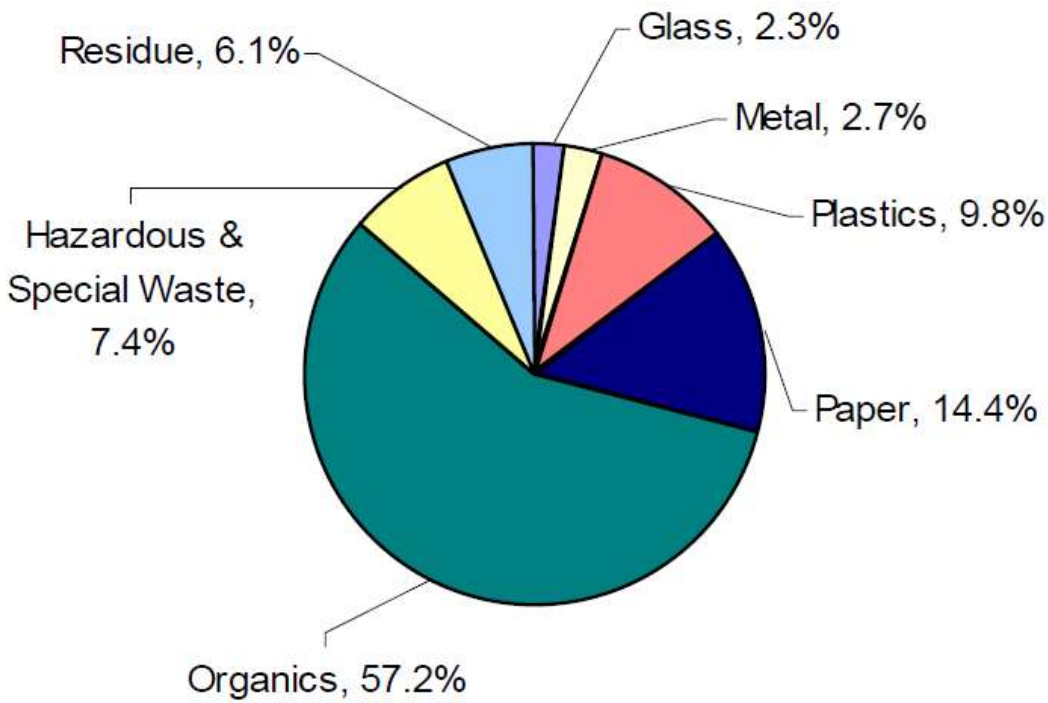
Composting provides important benefits for our environment

Alliance For Sustainable Colorado
Presentation on 2/12/2015

Next Greatest Opportunities for Waste Diversion

Denver's Waste Stream

- 14% food waste
- 29% yard waste



*2008 Denver Waste Composition Study (by weight)

Next Greatest Opportunities for GHG Reduction

Greenhouse Gas Emissions

- Lower Methane Emissions Through Composting
- Carbon Sequestering in Compost and Soils

Food discards produces 16.2% more methane than the average mixed solid waste loads.

Brief History of Denver Composts Program

Pilot Program (free service):

- Launched in fall of 2008
- State RREO grant
- Tested program in areas with different services types and participation levels
- 3,400 homes, **one route** (~17,000 eligible)

Brief History of Denver Composts Program

Pilot Program (fee-based service):

- Spring 2010, Grant Ended. No more funding.
- April 2010 – residents willing to pay to keep service ($9.75/month)
- 2,300 homes and 18 DPS schools, **one route**

Brief History of Denver Composts Program

2014 Program Expansion:

- 2014 City Council approved loan from Denver Environmental Health
- Expanded to additional 2,500 homes, **two routes** (~35,000 eligible)
- New routes selected primarily to increase route efficiencies

DENVER
ENVIRONMENTAL HEALTH

Brief History of Denver Composts Program

2015 Program Expansion & Beyond:

- Expanded to additional 5,000 homes, **four routes** (~60,000 eligible)
- New routes selected based on providing additional services to trash cart converted areas, areas likely to participate and route efficiencies
- **Beyond:** Continue expansion over next 4 to 6 years until most of city covered

Program Basics

- Only homes within existing compost route areas are eligible to participate
- **Subscription based program** at $9.75 per month (participants pay quarterly or annually)
- Once a week collection, year-round
- Residents provided with green cart, kitchen pail and starter box of small green compostable bags

Accepted in Green Carts

- **Yard debris:** Grass clippings, leaves, plant trimmings, etc.
- **Food waste:** All processed and non-processed foods including meat, dairy and bones.
- **Non-Recyclable paper:** Used paper plates, paper towels, wax paper, etc.
- **Miscellaneous items:** Cotton balls, feathers, pet hair, wooden popsicle sticks, etc.

Not Accepted in Green Carts

- No Plastic, Glass or Metal
- No Styrofoam®
- No Diapers, Human waste or Pet waste
- No Dirt, Sand, Sod, Rocks or Stone
- No Lumber or Treated wood
- No Liquids, Cooking Oil or Grease

Where Does it Go?

- Organic material hauled to a commercial composting facility in Keenesburg, CO
- Facility Operated by A1 Organics
- Organic material screened and ground into fine pieces by an industrial grinder

Producing the Compost Product

- Compost windrows maintained between 90 to 120 days under controlled temperatures and conditions (pathogen destruction and appropriate nutrient values)

- Analytical tests and documentation ensures that the compost is a quality product, meets industry regulations and is ready to be sold on the open market

Reduction of Greenhouse Gas Emissions

Keeping organic materials out of the landfill and avoiding potent methane emissions is the quickest, easiest and cheapest first step for a community to immediately reduce its Greenhouse gas emissions.[1]

Facts on Methane, a Greenhouse Gas (GHG)

- When measuring Global Warming Potential (GWP), Methane (CH_4) is **21 times** more effective at trapping radiant heat than carbon dioxide (CO_2) over a 100 year period.[2] (Note: 72 GWP over 20 years)

- Methane has a relatively short atmospheric lifetime, which means today's actions can have immediate and profound effects.[2]
  - Carbon dioxide (CO_2): 50-200 years (GWP = 1)
  - **Methane (CH_4): 12-17 years (GWP = 21)**
  - Nitrous Oxide (N_2O): 120-150 years (GWP = 310)
  - Chlorofluorocarbons (CFC_s): 102-1,000 years (GWP = 125-152)

GHG Sources[3]

GHG	Natural Sources	Human Sources
Carbon dioxide	Release from land and oceans	Fossil fuel combustion, land use conversion, cement production
Methane	Wetlands, enteric fermentation (non-domestic animals)	Fossil fuel combustion, rice paddies, **landfills**, biomass burning, enteric fermentation (livestock)
Nitrous Oxide	Release from land and oceans	Fertilized soils, fossil fuel combustion, Industrial processes, biomass burning
CFCs	None	Liquid coolants, foams

Methane from Landfills

- Landfills are the largest man-made source of methane source in the United States and accounted for approximately 22% of total U.S. anthropogenic methane (CH_4) emissions in 2008.[4]
- Despite capture or "burn-off" systems in place, the EPA estimates that 47% of the methane generated by U.S. landfills escapes into our atmosphere (or 125 $MMTCO_2$/yr.).[4]

Methane from Landfills

- Methane (CH_4) is produced from landfills by the decomposition of organic material under **anaerobic** (without oxygen) condition.[5]

- Annually more than 26 million tons of food waste alone is sent to landfills in the United States.[6]
  - The greenhouse gas impact of composting this mass instead would be equivalent to removing nearly **8 million passenger cars** from our roads.

Reducing Methane Emissions Through Composting

- Composting is an aerobic (with oxygen) process that results in less than 1 percent of the initial carbon content converted in the form of methane emissions. CH_4 almost always oxidizes to CO_2 before it escapes from the compost pile.
- The reduction in GHG emissions by composting far outweigh the minimal emissions that occur in the composting process, such as transportation and the turning of piles. EPA concluded from the available information that **methane generation from centralized compost piles is essentially zero**.[7]

Other Benefits of Composting Organic Material

- Carbon Sequestration (Storage) in Compost and Soils
- Composting Minimizes the Use of Toxic Chemicals
- Composting Protects Our Water Sources
- Many more….

Carbon Sequestration (Storage) in Compost and Soils

- Carbon sequestration is the process by which ambient CO_2 is absorbed and stored by vegetation, soils, oceans or other "sinks", and thus removed from the atmosphere.
- Soils that have been depleted of carbon have the potential to store carbon when treated with finished compost.[8]

Composting Minimizes the Use of Toxic Chemicals

- Advantages of composting of food and yard waste includes **destruction of pathogens** in the waste material.[9]

- By making more compost material available to our local farms and gardens for use, we are in turn making soils and plants healthier and more resistant to disease and insect damage. Thus, composts can significantly reduce our dependence upon toxic chemicals in our soils.[9]

Composting Protects Our Water Sources

- **Increase compost usage, decreases use of toxic chemicals:** The use of toxic chemicals in both backyard and agricultural applications results in contamination of our groundwater, creeks and rivers.[10]
- **Increase compost usage, decrease need to water:** Compost can retain 100% of its weight in water and is an important component of agriculture and gardening in drought seasons or years.[11]

More Benefits of Composting Organic Material

- Compost is a **value-added product** with many markets, including land reclamation, horticulture, landscaping, and soil erosion control.
- Compost increases the nutrient content in soils, helps regenerate poor soils and promotes higher yields of agricultural crops.
- Compost has water retention capabilities up to 2.5 times that of native soils
- Compost has the ability to clean up (remediate) contaminated soil.
- Compost can help prevent pollution and manage erosion problems.
- Composting sustains at least four times more jobs than landfill disposal on a per-ton basis. [12]

Bob Palmer, Springfield, Missouri, News-Leader

Why Methane and Composting?

- Recall Human GHG Sources from earlier slide
- What do we have the most direct control over?
  - **Answer: The materials we send (or don't send) to the landfill.**

GHG	Human Sources
Carbon dioxide	Fossil fuel combustion, land use conversion, cement production
Methane	Fossil fuel combustion, rice paddies, **landfills**, biomass burning, enteric fermentation (livestock)
Nitrous Oxide	Fertilized soils, fossil fuel combustion, Industrial processes, biomass burning
CFCs	Liquid coolants, foams

Calculating Denver's Potential GHG Emission Reductions

Percentage of Denver's Trash Landfilled (220,000 tons) that could composted (diversion rate)	Projected Organic Material Composted Annually in Tons (tons)	Annual GHG Emission Reduction (saved) in Metric Tons of Carbon Equivalent (MTCE)[15]	Annual GHG Emission Reduction (saved) in Metric Tons of Carbon Dioxide Equivalent ($MTCO_2E$)[15]
10%	22,000	1,189	4,360
20%	44,000	2,378	8,719
30%	66,000	3,566	13,075

Emission Reduction Comparisons in Common Terms

- Using the middle range of 20% and 2,378 Metric Tons of Carbon Equivalent (MTCE) annually equivalent to:[16]

  - Removing 1,597 passenger cars from our roads
  - Saving 989,557 gallons of gasoline
  - Eliminating 46 railway boxcars of coal

Summary

- Composting food & yard waste results in a net reduction of Greenhouse Gases (methane).
- Take advantage of the systems you control (i.e. what is sent to the landfill).
- If other communities are composting, why not Denver?

Sources

1. Eco-cycle – "**Zero Waste and Climate Change**," online at http://www.ecocycle.org/zerowaste/climate/ (site visited on 5/27/10).
2. Intergovernmental Panel on Climate Change (IPCC) - "**Radiative Forcing Report on Climate Change**," 1995.
3. Southwest Climate Change Network – "**What is One Million Metric Ton of Carbon Dioxide-Equivalent?**" June 2009. Online at http://www.southwestclimatechange.org/solutions/reducing-emissions/mmtco2-e (site visited on 5/28/10).
4. US EPA - "**US Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008**," April 2010 (U.S. EPA # 430-R-10-006).
5. US EPA – "**Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks**," September 2006.
6. US Composting Council – "**Factsheet: Greenhouse Gases and the Role of Composting: A Primer for Compost Producers**," 2008.
7. US EPA – "**Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks**," September 2006.
8. US EPA - "**Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices**," September 2009 (U.S. EPA # 530-R-09-017).
9. Sonoma Compost – "**Environmental Benefits of Composting**," online at http://www.sonomacompost.com/environmental.shtml (site visited on 6/2/10).
10. Sonoma Compost – "**Environmental Benefits of Composting**," online at http://www.sonomacompost.com/environmental.shtml (site visited on 6/2/10).

Sources *(continued)*

11. King County Extension Office/Washington State University – "**Watersheds & Environment**," http://king.wsu.edu/enviro/events.htm (site visited on 6/2/10)
12. Institute for Local Self-Reliance – "**Stop Trashing the Climate**," June 2008.
13. HDR Engineering – "**Spring/Fall 2008 Denver Waste Composition Analysis**," March 2009.
14. US EPA – "**Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks**," September 2006.
15. US EPA - "**Waste Reduction Model (WARM)**," online calculator at http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html (site visited on 5/27/10).
16. US EPA - "**Waste Reduction Model (WARM)**," online calculator at http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html (site visited on 5/27/10).

Contact Information

Denver Recycles
DenverGov.org/DenverRecycles
DenverRecycles@denvergov.org
311 (720-913-1311)

Tom Strickland, Program Administrator
Thomas.Strickland@denvergov.org
303-446-3409