Reduce, Reuse, Recycle: "Waste Management" or "Climate Management"?

Prepared for the College and University Recycling Coalition Workshop, AASHE 2011 Conference & Expo

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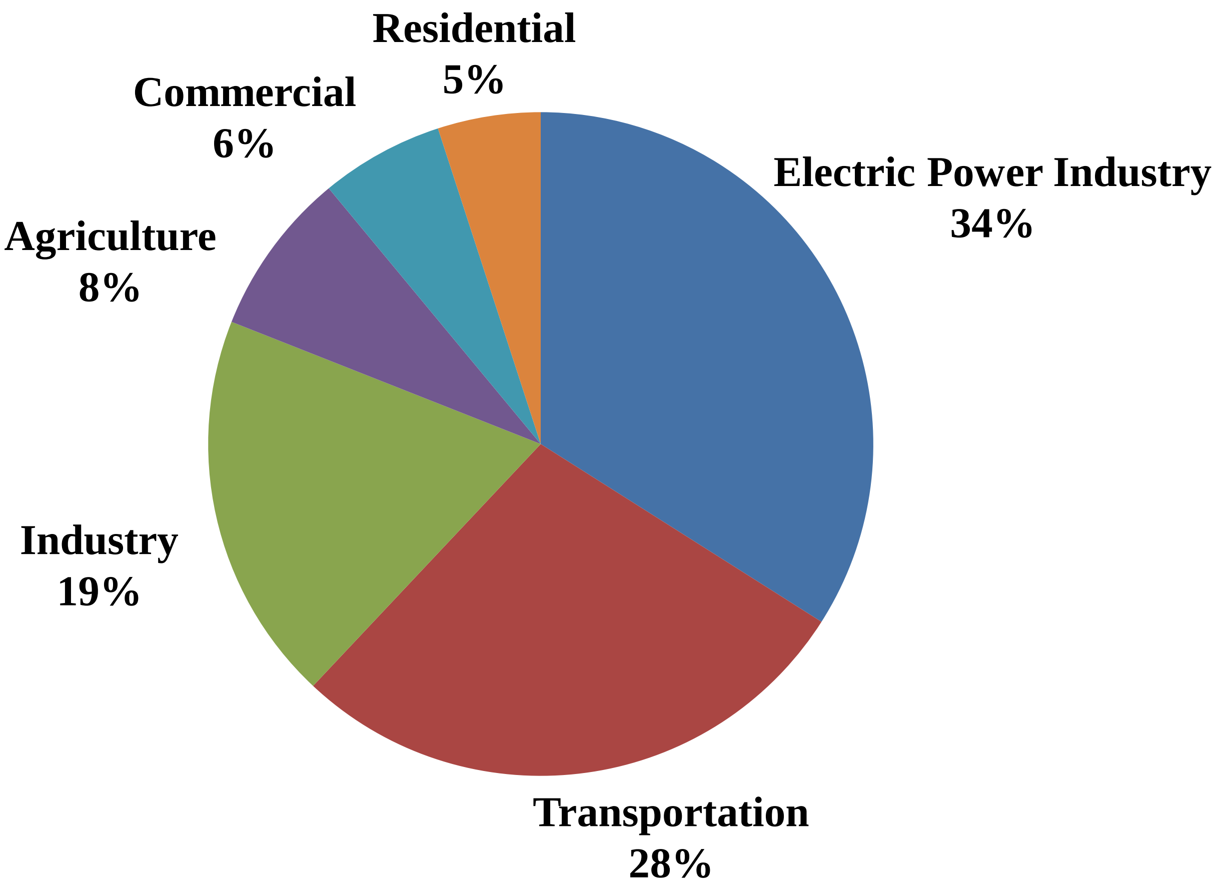
Overview

- A life cycle view of materials
- The climate impact of materials and waste
- Waste/discards management
  - Benefits of recycling
- The importance of “reduce, reuse” and purchasing
- Greenhouse gas inventories

Carbon Goggles

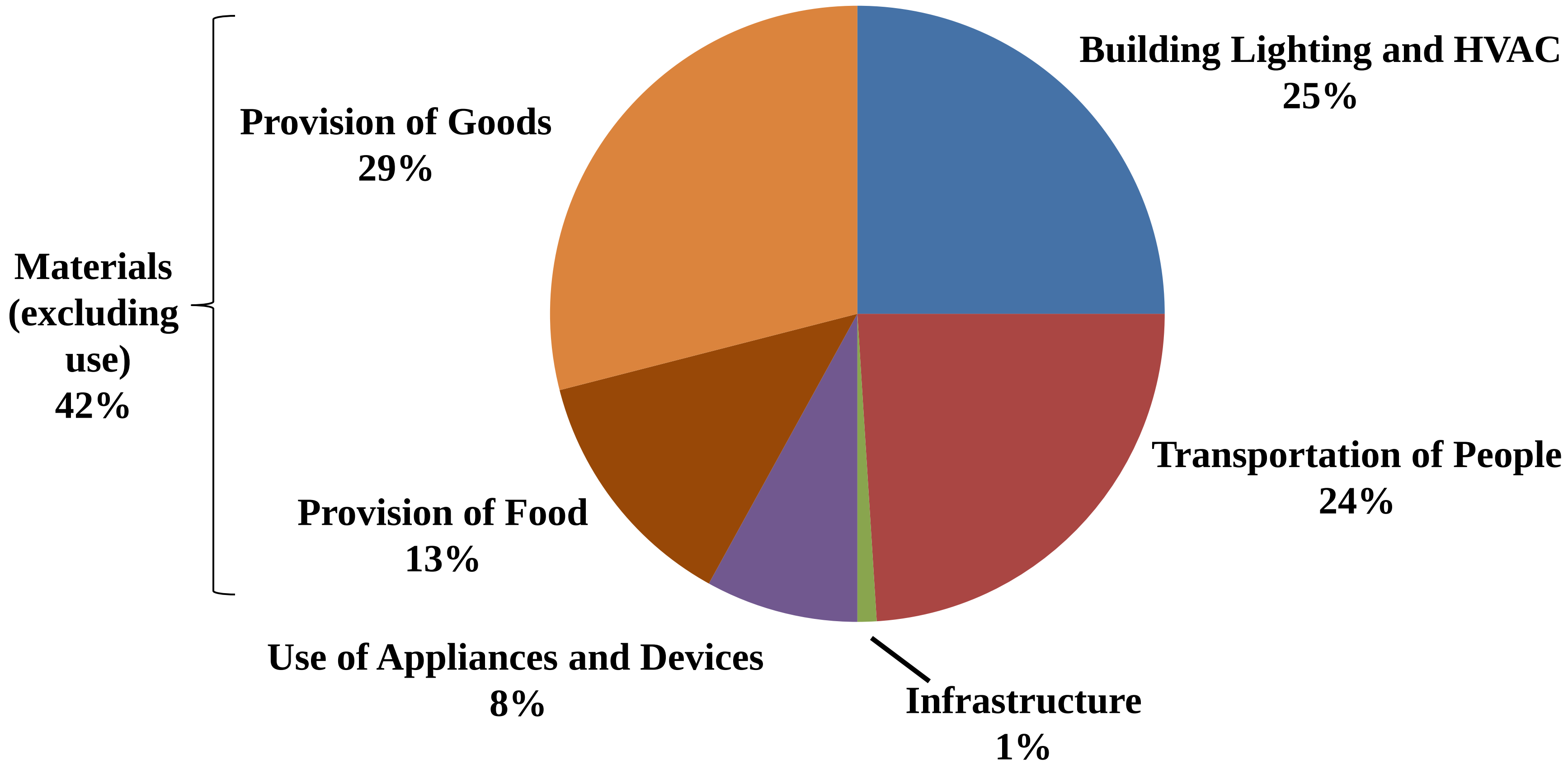
A Life Cycle View of Materials

Traditional Sector-Based View of U.S. Greenhouse Gas Emissions (2006)



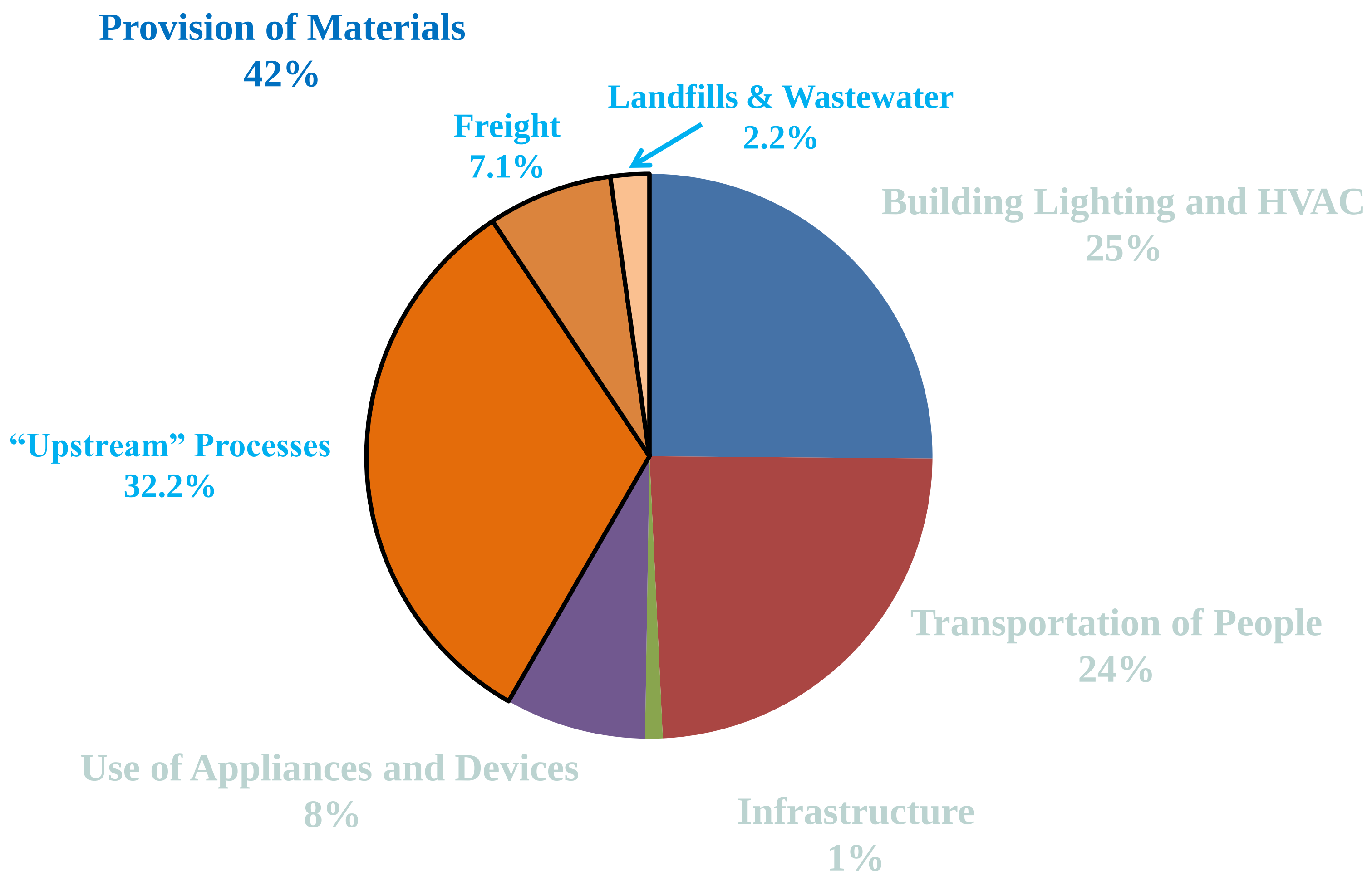
Source: US EPA (2009)

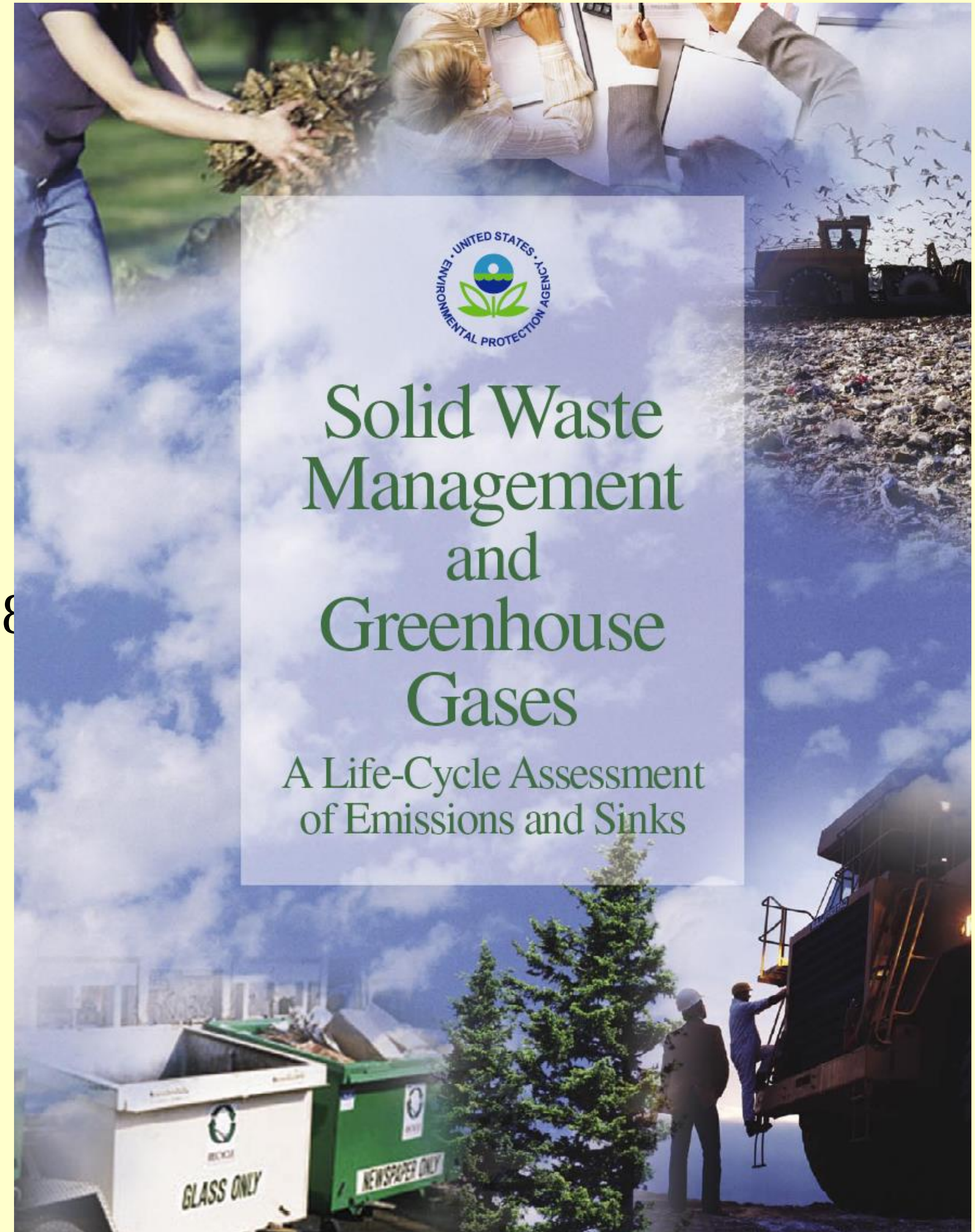
Materials Matter: Systems-Based Geographic Emissions Inventory (2006)



Source: US EPA (2009)

For Materials, "Upstream" Emissions Dominate





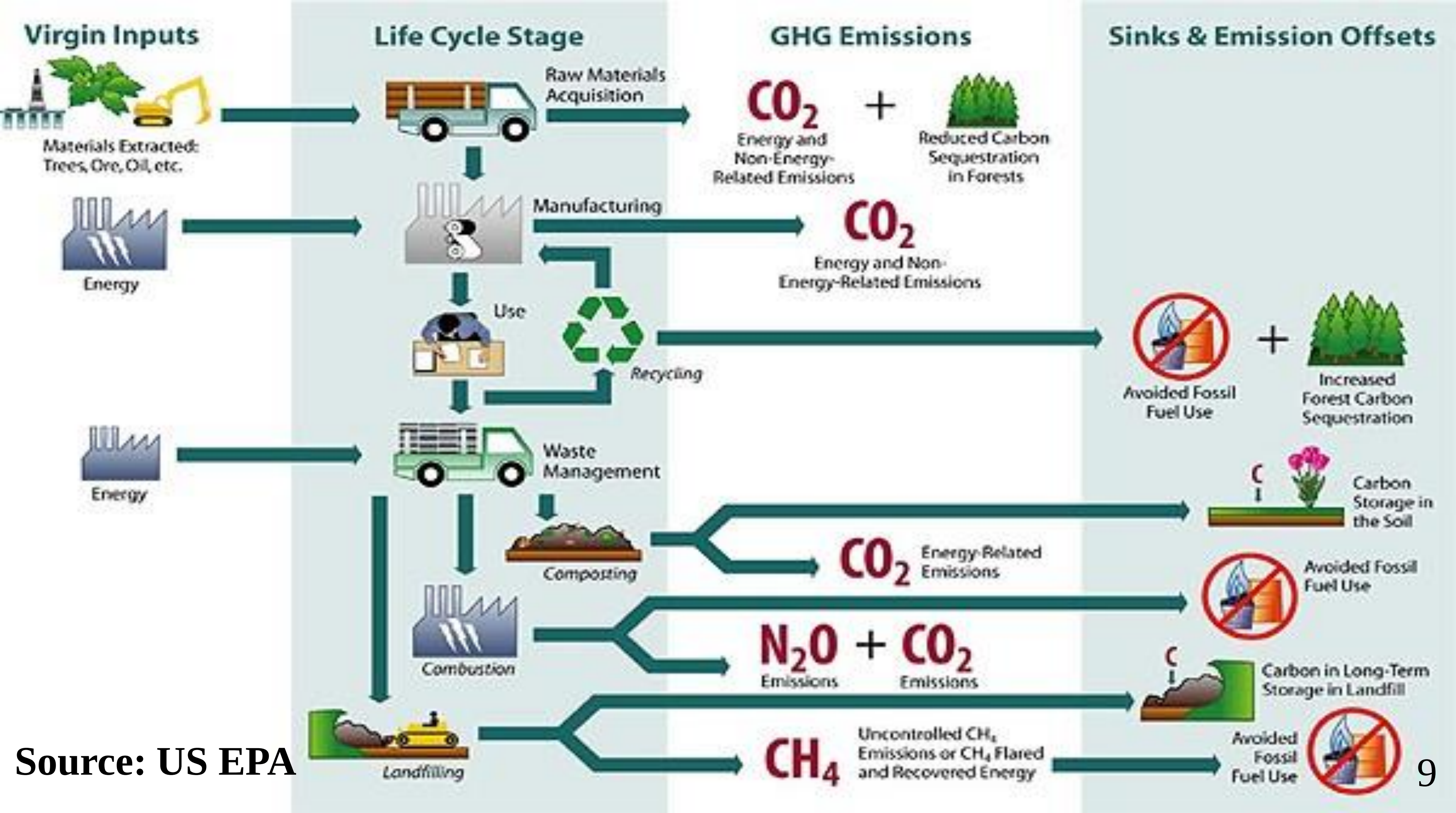
EPA Climate Change and Waste Resources:

Foundation Paper:
http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf

WARM (WAste Reduction Model) and other tools:
http://www.epa.gov/WARM

WARM Report:
http://www.epa.gov/climatechange/wycd/waste/reports.html

Greenhouse Gases Over the Product Life Cycle – EPA's WARM Tool



Source: US EPA

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Greenhouse Gas Benefits of Recycling

- Recycling in Oregon in 2010 reduced greenhouse gas emissions by ~3.0 million metric tons of CO_2e
    - ~4.3% of total statewide emissions
    - Equivalent of 620,000 “average” passenger cars
    - Benefits are dominated by “upstream” processes (not disposal avoidance)

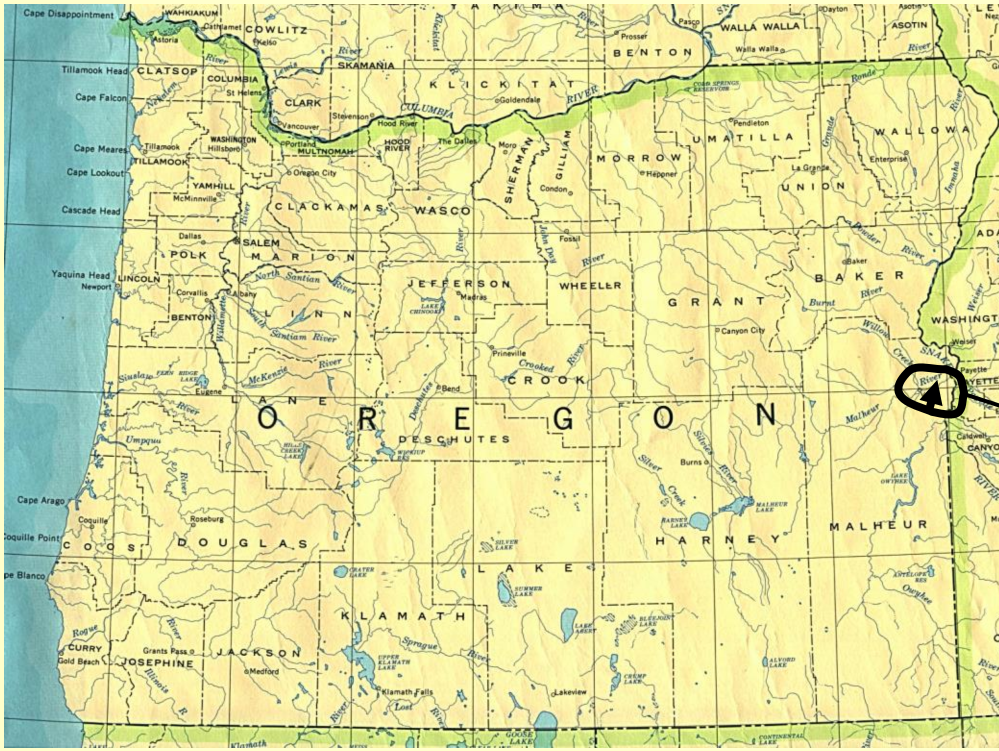
Long-Haul Is Not a Limiting Factor

Material	Production & Forestry Savings (MTCE/ton collected)	"Break-Even Point" (miles)		
		Truck	Rail	Freighter
Aluminum	3.44	116,000	451,000	524,000
Corrugated	0.79	27,000	104,000	120,000
Newspaper	0.68	23,000	90,000	104,000
Steel	0.48	16,000	63,000	73,000
LDPE	0.36	12,000	47,000	55,000
PET	0.33	11,000	43,000	50,000
HDPE	0.30	10,000	39,000	45,000
Glass (to bottles)	0.07	2,000	9,000	11,000

"Break-Even Point" is where GHG emissions transporting the recyclables equals GHG emissions avoided when the recyclables displace virgin feedstocks.

Avoided disposal-related emissions are not included.

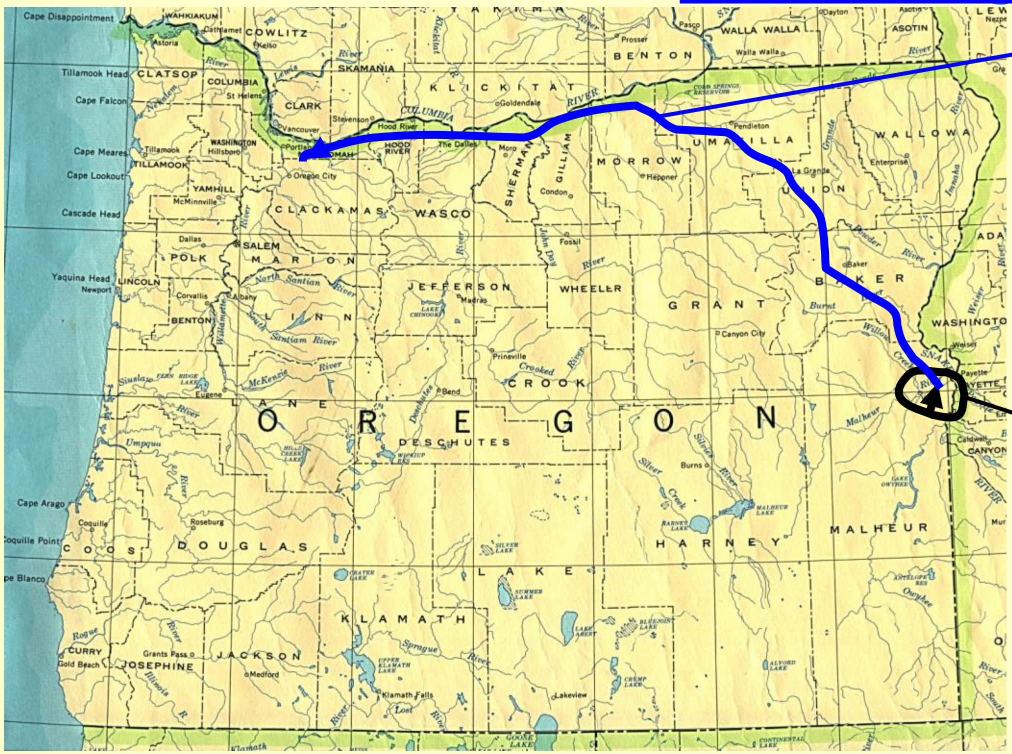
End Markets Matter! (sometimes)



Cullet to Aggregate Recycling (Local)
Net Energy Savings:
~0.2 MMBTU/ton

End Markets Matter! (sometimes)

Cullet to Bottle Recycling (Portland)
Net Energy Savings: ~2.1 MMBTU/ton



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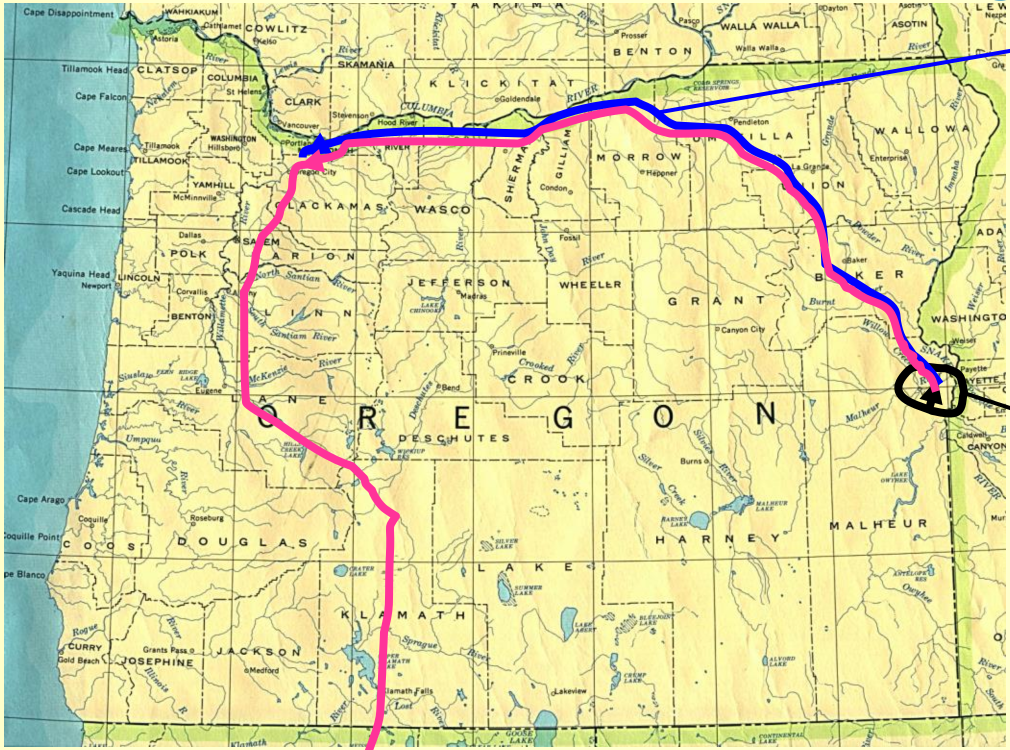


Cullet to Aggregate Recycling (Local)
Net Energy Savings: ~0.2 MMBTU/ton

Cullet to Fiberglass Recycling (California)
Net Energy Savings: ~3.2 MMBTU/ton

Composting

- Emissions, emissions avoidance are variable
- Composting food waste has higher per-ton benefits than composting yard debris
- GHG benefits/impacts may be small
    - In Oregon (2009), recycling benefits were ~56 times higher than compost impacts
    - Recycling tonnage was only 3 times higher
    - Recognize high uncertainty in compost results, other (non-climate) benefits of composting

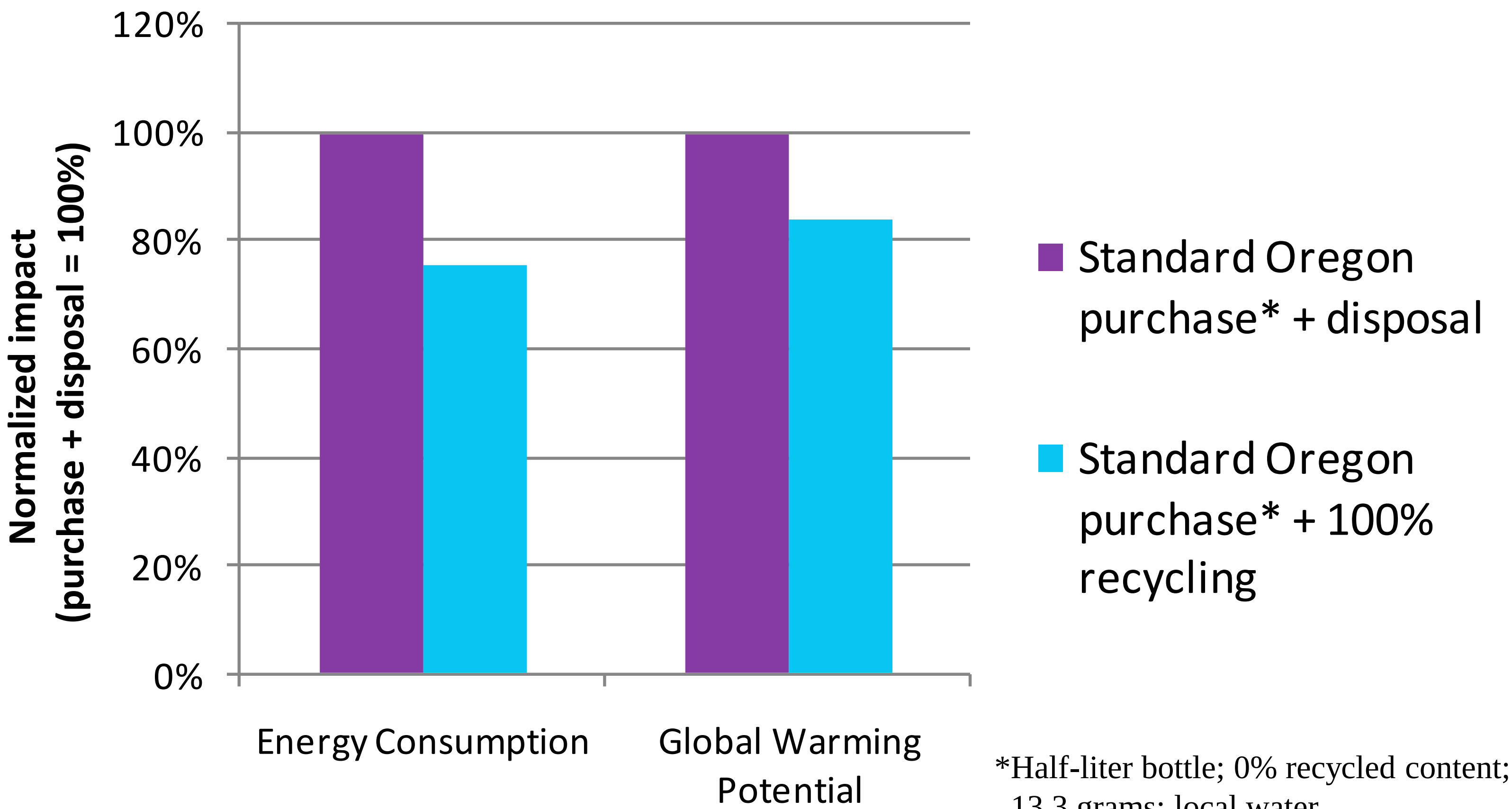
DEQ's Life Cycle Analysis of Water Delivery

- 3 basic systems:



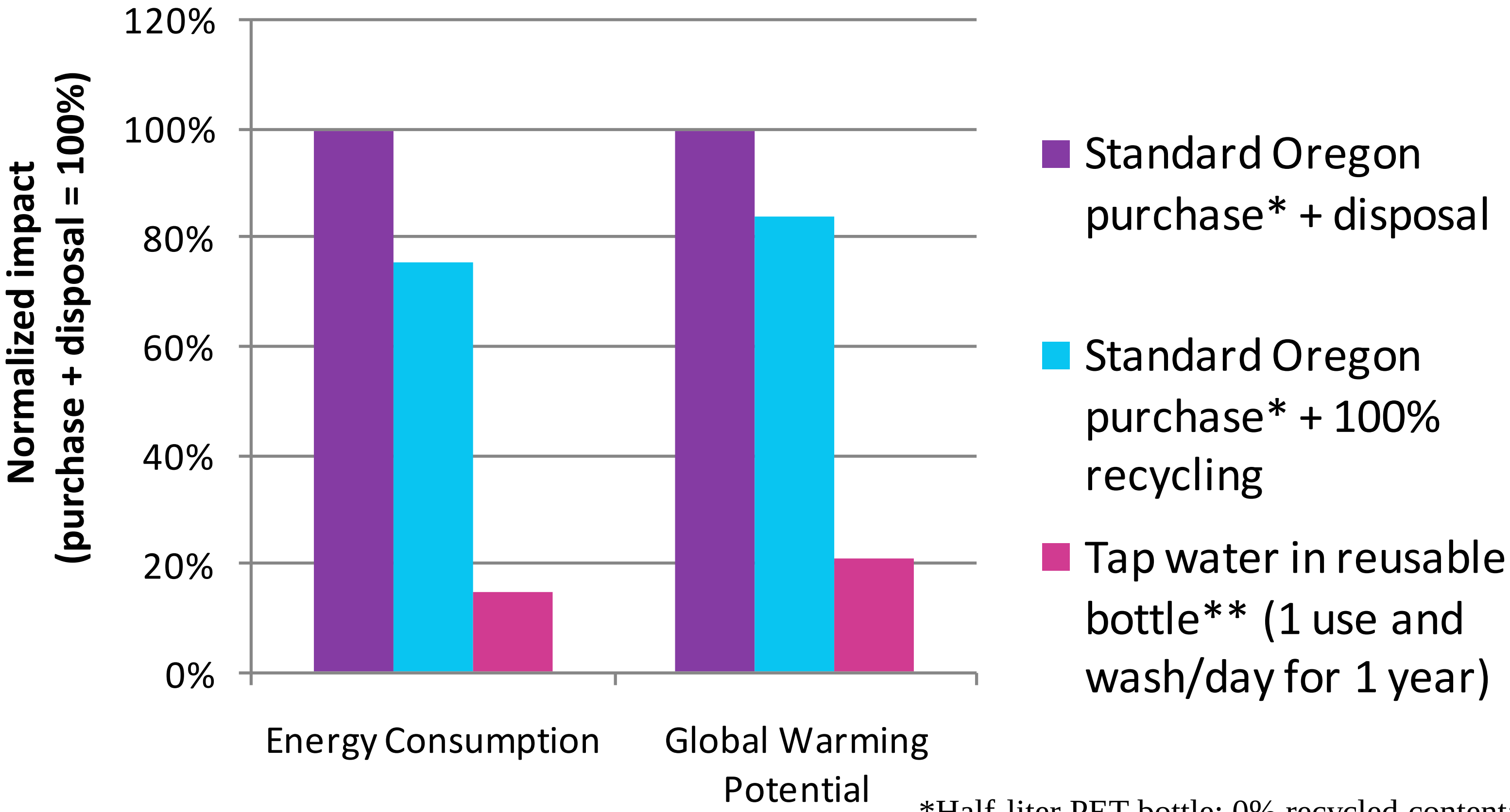
Full study at:
http://www.deq.state.or.us/lq/sw/wasteprevention/drinkingwater.htm

Disposal vs. Recycling



*Half-liter bottle; 0% recycled content; 13.3 grams; local water

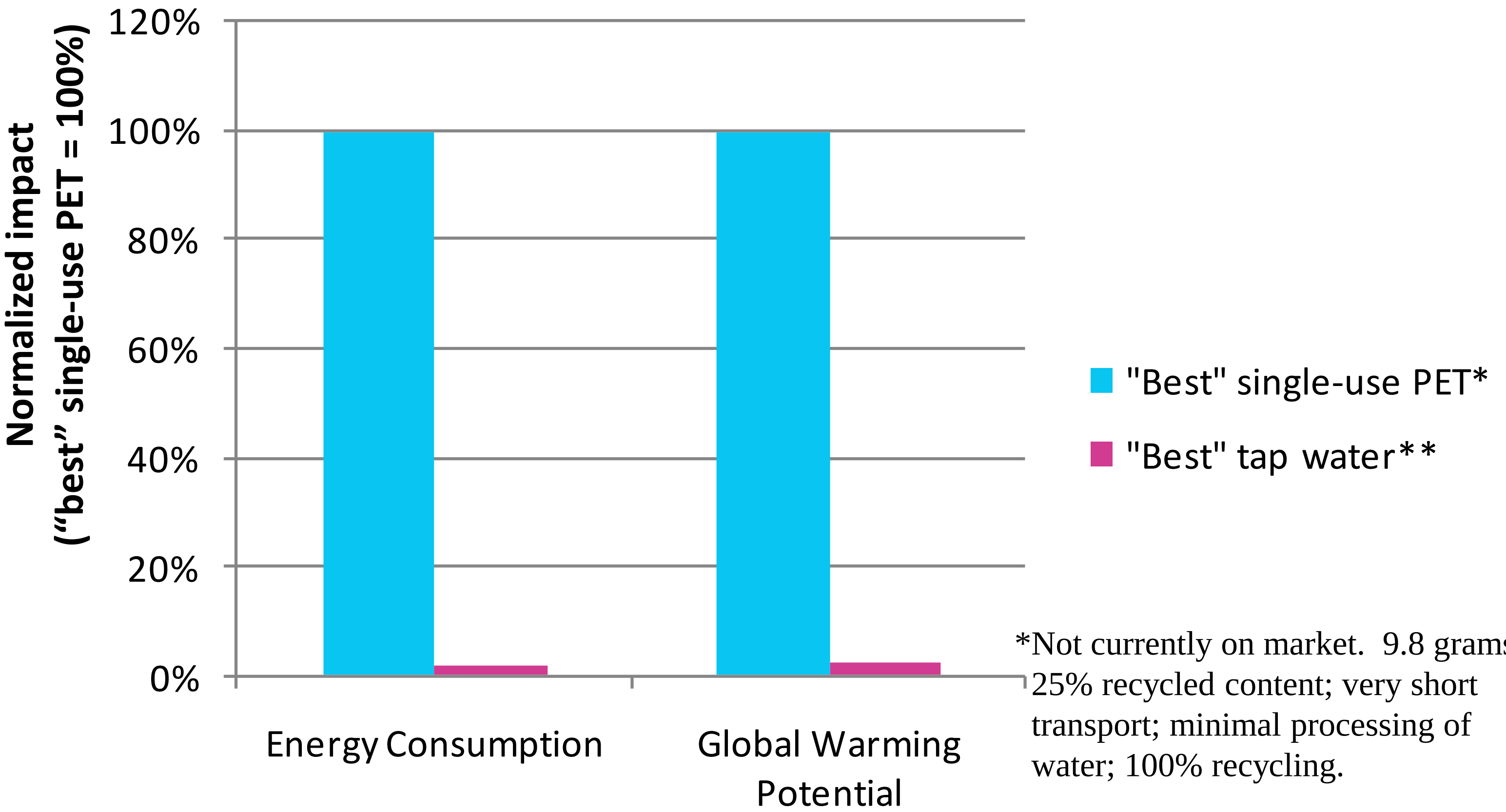
Disposal vs. Recycling vs. Prevention (Drinking Water Example)



*Half-liter PET bottle; 0% recycled content; 13.3 grams; local water

**Average of aluminum/PET/steel; no recycling; high-water use dishwasher

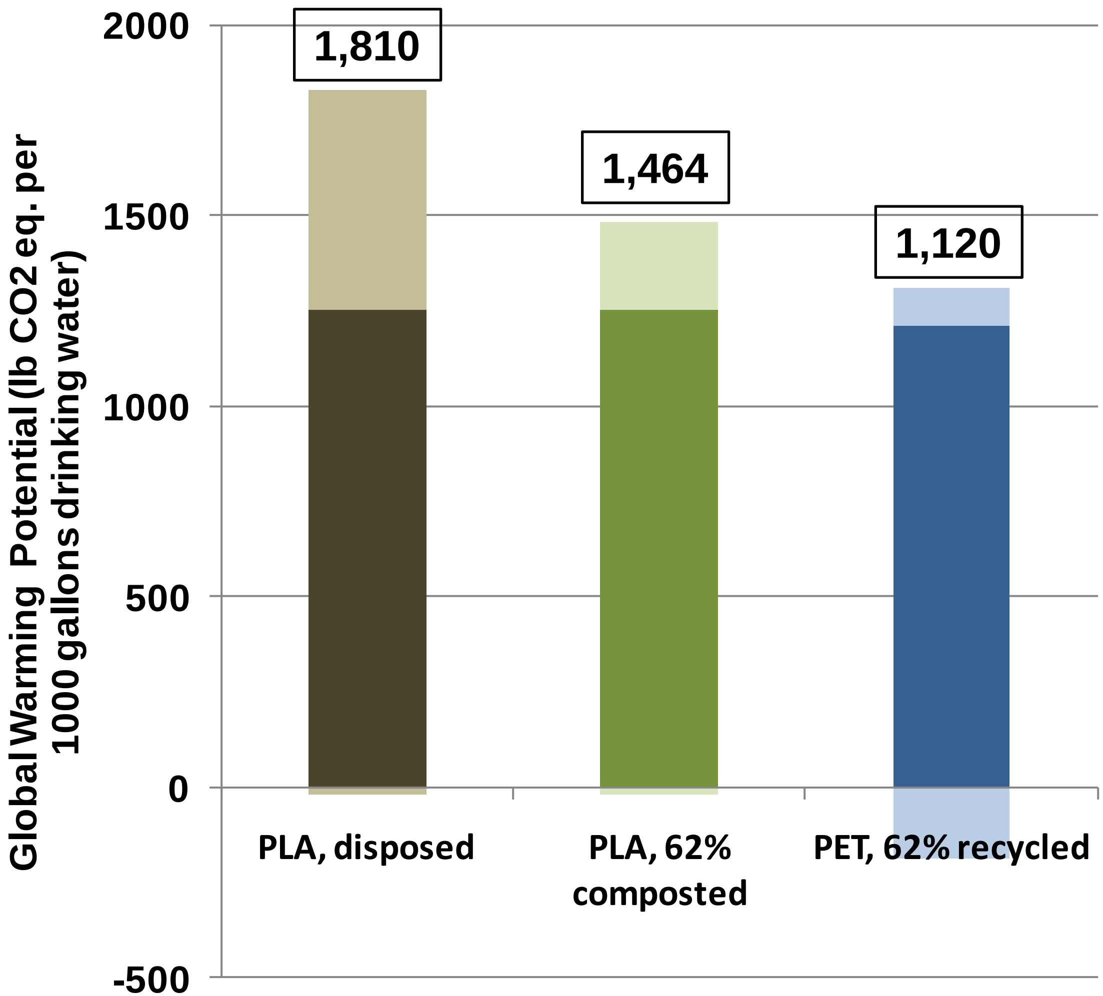
Best Case Recycling vs. Best Case Prevention



*Not currently on market. 9.8 grams; 25% recycled content; very short transport; minimal processing of water; 100% recycling.

**Steel reusable; used 5 years; used 2 times/day; washed weekly in efficient, full dishwasher; 100% recycling

Compostable (PLA) and Recyclable (PET) Water Packaging – Global Warming Potential (PLA decomposes in landfill)



Darker colors are “upstream” impacts; lighter colors are “downstream” impacts (discards management)

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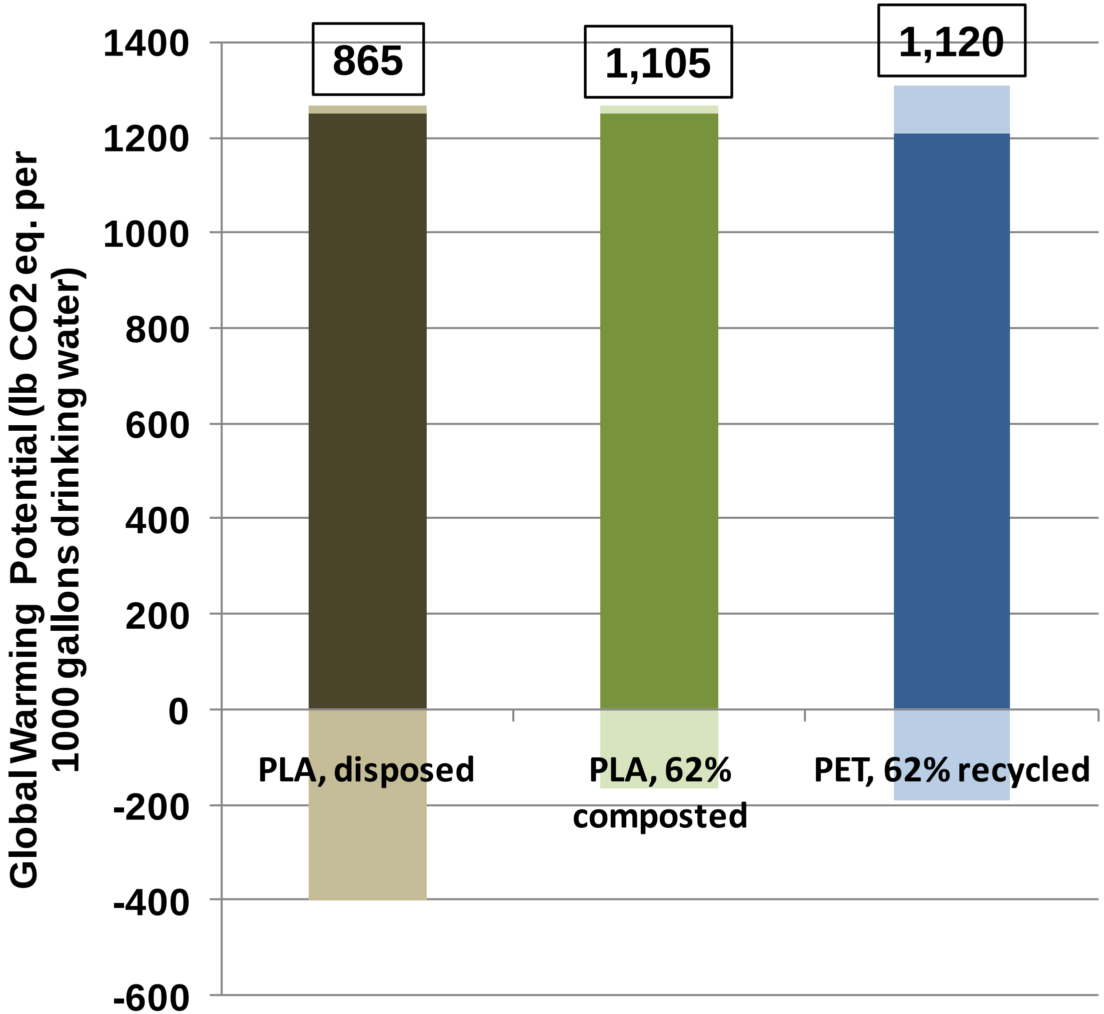
Compostable (PLA) and Recyclable (PET) Water Packaging – Global Warming Potential (PLA inert in landfill)



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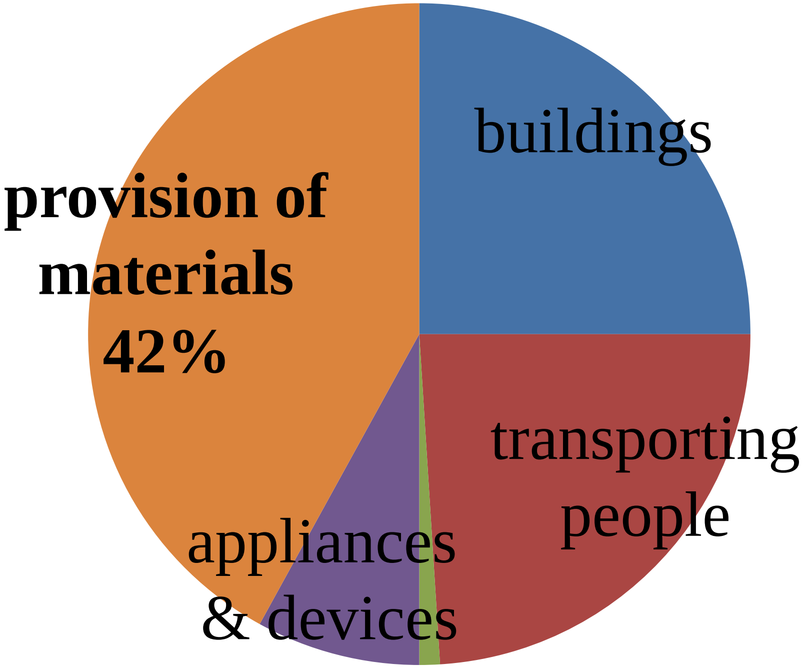
The importance . . . and limitations . . . of waste recovery (recycling, composting)



2006 U.S. GHG inventory with 32% recovery (MSW)

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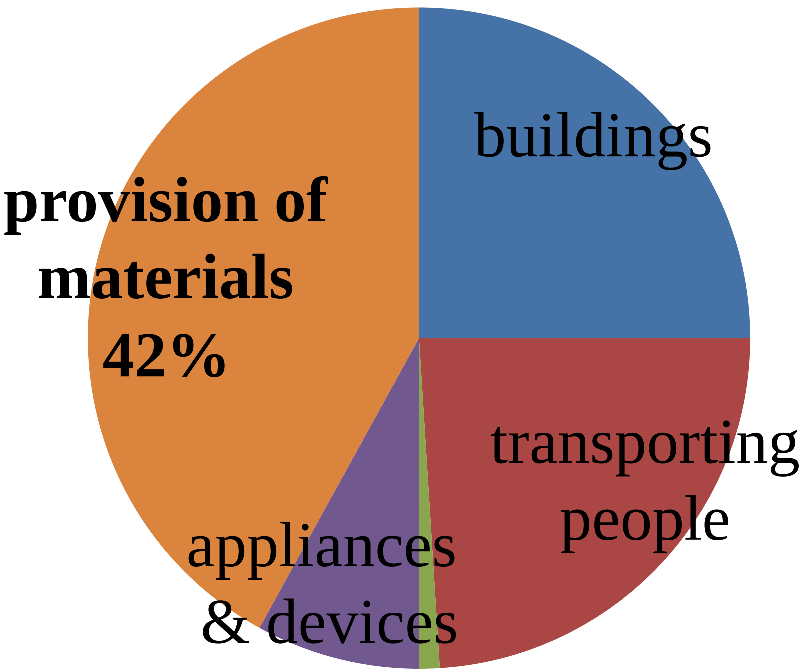

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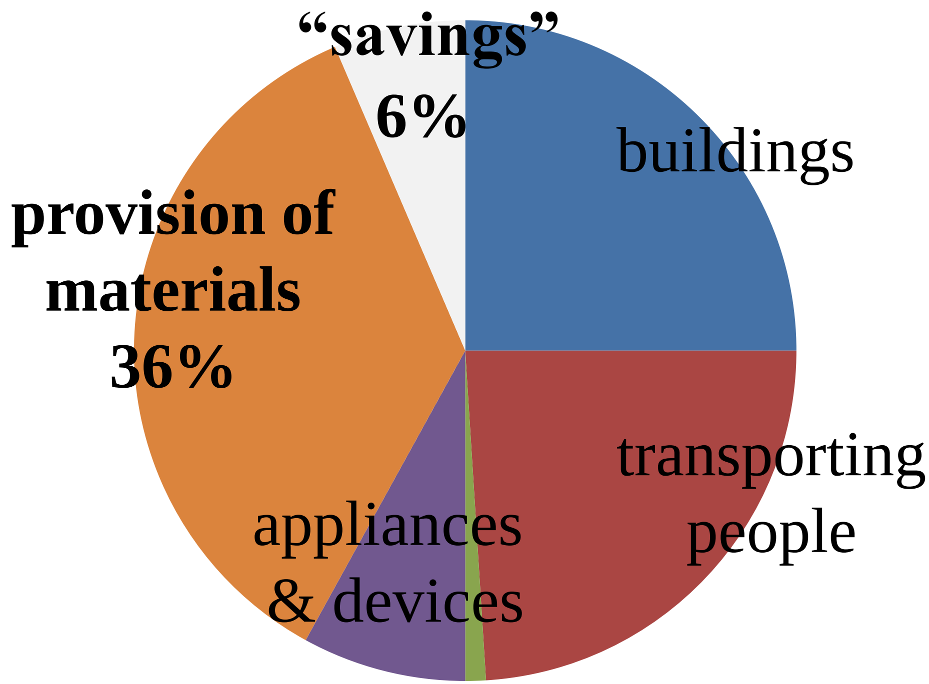
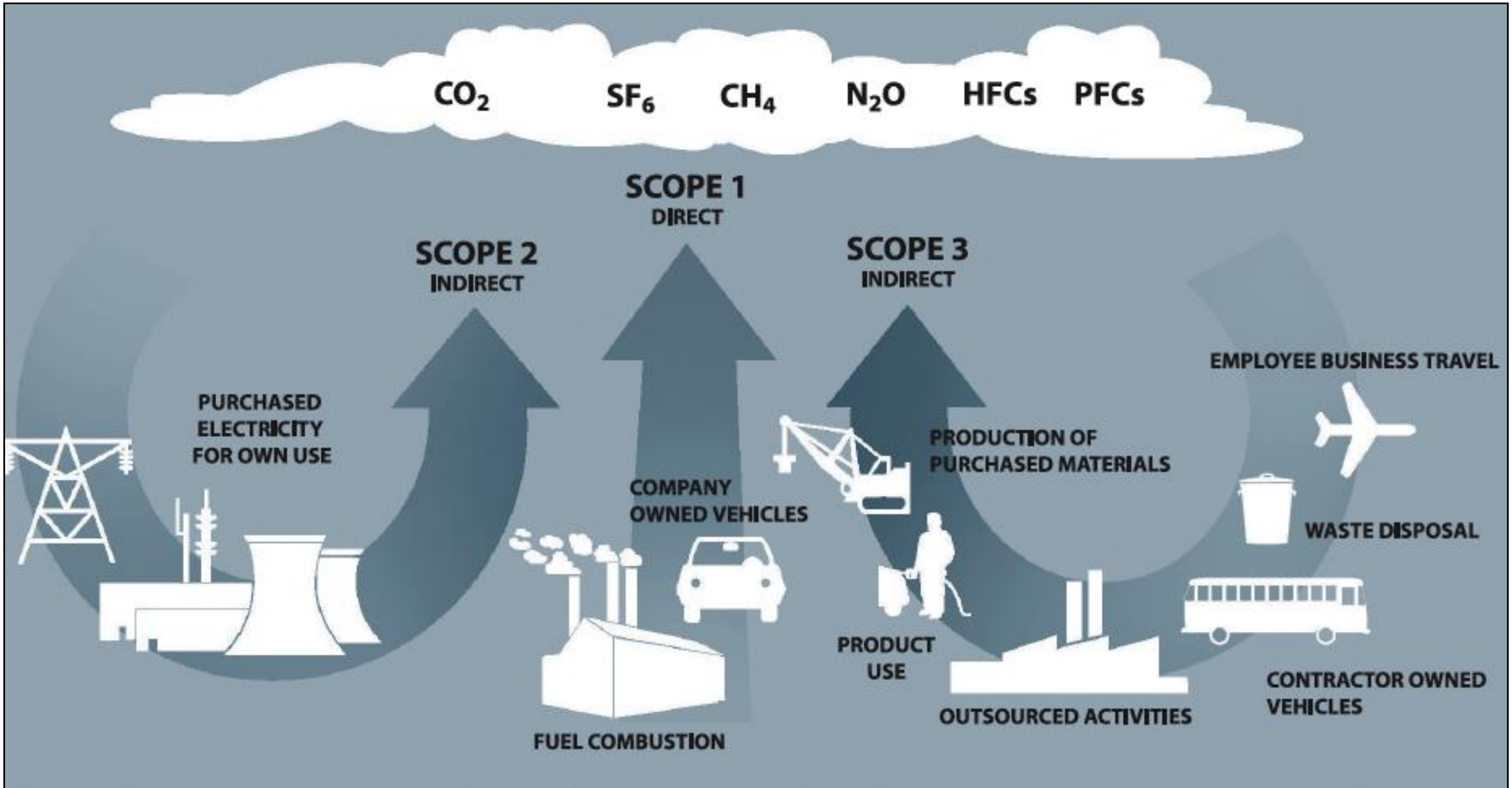


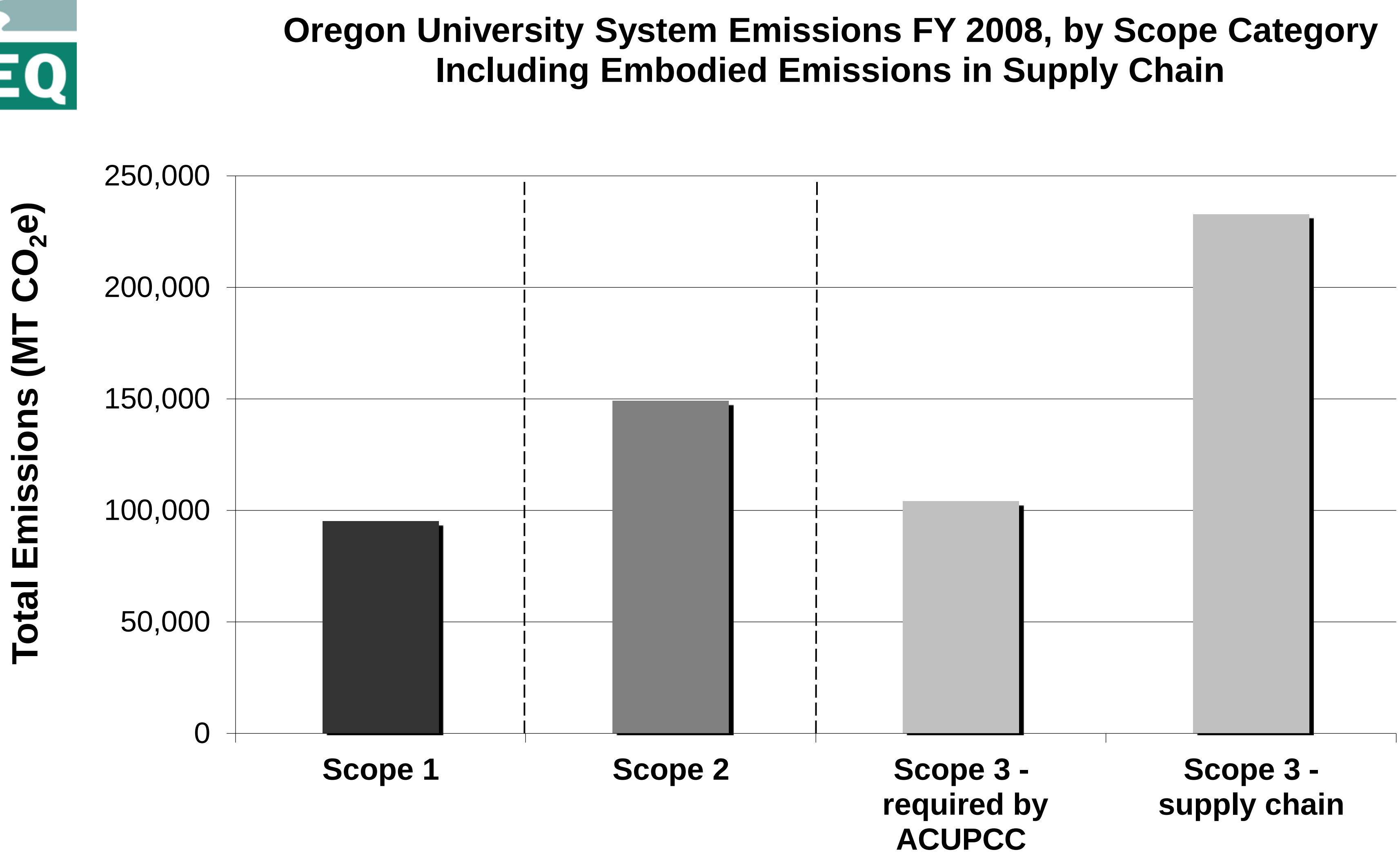
2006 U.S. GHG inventory with <u>very high recovery rate (~95% MSW + >70% C&D)</u>

GHG Inventories

- Common uses of college/university inventories:
  - Identify how the college/university contributes to emissions
  - Support GHG reduction planning (scenario analysis)
  - Establish a baseline and reduction goals
  - Measure change relative to the baseline
  - Communicate all of the above to administration, students, etc.

GHG Inventories: Corporate Reporting and the "Three Scopes"





Source: Good Company (2009)

Thank You!

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