

West Coast Climate and
Materials Management Forum
Monday, May 7, 2012

Materials Management and Climate Change

An Introduction

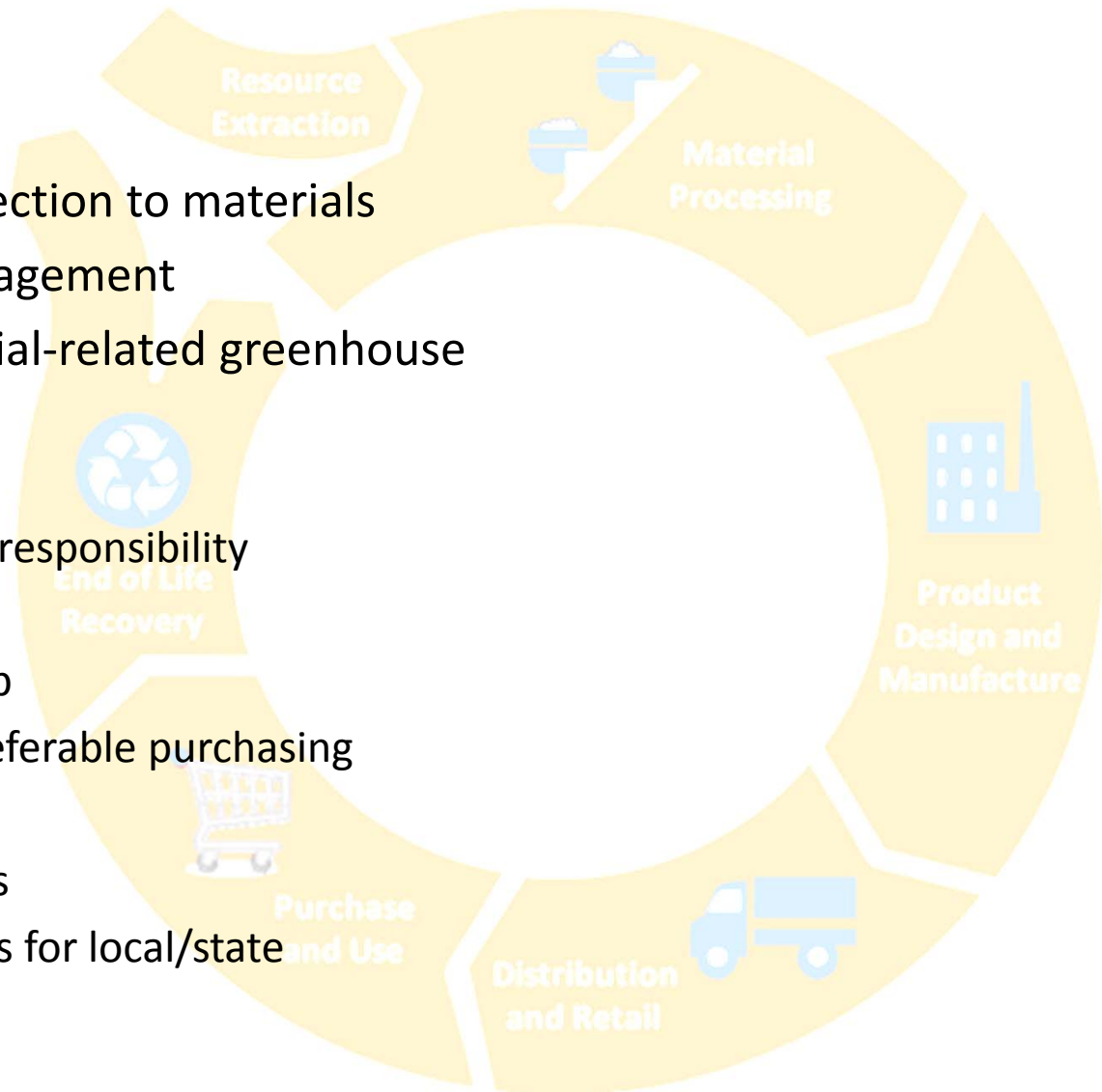
Shannon Davis, EPA

Davis.shannon@epa.gov

- 1) Consumption patterns
- 2) Greenhouse gas connection to materials
- 3) Role of materials management
- 4) Ways to reduce material-related greenhouse gases
 - a) Recycling
 - b) Extended producer responsibility
 - c) Limits of recycling
 - d) Product stewardship
 - e) Environmentally preferable purchasing
 - f) Consuming less
 - g) Government actions
 - h) Additional resources for local/state governments

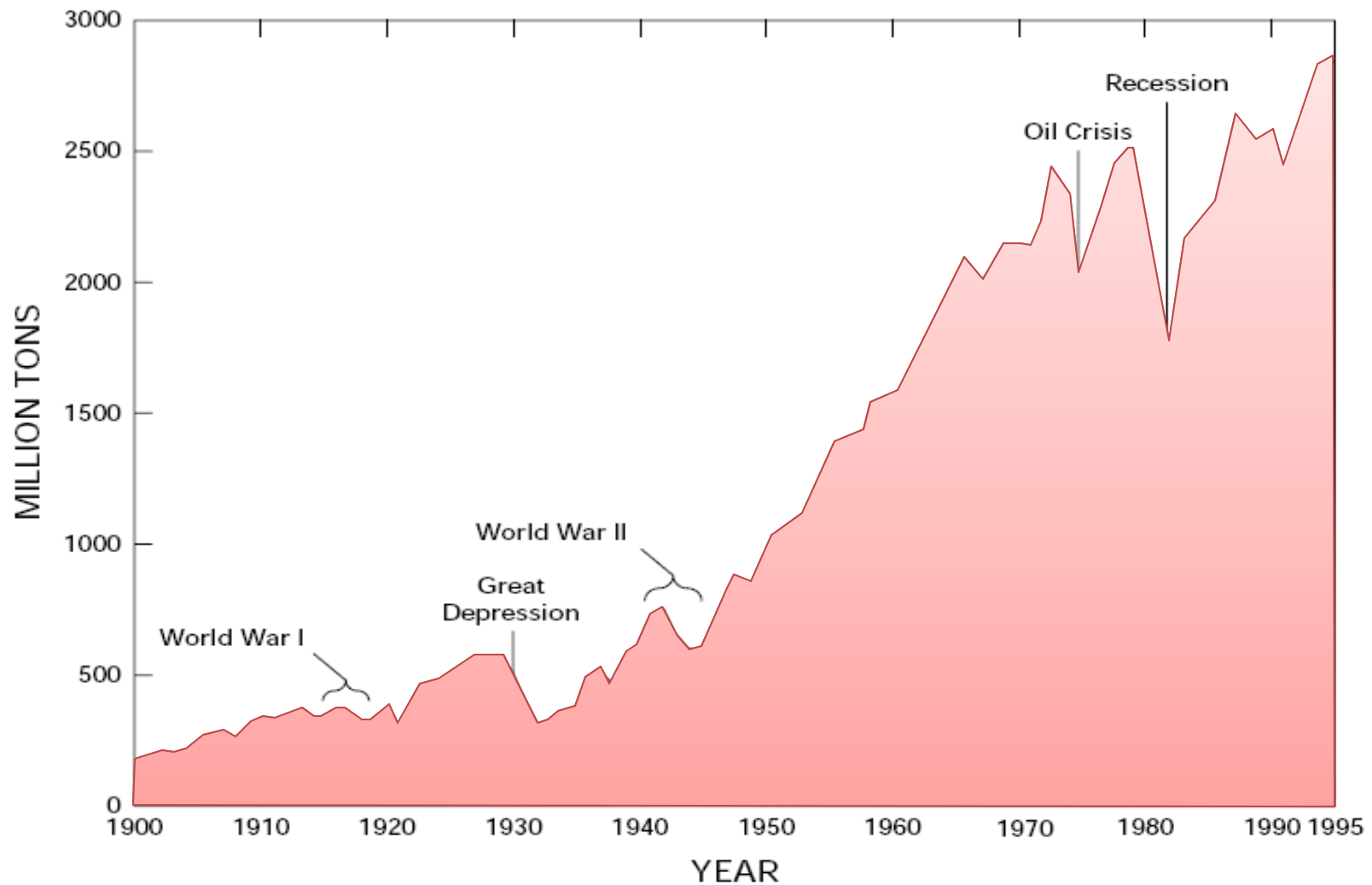


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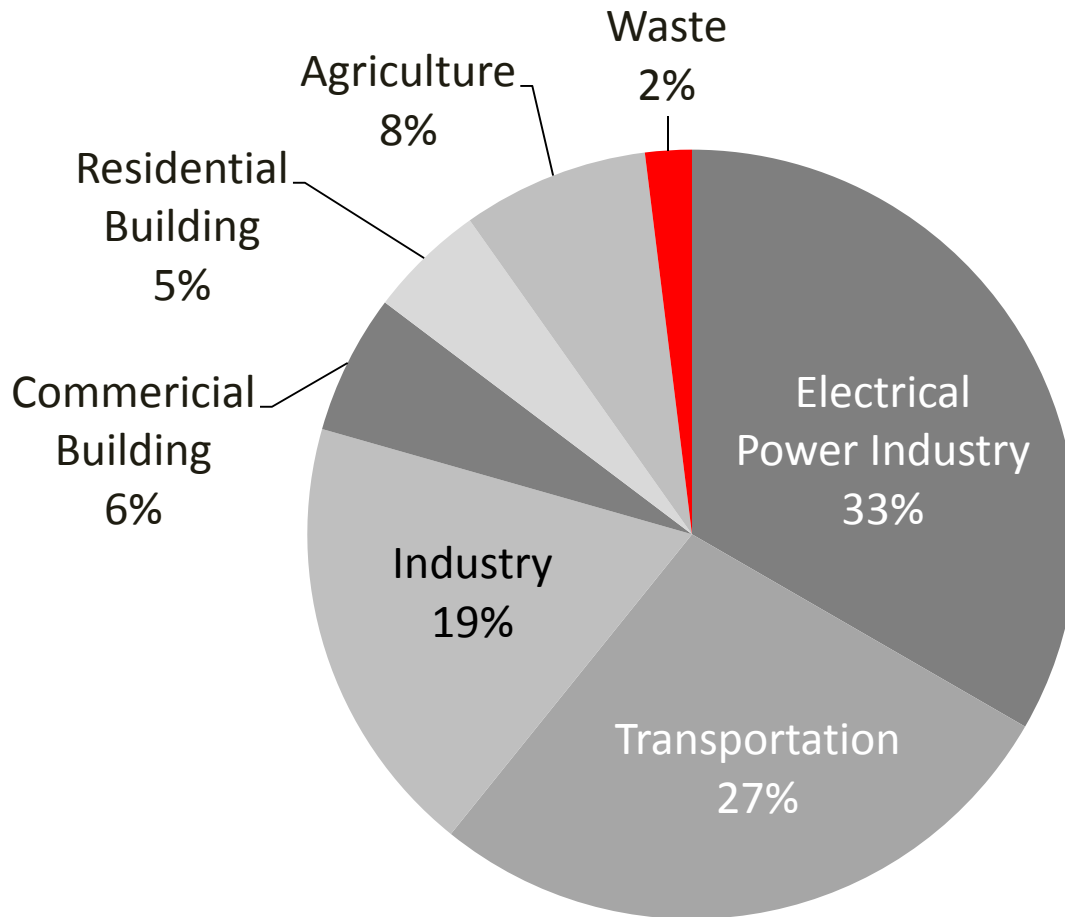


Define "materials".



Use of materials in the United States, 1900-1995. Modified from Matos and Wagner, 1998, p. 110.

Materials Consumption



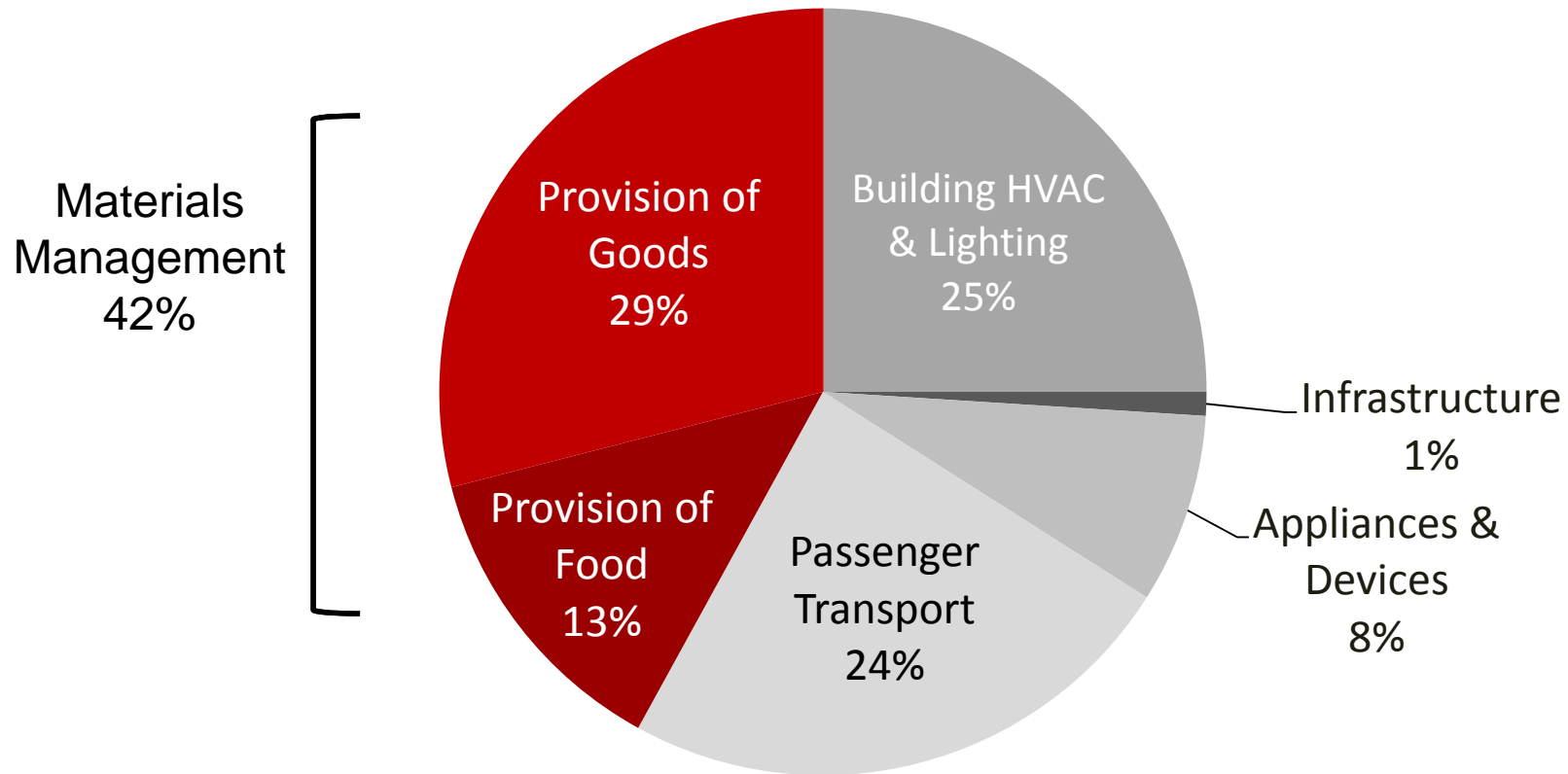
Source: U.S. Inventory of GHG Emissions and Sinks : 1990-2006 (US EPA, 2008)

US Greenhouse Gas Emissions (2006)



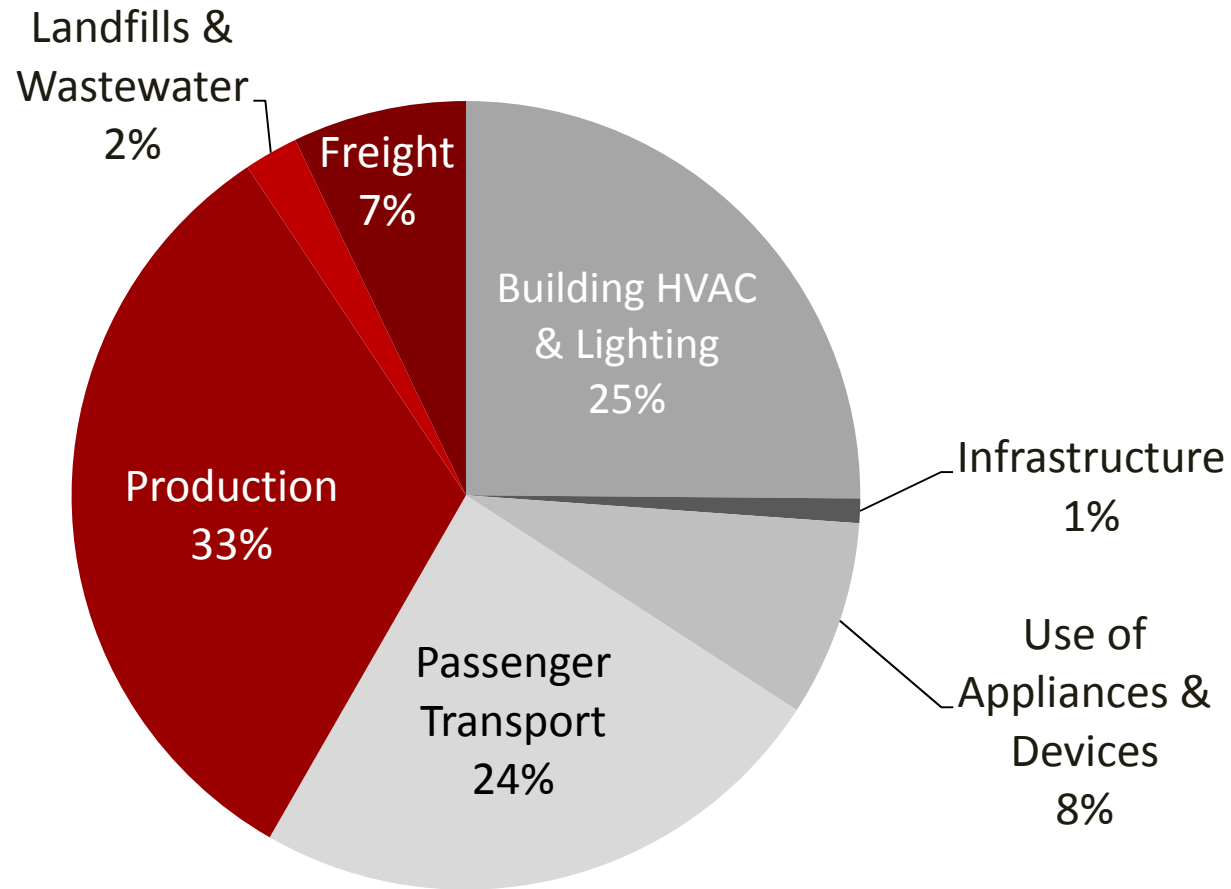
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US Greenhouse Gas Emissions (2006)



Source: *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. EPA.

US Greenhouse Gas Emissions (2006)



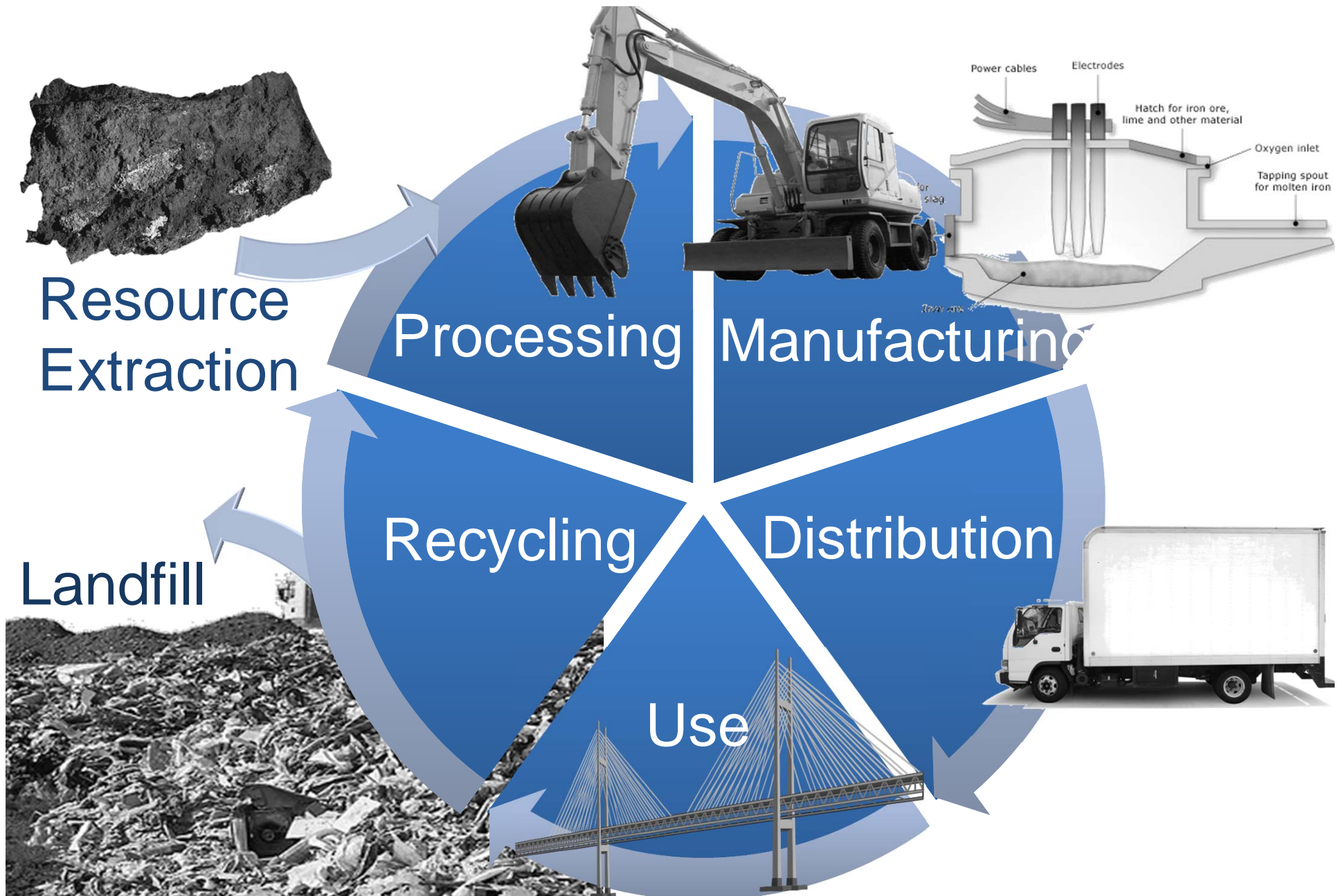
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Materials: Production Dominates Emissions

WASTE management vs. MATERIALS management



Product Lifecycle



Lifecycle of Steel

“Materials management is an approach to using and reusing resources most efficiently and sustainably throughout their lifecycles. It seeks to minimize materials used and all associated environmental impacts.”

- From EPA, [Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices \(PDF\)](#) (98pp, 1.5MB)

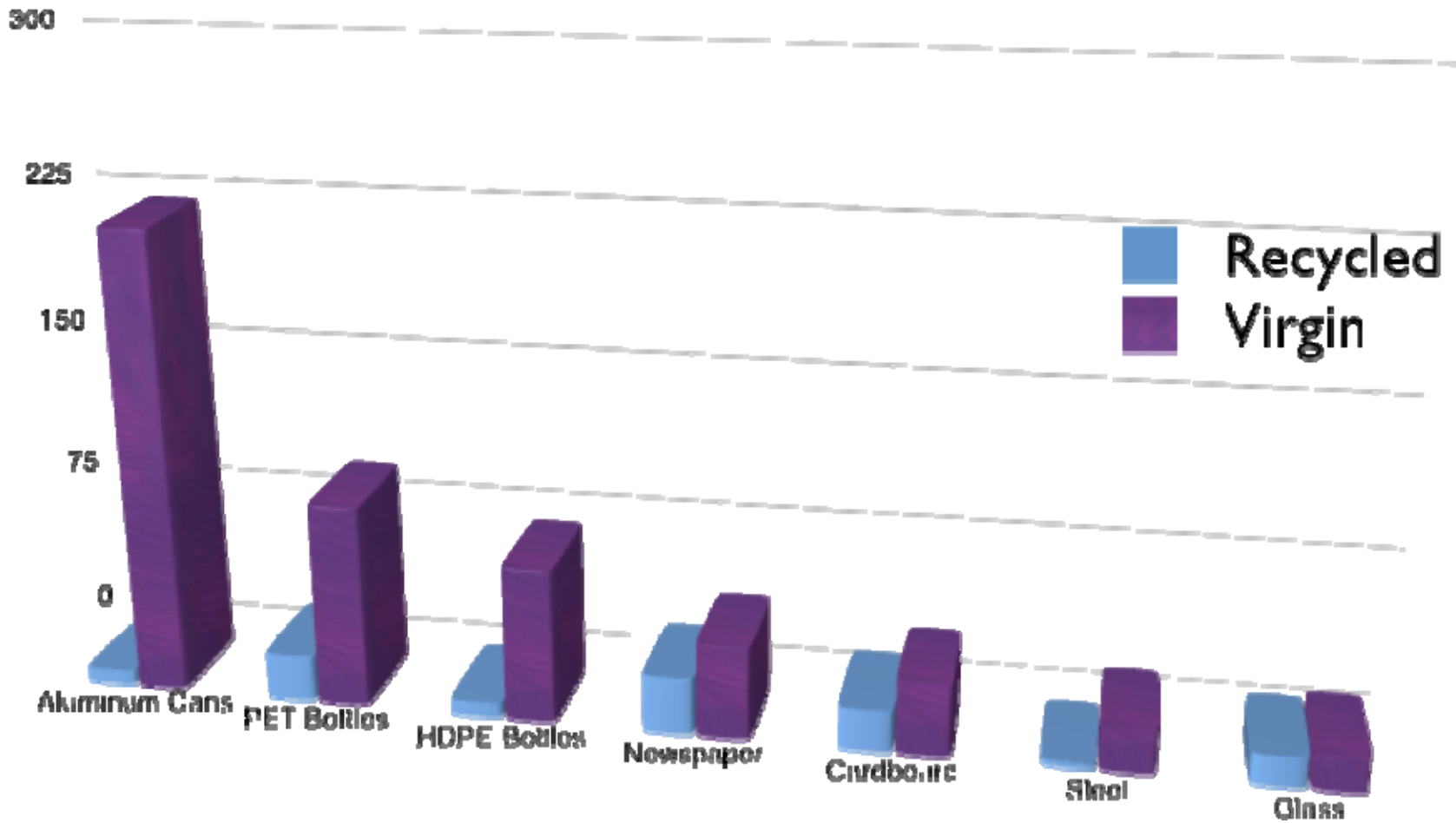
Materials Management: A Working Definition



Reducing the Impacts of Our Consumption

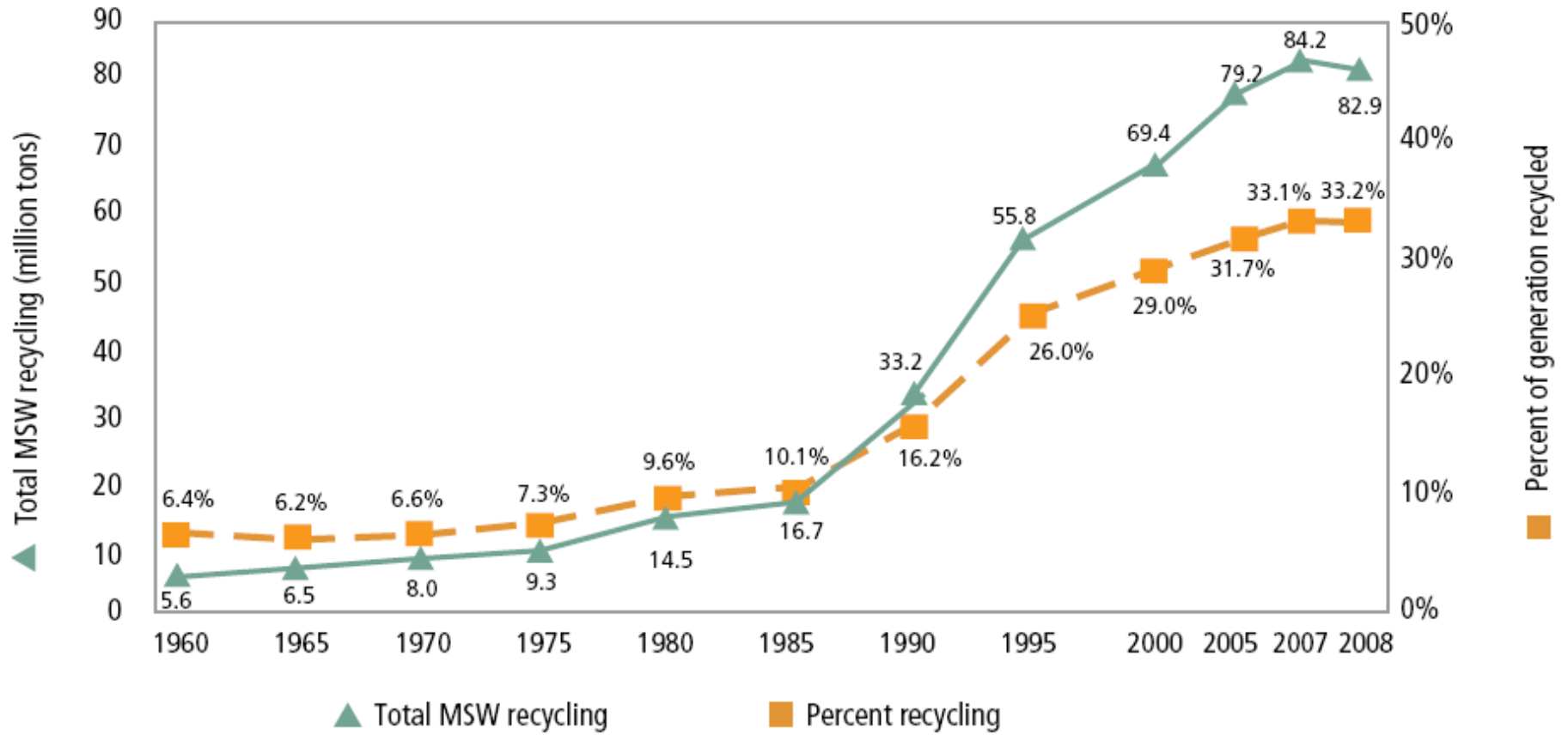
Photo credit: flickr Nick Bramhall, licensed under Creative Commons Attribution-Non-Commercial 2.0 license

Energy Use: Recycled vs. Virgin Content Products
(million BTUs/ ton)



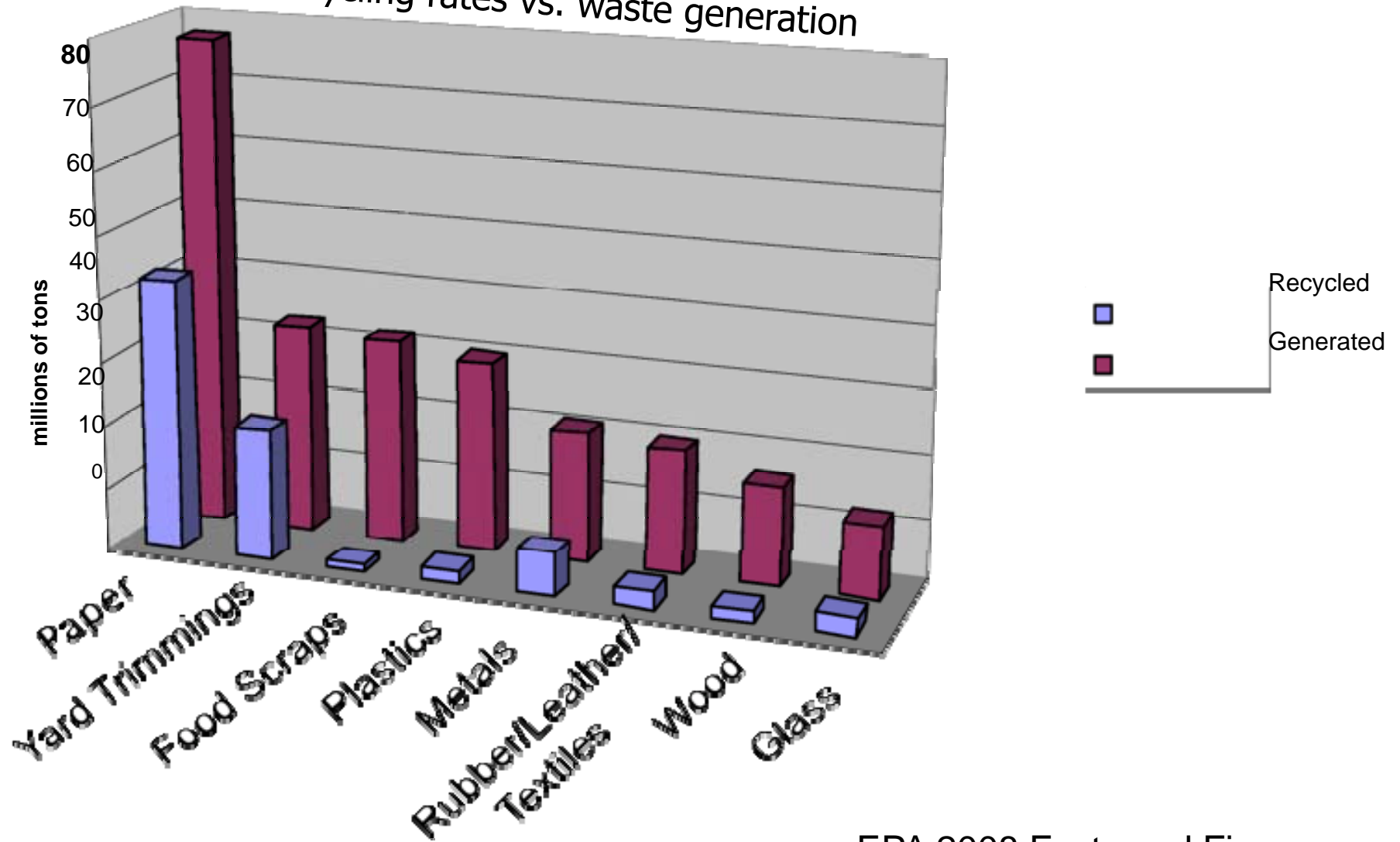
Recycling Conserves Energy

Figure 2. MSW Recycling Rates, 1960 to 2008



Recycling Rates

Recycling rates vs. waste generation



EPA 2008 Facts and Figures

Recycling vs. Waste Generation

**39 million
cars off the road**



**22 million
homes heated/
year**



**50
power plants
avoided**



**400 million
barrels of oil
conserved**

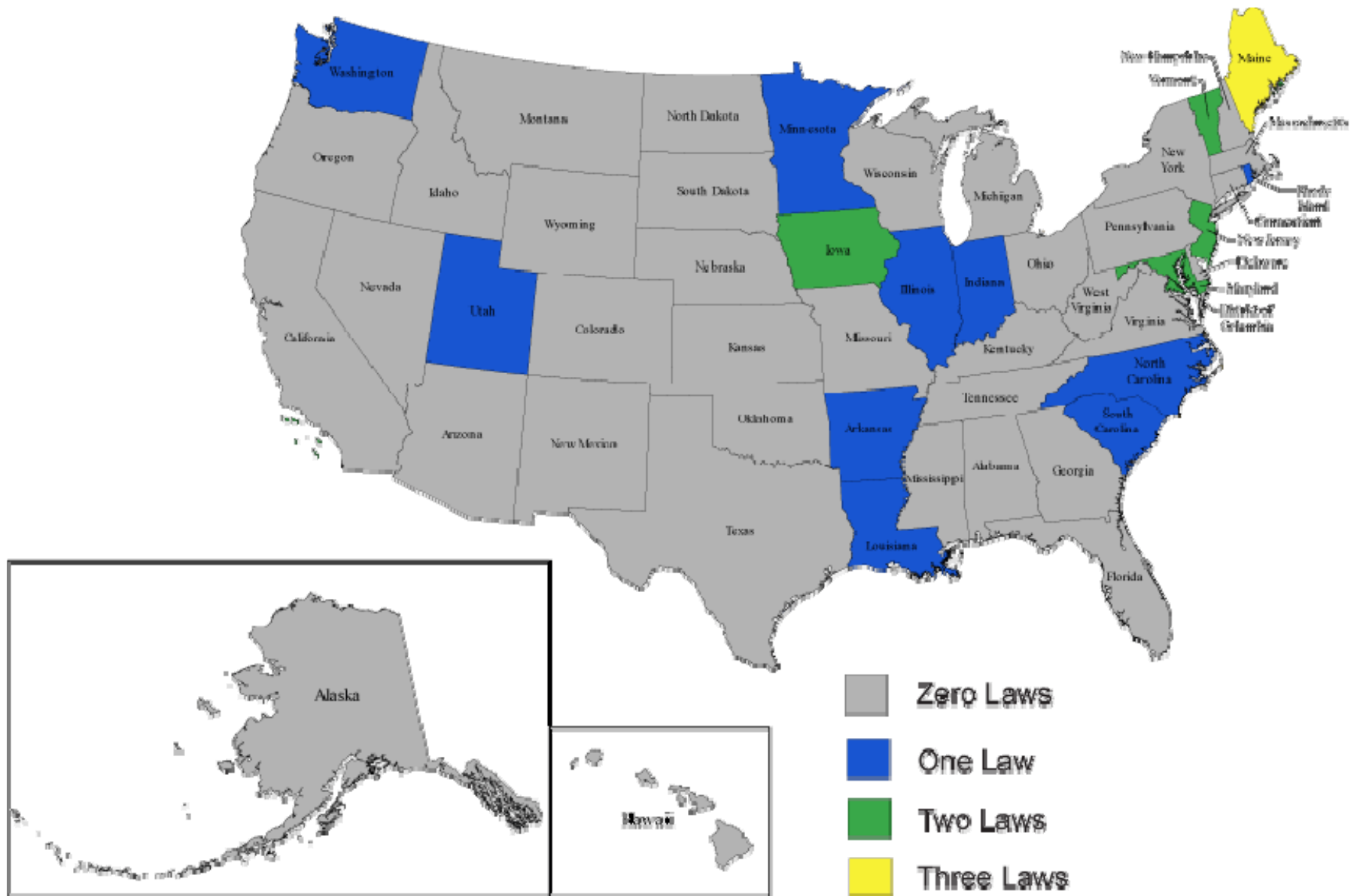


Impacts from Recycling Rate (33%)

**EPSON got to zero waste
\$300,000 saved**



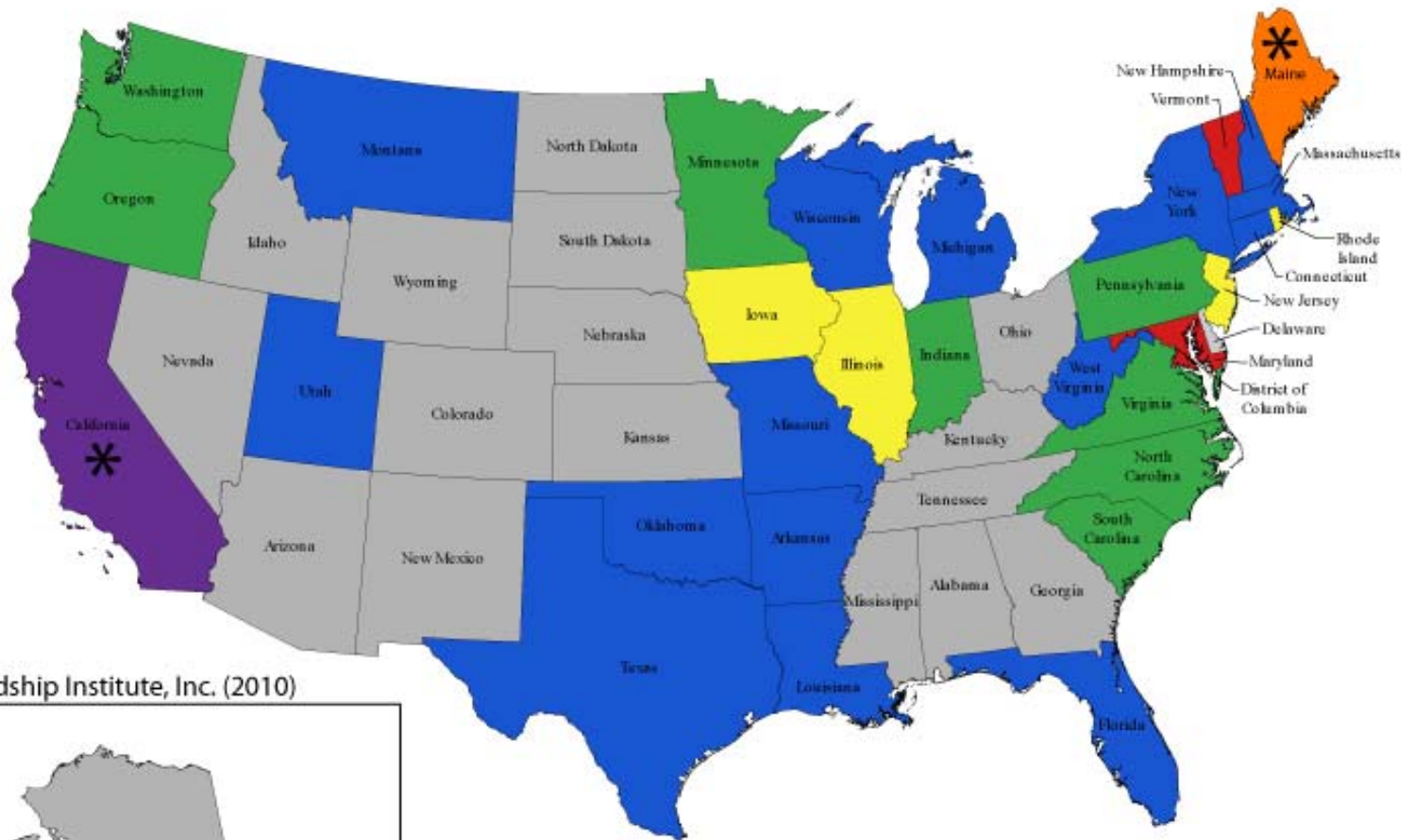
**HP eliminated 90% of waste
\$870,564 saved**



Extended Producer Responsibility Laws 2006

Product Categories

- Auto Switches
- Batteries
- Carpet
- Cell Phones
- Electronics
- Fluorescent Lighting
- Mercury Thermostats
- Paint
- Pesticide Containers



Source: Product Stewardship Institute, Inc. (2010)



Number of Product Categories Covered by EPR Law

- Zero
- One
- Two
- Six
- Three
- Four
- Five

* Other laws authorizing agencies to require EPR, including Framework laws.

Extended Producer Responsibility Laws 2010



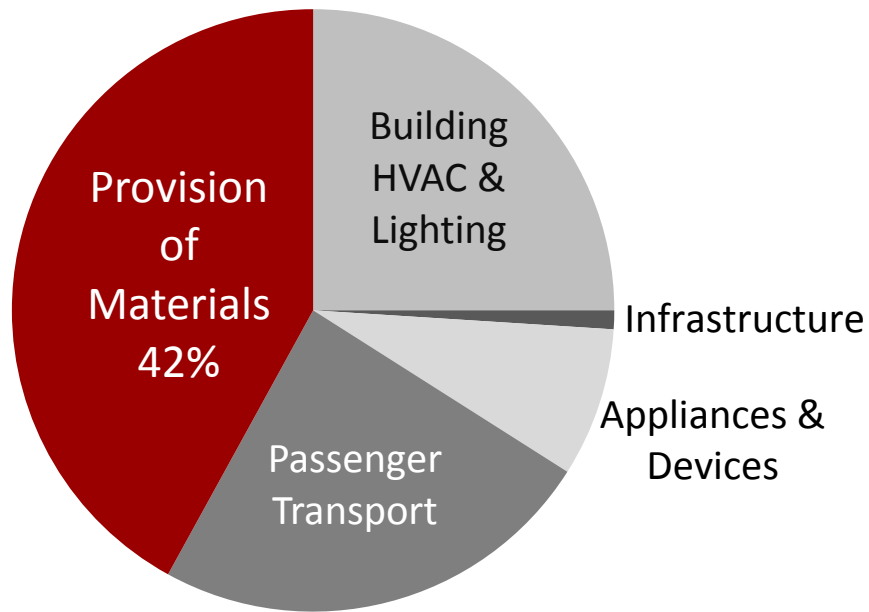
Jobs

Increase to 100% recycling nationally yields:

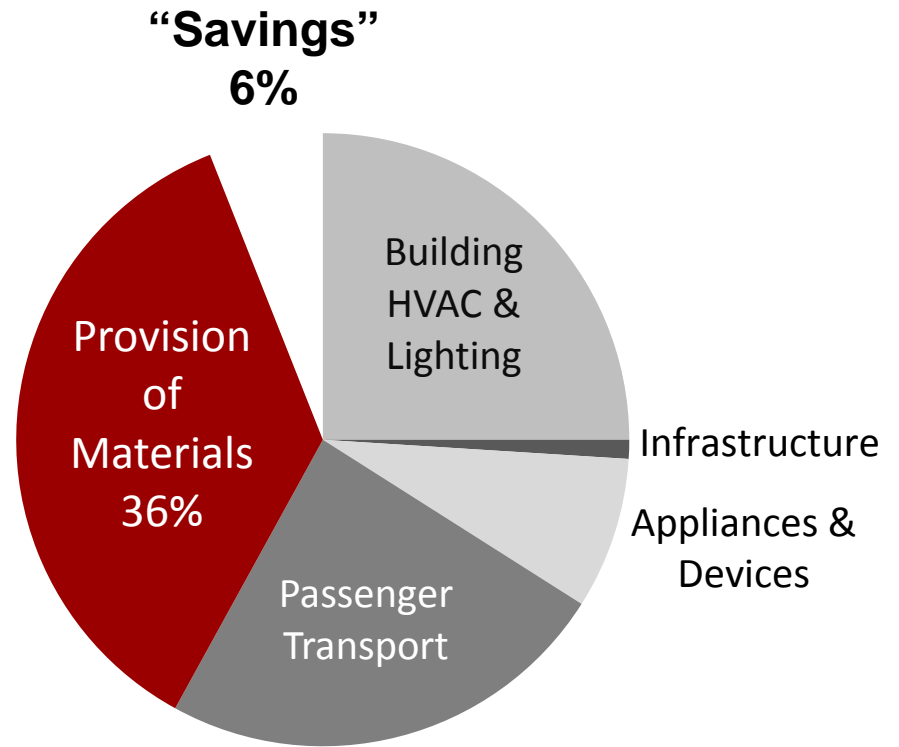
- 450 million metric tons of greenhouse gas reductions per year
- Includes all municipal solid waste MSW and construction, remodel, and demolition debris.



GHG Reduction Potential



2006 U.S. GHG inventory
with 32% recovery
(municipal solid waste)



2006 U.S. GHG inventory with
hypothetical recovery rate
(~100% municipal solid waste + construction and
demolition debris)

Limitations of Recycling and Composting

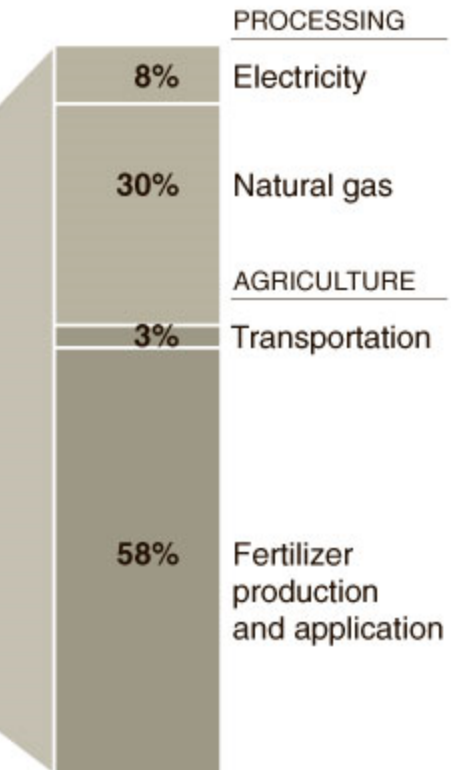


Sources of carbon dioxide emissions

THROUGHOUT PRODUCT LIFE CYCLE



DURING JUICE PRODUCTION*



*Percentages do not total 100 percent, because of rounding.

Source: Tropicana

THE NEW YORK TIMES

Product Stewardship

Tropicana Orange Juice



greenhouse gas emissions

water consumption

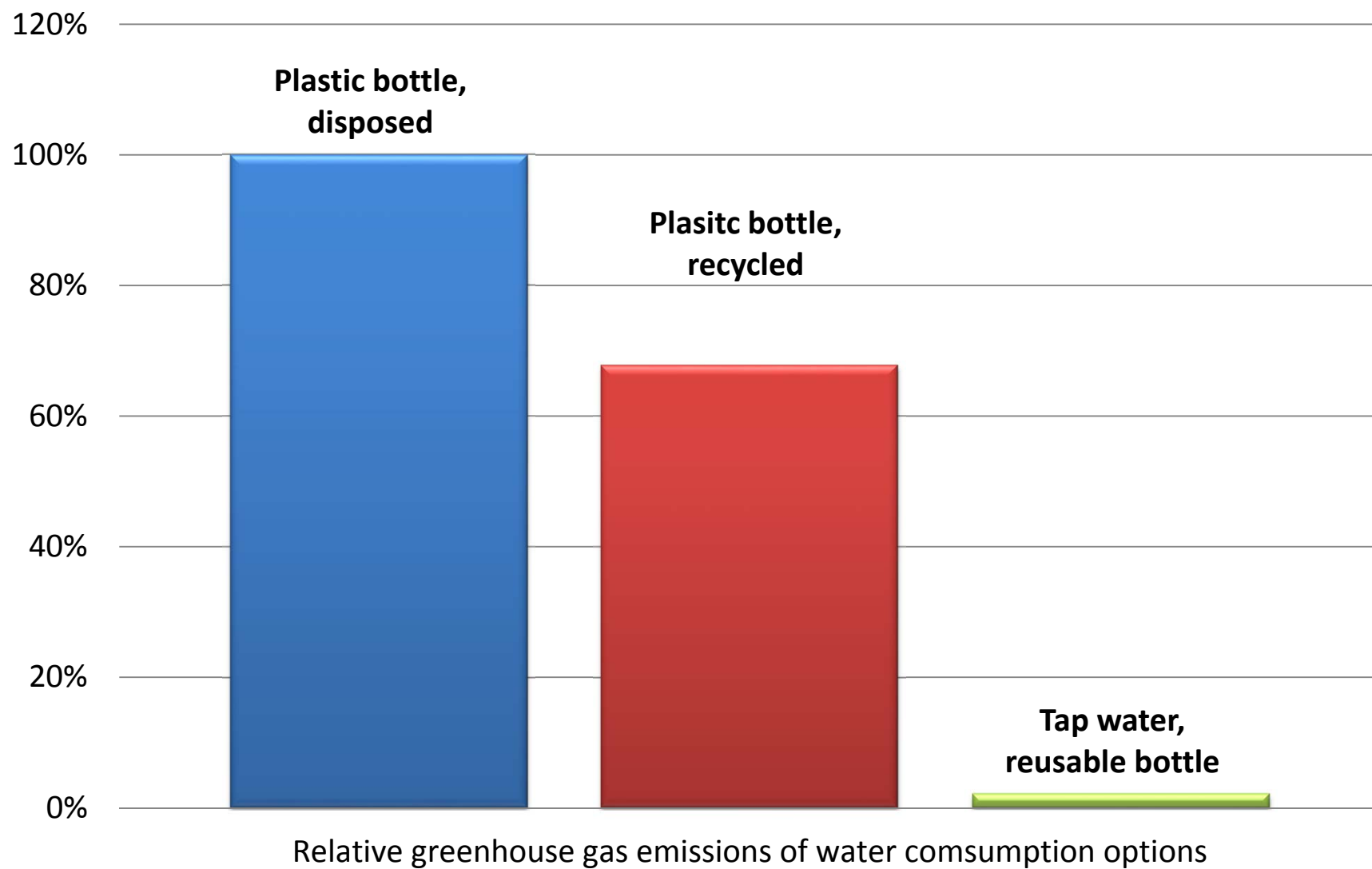
recycled content

energy efficiency

EPA Resources:

- Electronic purchasing: <http://www.epa.gov/epp/pubs/products/epeat/index.htm>
- Recycled content purchasing: http://www.epa.gov/climatechange/wycd/waste/calculators/ReCon_home.html

Environmentally Preferable Purchasing



Water Consumption

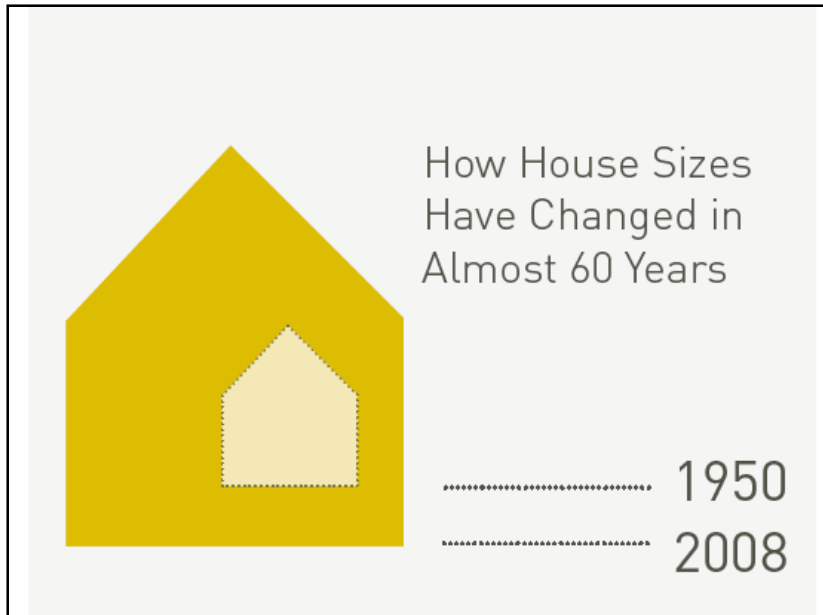
Source: A study commissioned by Oregon Dept of Environmental Quality

Shipping bags – even if made from virgin resources and not recycled – have lower environmental burdens in most categories than cardboard boxes – even if the boxes contain high levels of recycled content.



Packaging

Source: A study commissioned by Oregon Dept of Environmental Quality



| YEAR | HOME SIZE | FAMILY SIZE | SQ. FT. PER PERSON |
|------|-----------|-------------|--------------------|
| 1950 | 983 | 3.8 | 258.7 |
| 2008 | 2500 | 2.6 | 961.5 |

Building Materials



Design for Deconstruction



Reduced Consumption

Photo credit: flickr user jesusalı, licensed under Creative Commons Attribution-Non-Commercial 2.0 license



Collaborative Consumption



PRODUCT SERVICE SYSTEMS



REDISTRIBUTION MARKETS



COLLABORATIVE LIFESTYLES

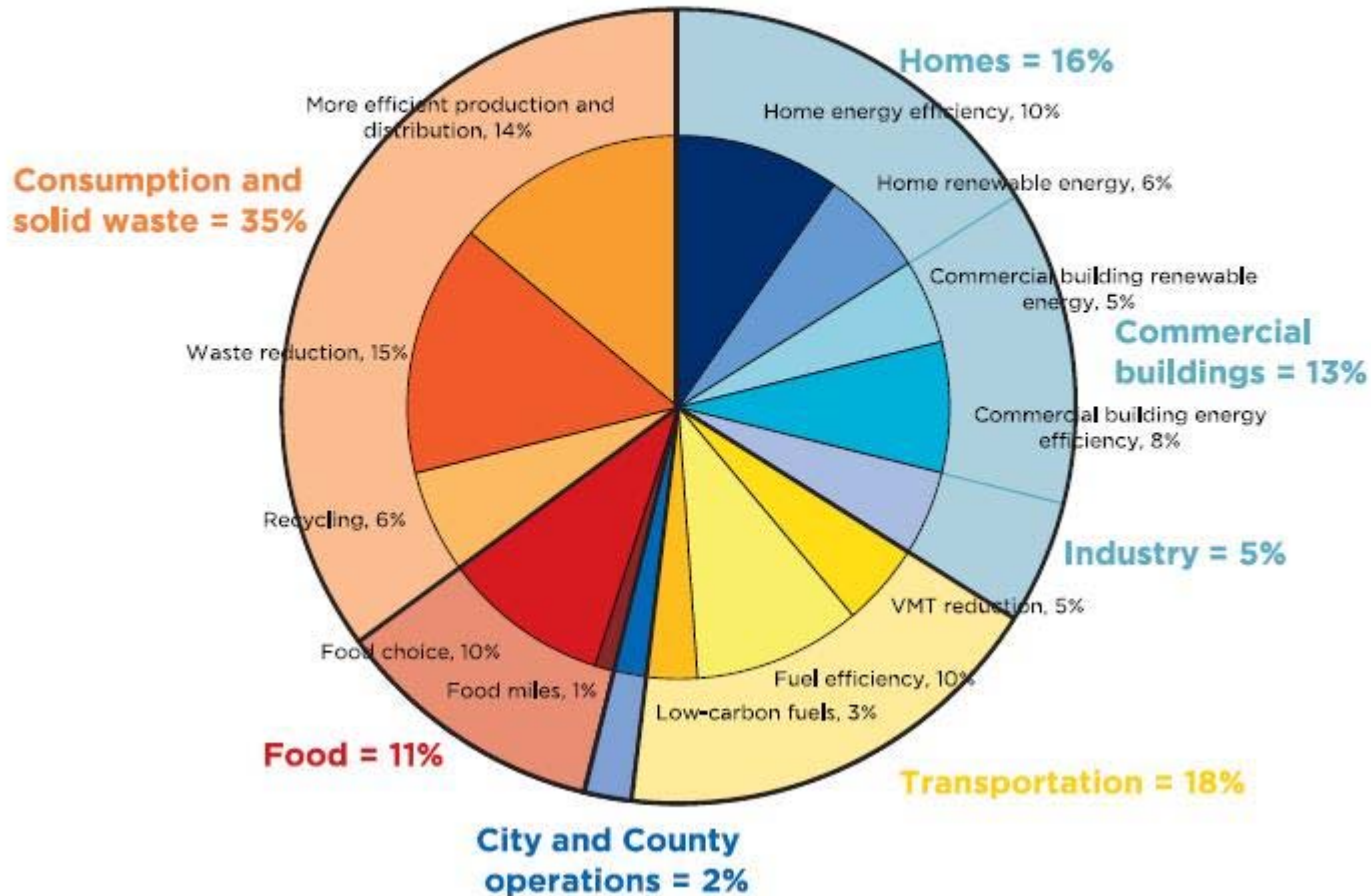
Collaborative Consumption



Lending Libraries

CLIMATE ACTION PLAN

(APPROXIMATE CONTRIBUTION TO 2030 EMISSION-REDUCTION GOAL)



State and Local Government Actions



State and Local Government Actions

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PROCUREMENT



SPECIFICATIONS



LABELING



FOOTPRINTING

State and Local Government Actions

Materials Management Approaches for State and Local Climate Protection

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- Home Page
- We Want to Hear from You
- Background & Motivation
- Greenhouse Gas Inventories
- Setting Targets
- Climate Protection Actions
- Measuring Results
- Resources
- Glossary
- Acknowledgements

Our Purpose - Reducing Greenhouse Gases through Materials Management

Materials Management strategies reduce greenhouse gas (GHG) emissions associated with waste, materials and products through a lifecycle and systems approach.

This wiki is a materials management toolkit of:

- Climate Protection Actions
- Example Climate Action Plans
- New approaches to GHG Inventories
- Measurement Tools
- Links to resources
- And more...see links at left

We want to hear from you. This beta version toolkit was launched on 9/8/10. Help us improve it with your feedback. Let us know what materials management approaches you are adding to your Climate Action Plan.

Who Should Use This Toolkit

- State and Local Government Climate Change Staff
- Recycling, Composting and Solid Waste Professionals

The diagram illustrates the lifecycle of materials and its impact on climate change. It is divided into four main stages: Virgin Inputs, Life Cycle Stage, GHG Emissions, and Sinks & Emissions Offsets. Virgin Inputs include materials extracted from trees, oil, and other sources. The Life Cycle Stage involves raw materials acquisition and manufacturing. GHG Emissions are shown as CO₂ from energy and non-energy related emissions, and CO₂ from energy and non-energy related emissions. Sinks & Emissions Offsets include reduced carbon sequestration in forests.

www.captoolkit.wikispaces.com

Tools and Resources

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 - g) Consuming less
 - h) Government actions
 - i) Additional resources for local/state governments



Summary

<http://yosemite.epa.gov/R10/ECOCOMM.NSF/climate+change/wccmmf>

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We welcome your feedback and ideas.