Northeast Forum on Climate-Waste Connections

Make Materials Management Count: Tools & Techniques

June 24, 2009

DISCLAIMER

This presentation is part of the U.S. EPA's Northeast Forum on Climate and Waste Connections

- This document does not constitute EPA policy or guidance and should not be interpreted as providing regulatory interpretations.
- Inclusion within this document of trade names, company names, products, technologies and approaches does not constitute or imply endorsement or recommendation by EPA.
- Information contained within this document from non-EPA presenters has not been screened or verified. Therefore, EPA has not confirmed the accuracy or legal adequacy of any information provided by the non-EPA presenters and used by EPA on this web site.
- Finally, links to non-EPA websites are provided for the convenience of the user; reference to these sites does not imply any official EPA endorsement of the opinions, ideas, data or products presented at those locations nor does it guarantee the accuracy of the information provided.

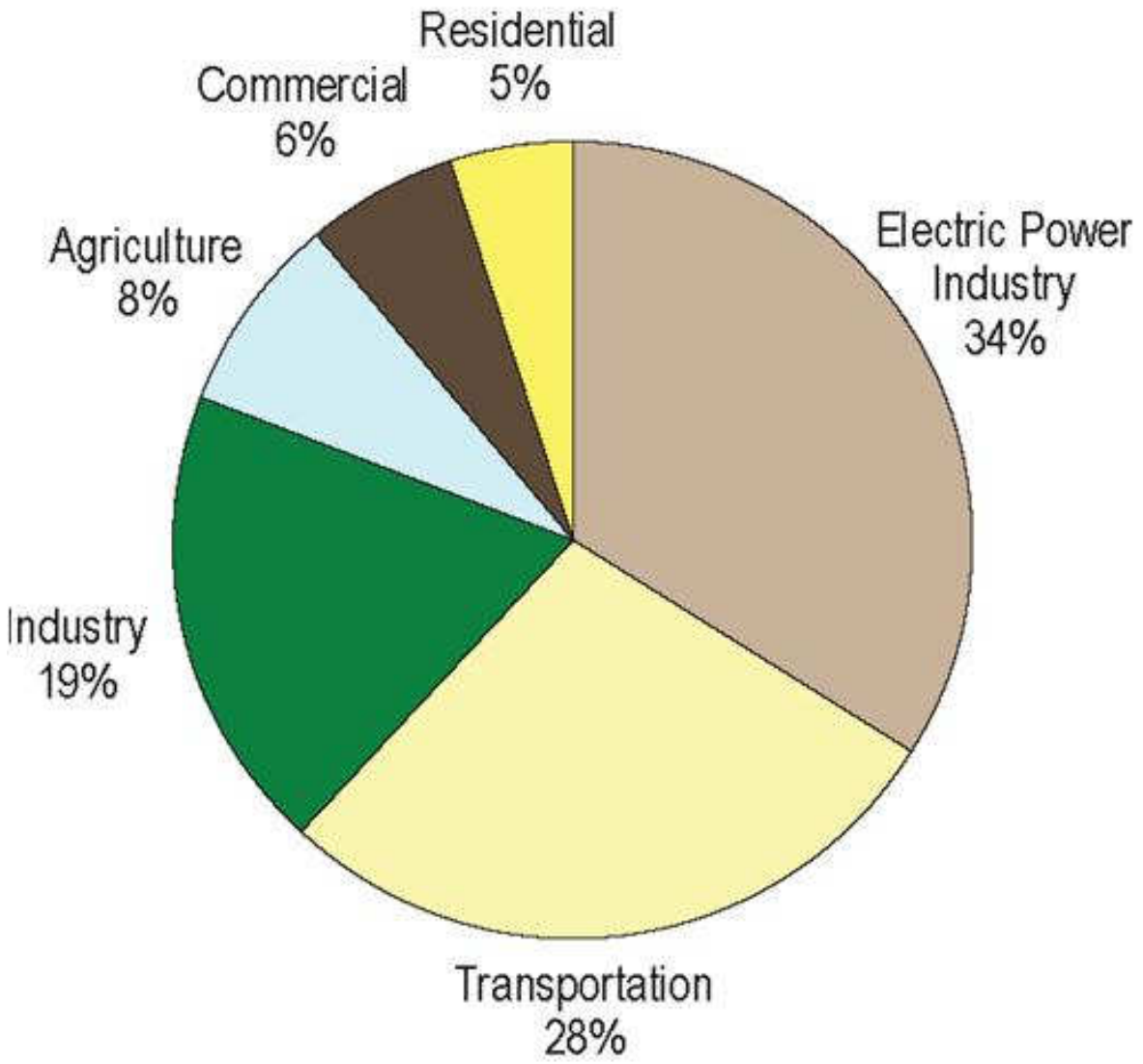
Treatment of Materials in Community-Scale Greenhouse Gas Inventories

Presentation for Northeast Forum on Climate-Waste Connections

David Allaway,
Oregon Department of Environmental Quality
(503) 229-5479
allaway.david@deq.state.or.us

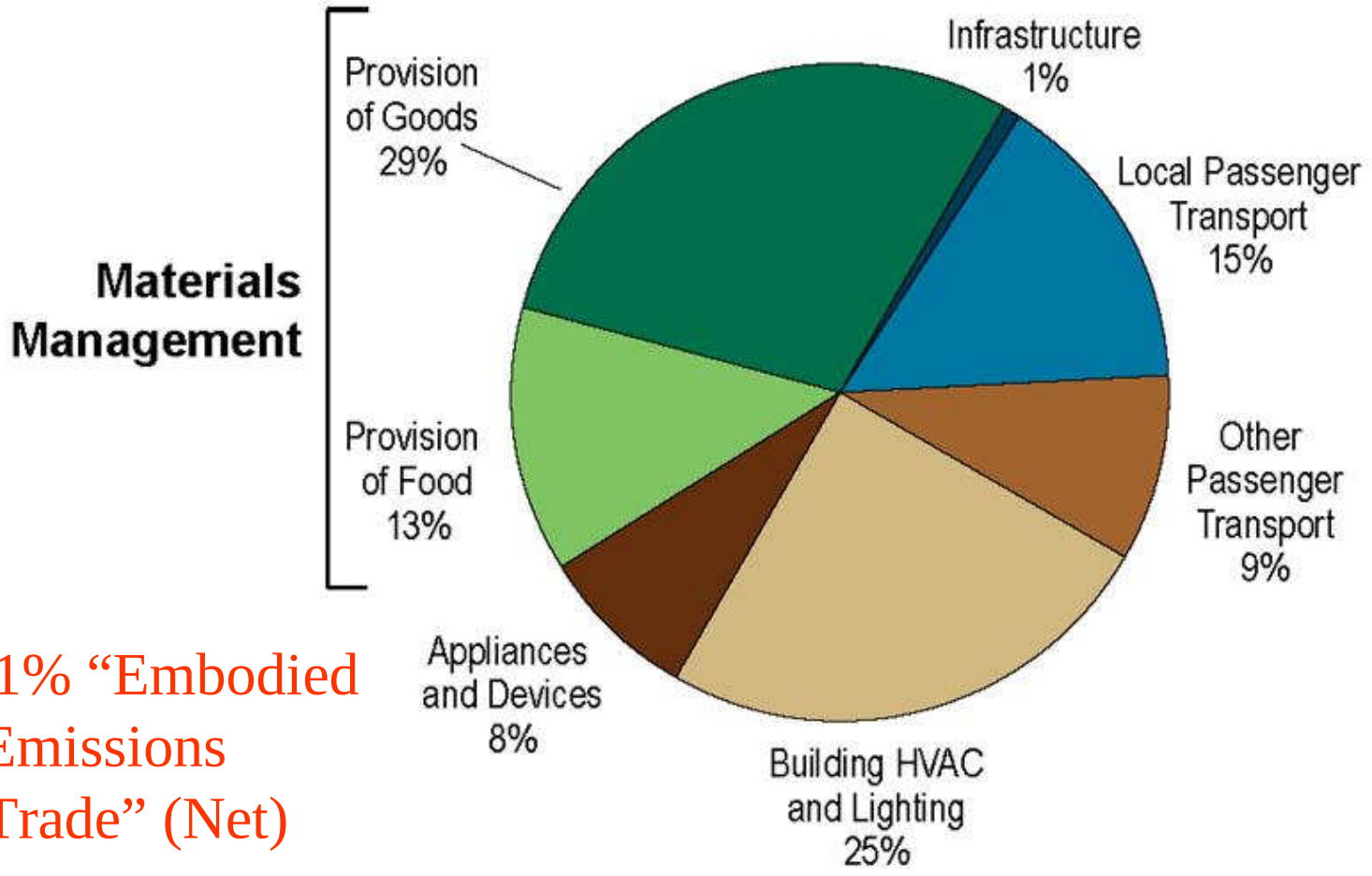
June 24, 2009

US Greenhouse Gas Emissions (2006): Conventional "Sector-Based" View



Source: US EPA

US Greenhouse Gas Emissions (2006): Alternative "Systems-Based" View



+ ~3-21% "Embodied Emissions of Trade" (Net)

Sources: US EPA (draft); Weber and Matthews (2007)

How Are Inventories Used?

Identify “sources of emissions”, in order to:

- Evaluate options for reducing emissions, and develop climate action plans
- Track progress at reducing emissions over time
- Communicate to the public

- Internationally: calculate a global sum

Community-scale inventories

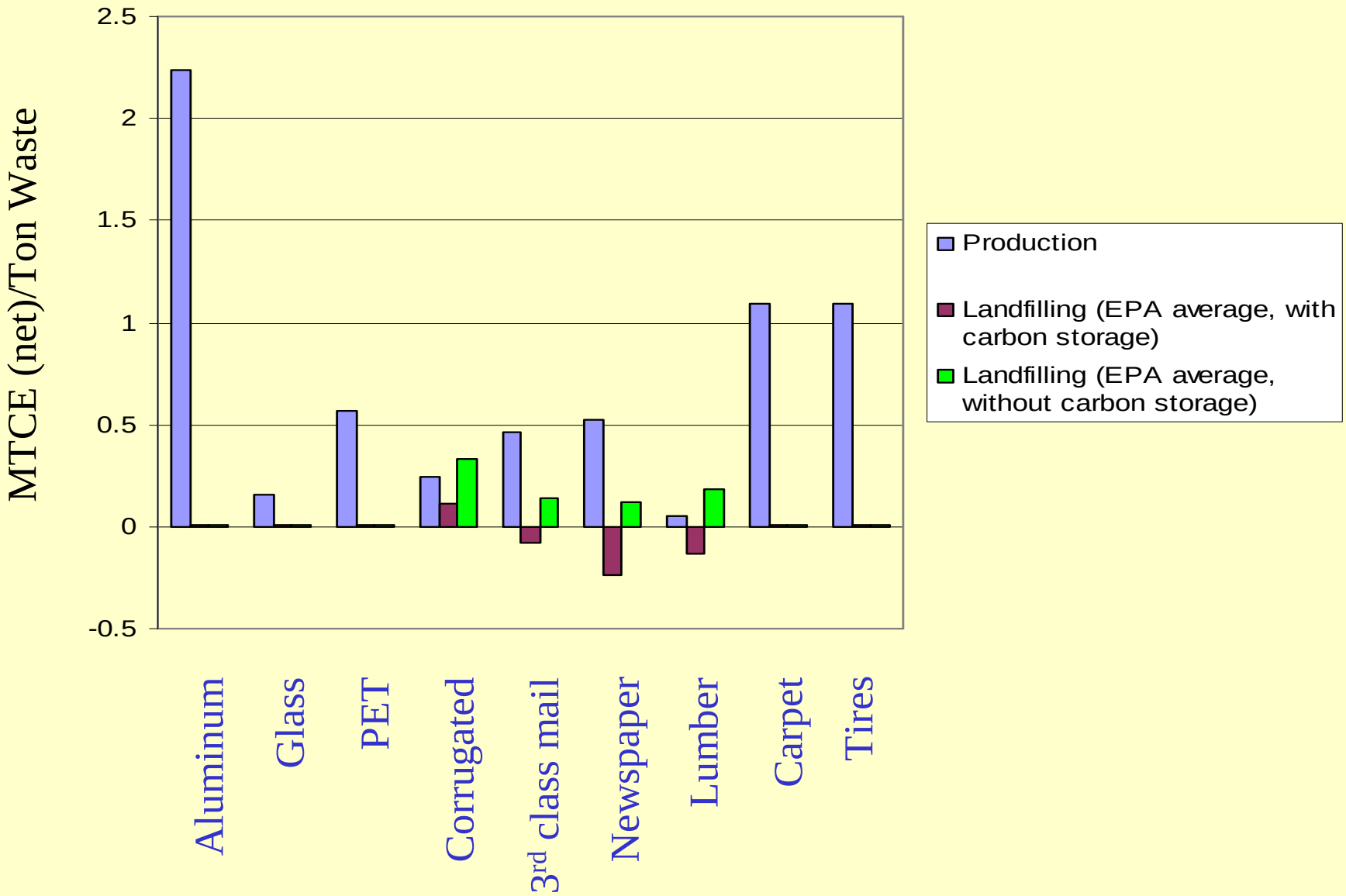
- Geographic (“production”)
- Hybrid
- Consumption

Conventional GHG Accounting at the Community Scale, circa 2009

- A “hybrid” approach, adding together:
  - Emissions associated with production (manufacturing, agriculture)
  - Combustion emissions associated with all (most) consumption of fuels (heating, transportation)
  - Combustion emissions associated with all consumption of electricity
  - Emissions from waste disposal (sometimes)

So, what does this mean for materials conservation?

For many materials, disposal emissions < production emissions

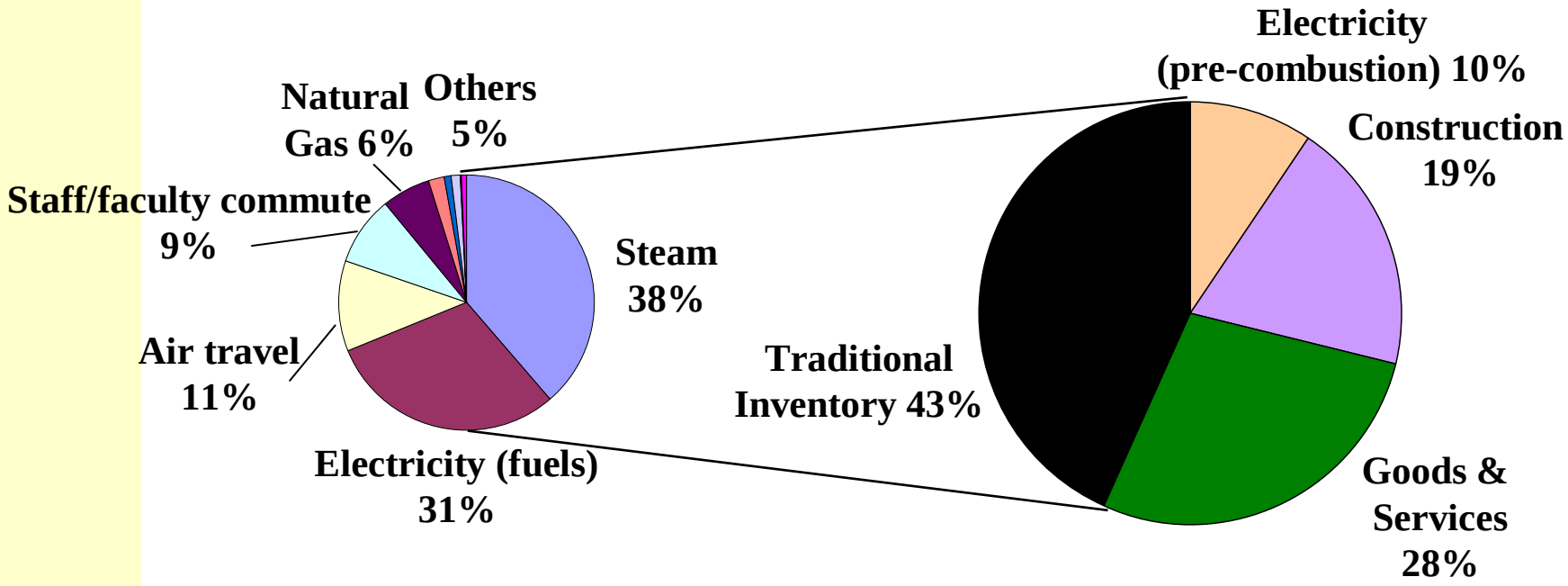


Some limitations of conventional accounting

- Mixes production- and consumption-related emissions
- Inconsistent treatment of materials and energy consumption (and conservation). For example:
  - Curbside recycling fleet emissions are included.
  - Upstream recycling benefits are excluded.
  - Upstream benefits are ~40 times higher!

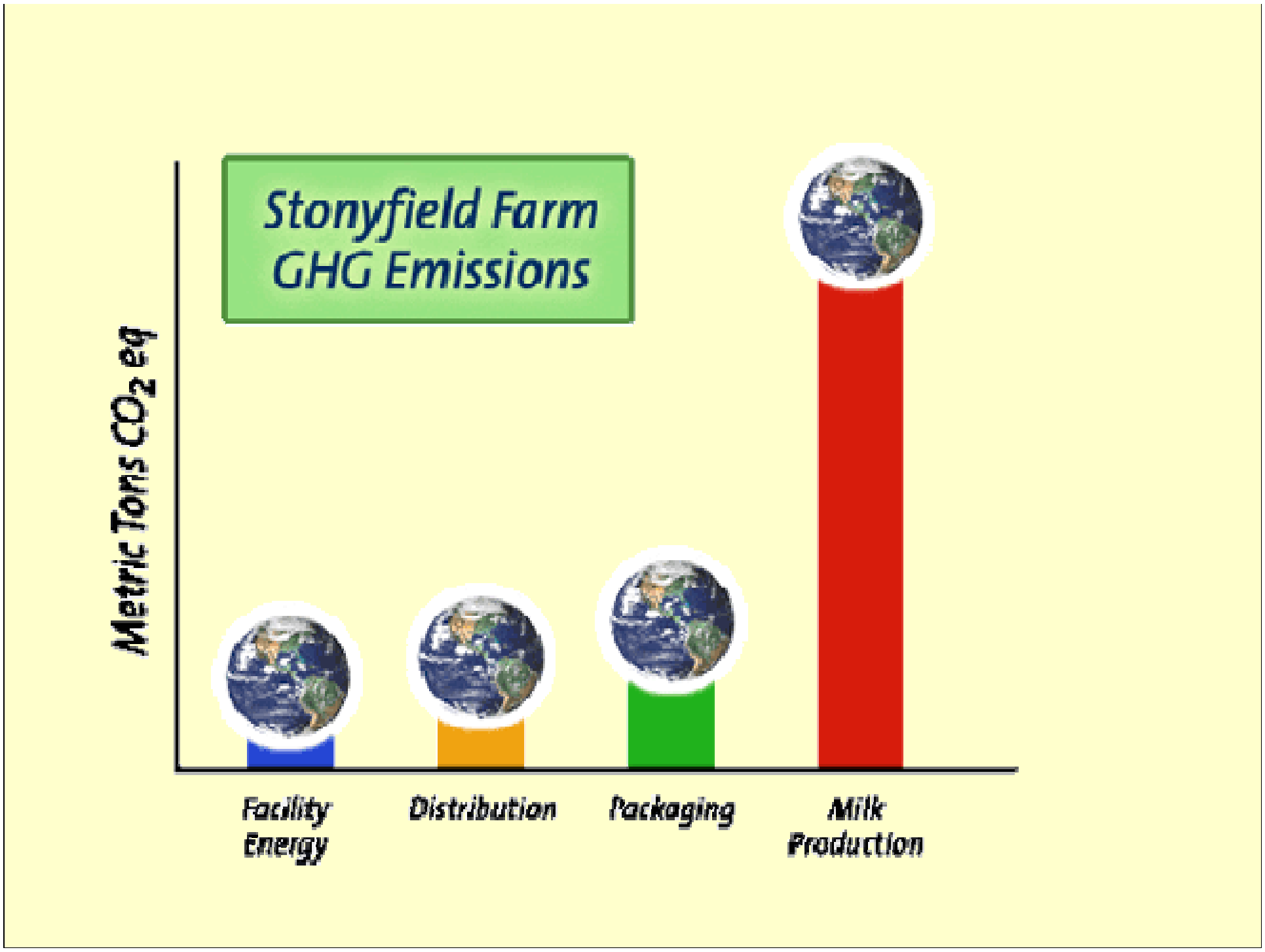
Greenhouse Gas Inventory Example: UC Berkeley (2006)

http://sustainability.berkeley.edu/calcap/inventory-footprint.html



Traditional Inventory
209,000 MTCO2e

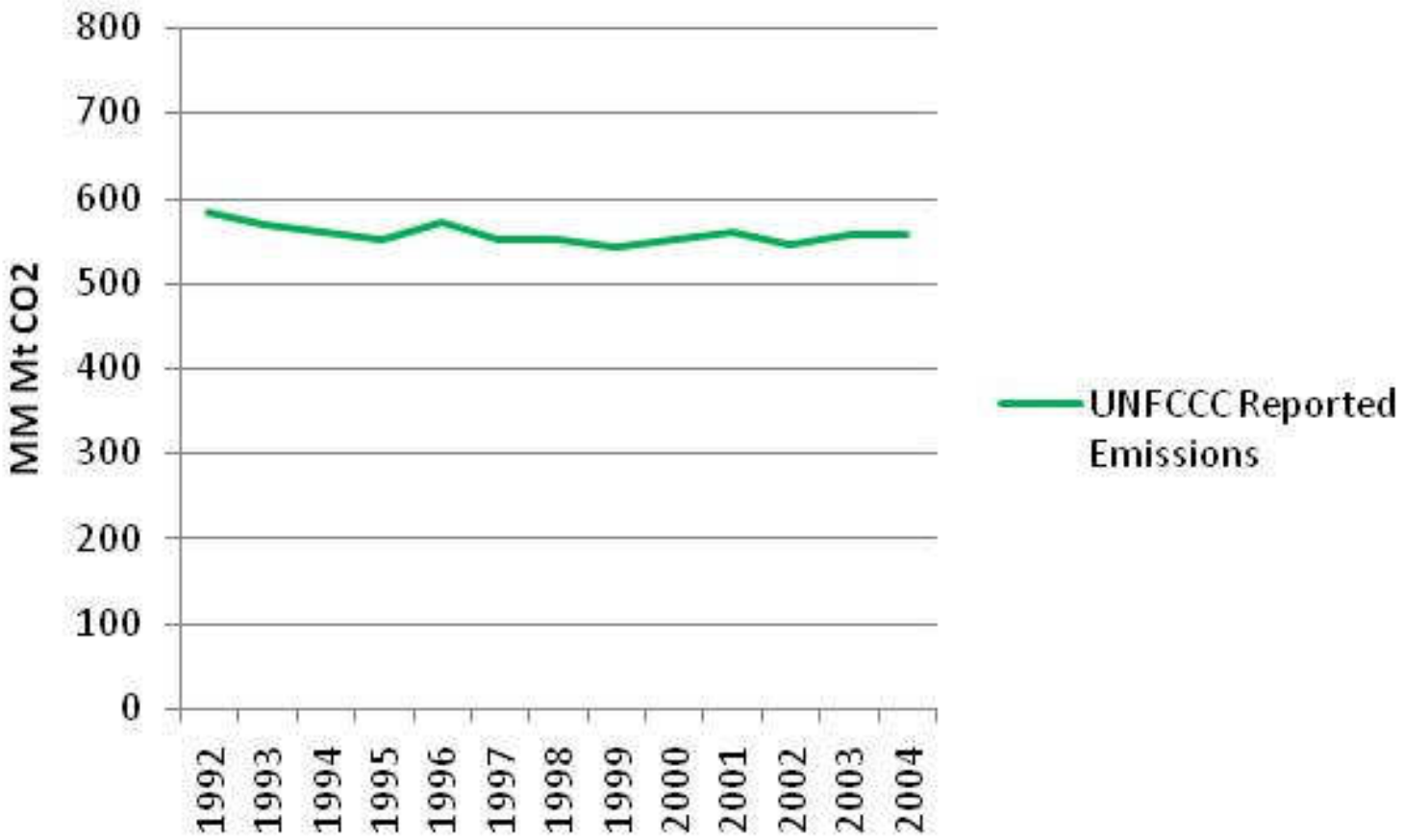
"Footprint"
482,000 MTCO2e


Stonyfield Farm
GHG Emissions
Metric Tons CO_2 eq
Facility Energy
Distribution
Packaging
Milk Production

Some more limitations of conventional accounting

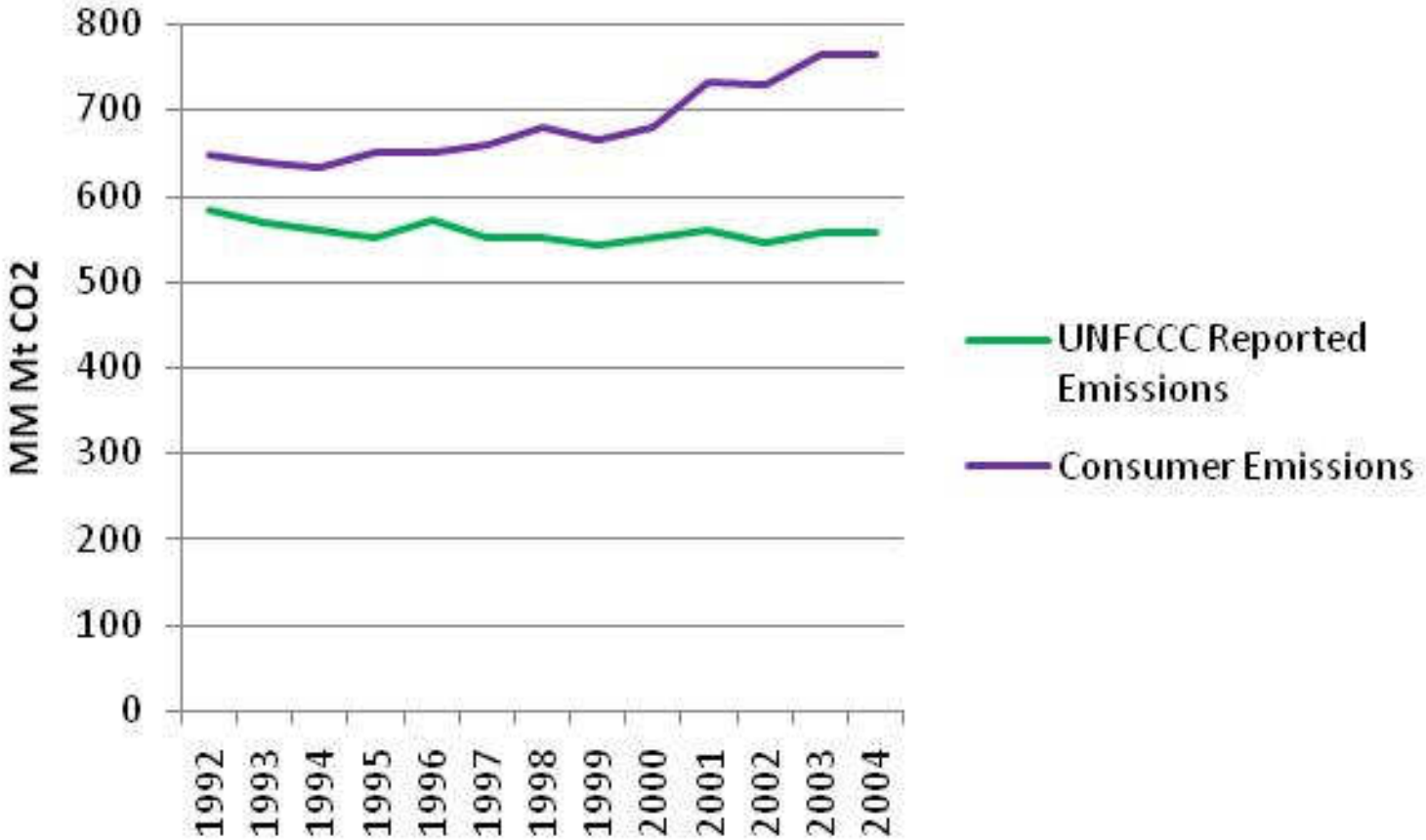
- Insensitive to certain rebound effects
- Rewards leakage
- Potentially undermines public credibility

United Kingdom CO_2 Emissions



Source: DEFRA, 2008

United Kingdom CO_2 Emissions



Source: DEFRA, 2008

Two Projects

- Oregon's consumption-based accounting of greenhouse gases
- EPA West Coast Forum on Climate, Materials and Waste: Inventory Workgroup
  - California Air Resources Board community inventory protocol
  - ICLEI – Local Governments for Sustainability

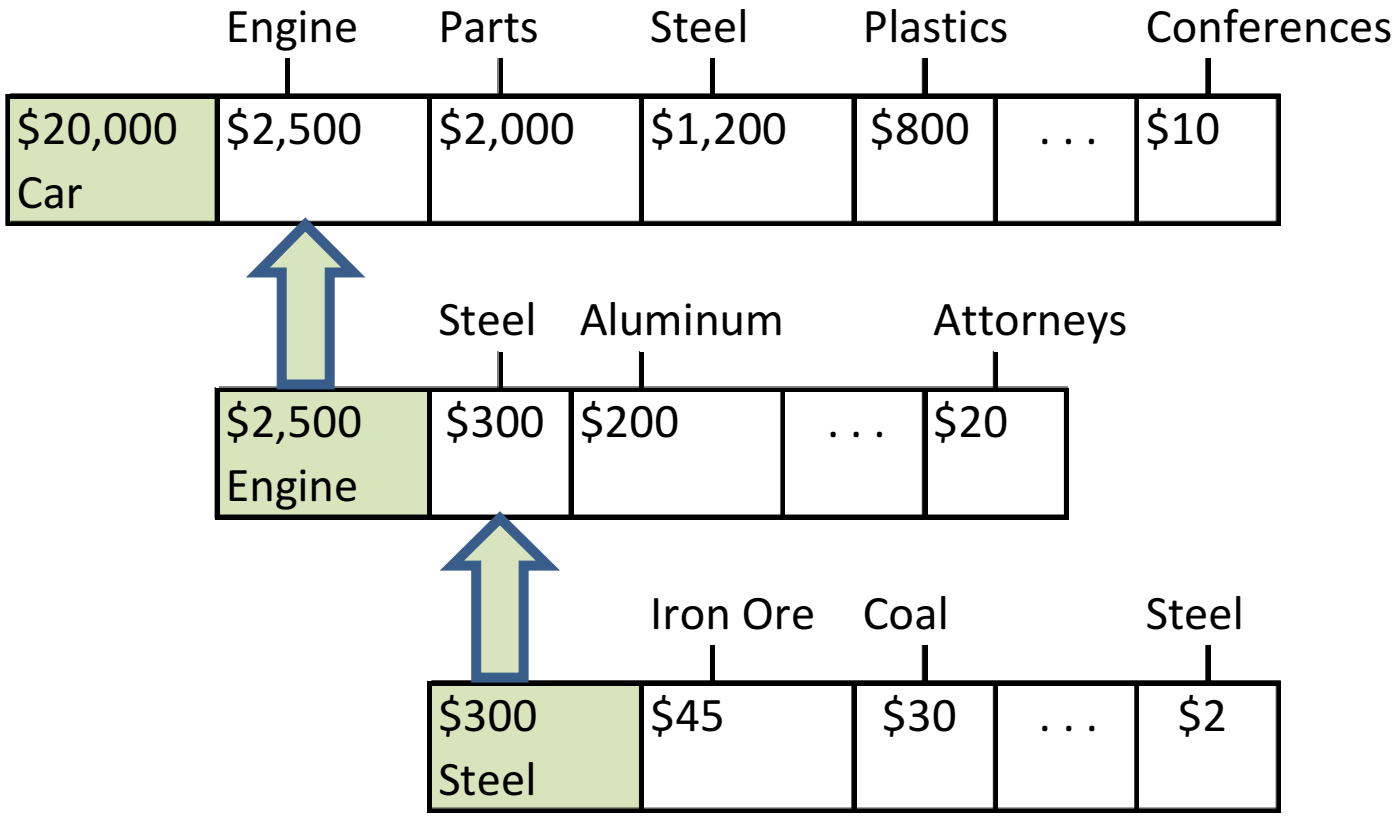
DEQ's Consumption-Based Accounting: Key Questions

- How do materials in Oregon contribute to GHG emissions?
  - Using a production-based frame of reference
  - Using the conventional "hybrid" frame of reference (with EPA's new categorization scheme).
  - Using a consumption-based frame of reference.
- Which materials contribute the most?
  - On an absolute basis.
  - Per dollar spent.
  - By life-cycle stage.
- Can we estimate where these emissions occur?
  - Requires multi-regional modeling

Consumption-Based Accounting: Key Questions (continued)

- How do consumption-related emissions compare against the conventional inventory?
  - How do different categories of consumption compare?
- How do materials-related emissions intensities compare?
  - In-state production.
  - Other US production.
  - Foreign production.
- Can our model be readily replicated and extended?
  - CARB community inventory protocol
  - Local government inventories in Oregon and elsewhere
  - Other years

Input-Output LCA



Consumption-Based Accounting: Methodology Overview

- Elementary flows: dollars (not tons)
- Generate estimate of 2005 “final demand” (household, government, investment expenses) for ~500 commodities
  - IMPLAN estimates how much final demand is satisfied by final production in Oregon, other 49 states, and other countries
- Estimate “upstream” emissions
  - Direct coefficients (kg CO2e/$)
  - Direct+Indirect coefficients
  - Weighting for out-of-region supply chains
- Estimate use phase and end-of-life emissions (recycling?)
- Draft results in July?

EPA West Coast Forum/ CARB Inventory Protocol

- EPA West Coast Forum on Climate, Materials and Waste: Inventory Workgroup
  - California Air Resources Board (CARB) community inventory protocol
  - ICLEI – Local Governments for Sustainability
- Requests of the West Coast Forum Inventory Workgroup:
  - Disposal emissions should be assigned to the generating community, not the host community
  - Credits should be provided for recycling
  - Consumption-related emissions should be included on a supplemental basis (or at least acknowledged)
- Letter currently drafted and waiting for CARB to announce plans

Issues

- Consumption-based accounting meets 2+ of the 3 objectives of inventorying
  - Evaluate options for reducing emissions
  - Track progress over time
  - Communicate to the public
- Limitations of consumption-based accounting
  - Can supplement conventional inventory, but not additive
  - Consumption data (final demand) is modeled, not actual
  - Some information less directly actionable for local governments
  - Methodology is complex

Issues, continued

- Landfill emissions: which year to assign them?
  - "Methane commitment" approach (year waste is disposed)
  - "Age of waste in place" approach (year emissions are estimated to occur)
- Treatment of recycling
  - Recycling has downstream and upstream benefits
  - What if downstream and/or upstream benefits aren't already reflected in the inventory?
    - Don't count the credits?
    - Count them but treat them separately?
    - Adjust the inventory to include them the emissions?
  - Recycling already reflected (somewhat) in consumption inventories

Issues, continued

- Land use changes are currently excluded from consumption methodologies
  - What are the emissions resulting from consumption?
  - When do they occur?
  - Of interest to waste prevention; paper recycling; composting; landfilling

Thank You!

For more information:

David Allaway, Oregon DEQ

(503) 229-5479

Toll Free in Oregon: 1-800-452-4011

allaway.david@deq.state.or.us

“Recycle or Die”

City of Keene, New Hampshire

- “Live Free or Die” State
  - Also known as “Live, Freeze & Die” State
- Population 23,000 (60,000 during daytime)
- Located in Southwest corner of NH
- Economic Hub of County (pop. 70,000)

“Recycle or Die”

“Recycle or Die”

- In April 2000, the City joined the Cities for Climate Protection campaign administered by ICLEI.
- Completed Local Action Plan in 2004
- Update to be completed in 2009

“Recycle or Die”

- Challenge making climate change relevant
- Too much information
- Can’t identify with what it means

- Global Warming- misleading
- Global Climate Change- BORING

"Recycle or Die"

- Coining new term:

  "**Caffeinated Climate**"-

  our weather on caffeine

- Effective for Red Bull generation as well as anyone familiar with the effects of coffee
- If that fails, talk about $$

“Recycle or Die”

- Constructed Materials Recovery Facility in 1994
- Constructed landfill gas to energy system to power recycling center off grid
  - Landfill closed 1999- opened transfer station, costs increased dramatically
  - Publicity of LFG system has been equally valuable as the hundreds of thousands of dollars saved in energy costs.
- Over 173 Million Pounds (86,500 tons) processed at recycling center since 1994
- Equivalent to 4,325 tractor trailer loads of material
- Ho Hum

Want to get them to perk up?

“Recycle or Die”

- Saved over $9 Million in Disposal Costs
- Over $3 Million in revenue
- Never underestimate the lengths people will go to save a nickel
- Something they can understand (“fairness”-pay as you throw, “free”)

“Recycle or Die”

- Used SOS pads & coat hangers
- What I lose sleep over-
  - **Paper!**
    - **Estimates that we dispose of over 8,000 tons of paper through transfer station**
    - **Equivalent to $1.2 million between disposal cost and lost revenue**
    - **For those 10% that care it equates to 142,000 trees**

"Recycle or Die"

- Success in portraying what we do as smart business (that happens to have environmental benefits)
- Shotgun approach to public outreach
  - **Clear link between investment in education and success in recycling program**
  - **Despite clear link- education funding slashed**

“Recycle or Die”

- What worked:
  - Calendars
  - Refrigerator magnets
  - School & Community group presentations

"Recycle or Die"

- We talk about global climate change or "caffeinated climate" at every turn
- But we do it in a way that people can relate to
  - Always bring an aluminum can filled ¾ full of water and pour it out on the ground- tell people it's the wasted energy equivalent by not recycling. Always has an impact.
- Easiest way for people to **make a difference** is to reduce waste, increase recycling

"Recycle or Die"

Resources

- Northeast Resource Recovery Association
  - www.nrra.net
    - Cooperative marketing association
- Northeast Recycling Council
  - www.nerc.org
    - Environmental Benefits Calculator
- City of Keene
  - www.ci.keene.nh.us
    - Link to YouTube videos, program information