

# **Materials Management and Climate Change**

## An Introduction

- 1) Materials and Greenhouse Gas Emissions
- 2) Strategies to reduce material-related greenhouse gases for governments and others
  - a) Recycling
  - b) Reusing and Reducing
  - c) Climate Friendly Purchasing
  - d) Consuming Less
- 3) Climate Action Plans
- 4) Case Studies



*“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.”*

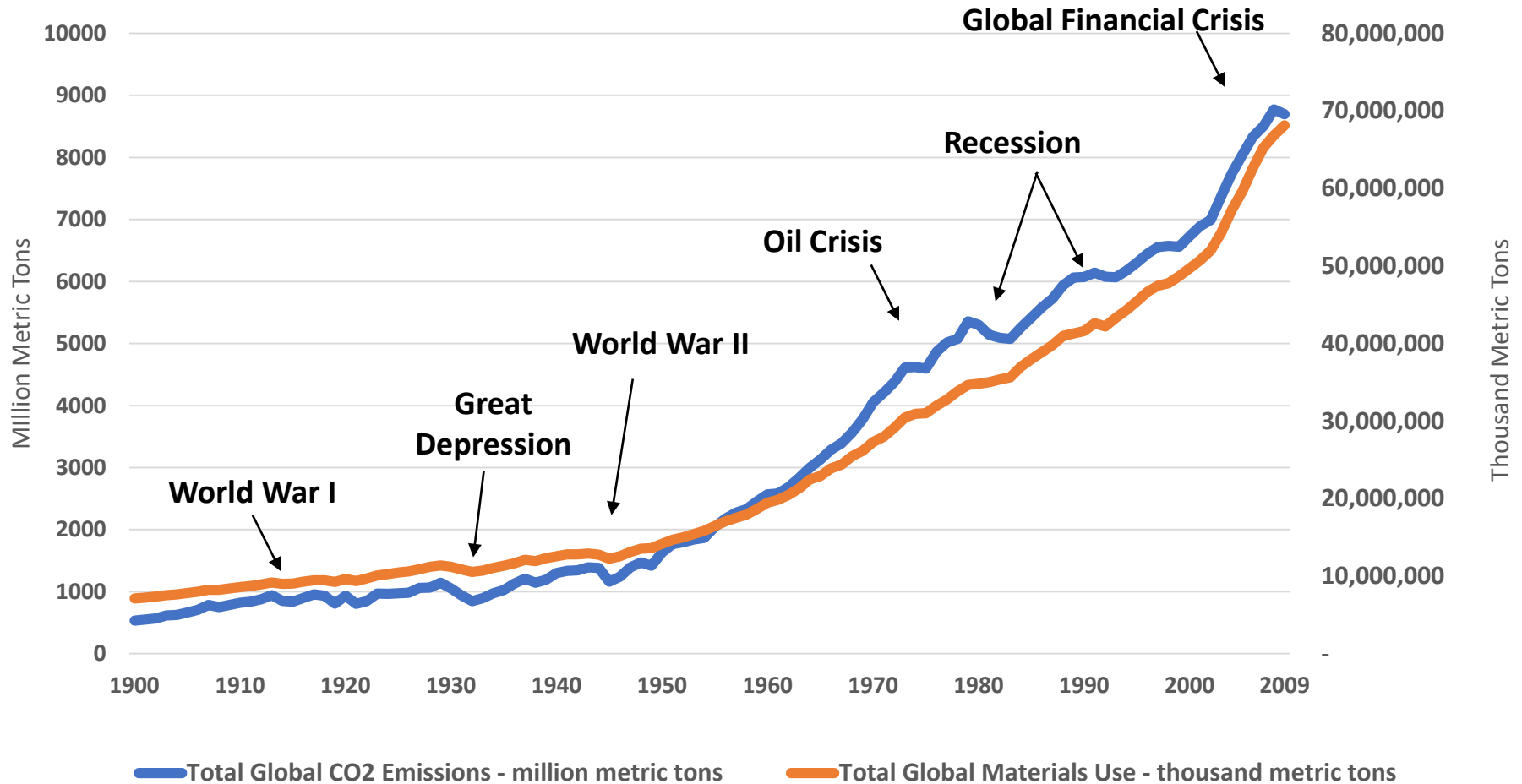
- From EPA, [Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices \(PDF\)](#) (98pp, 1.5MB)

# Materials Management: A Working Definition

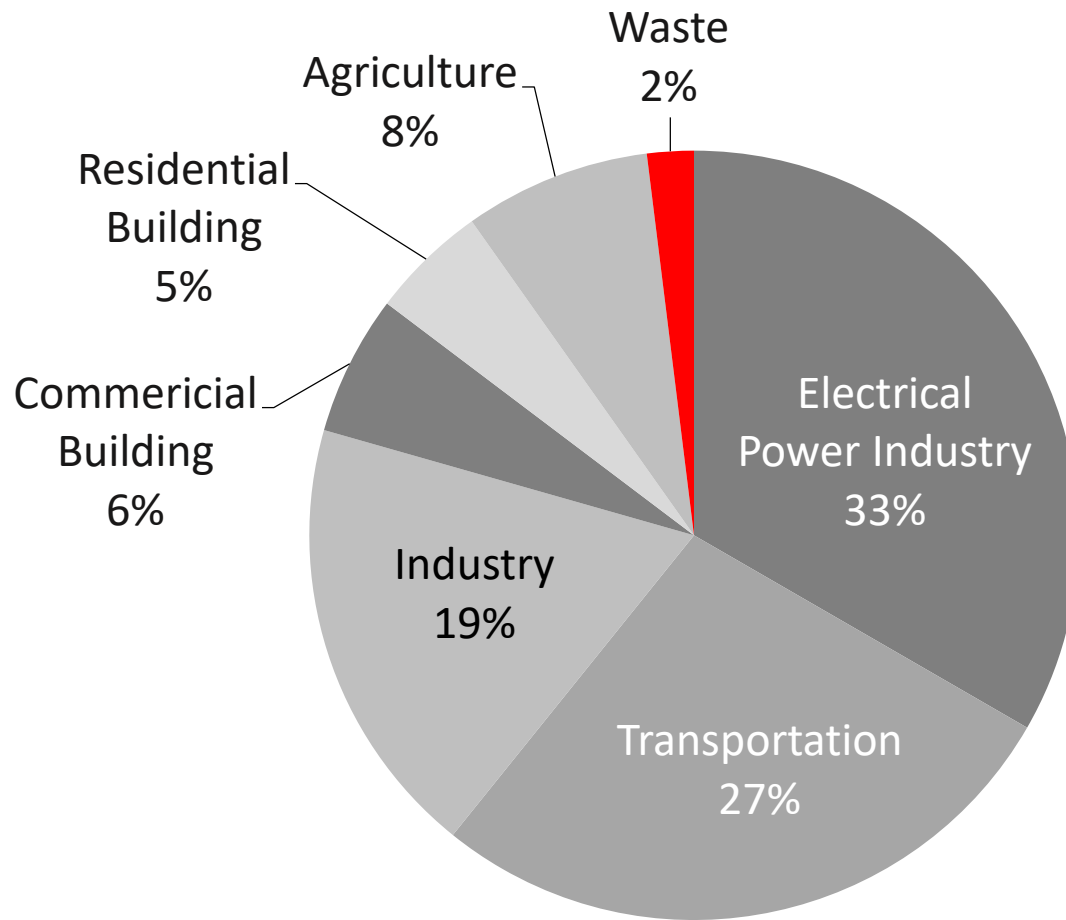


Define "materials"

# Global Material Consumption and Carbon Emissions



# Materials Consumption and Carbon Emissions



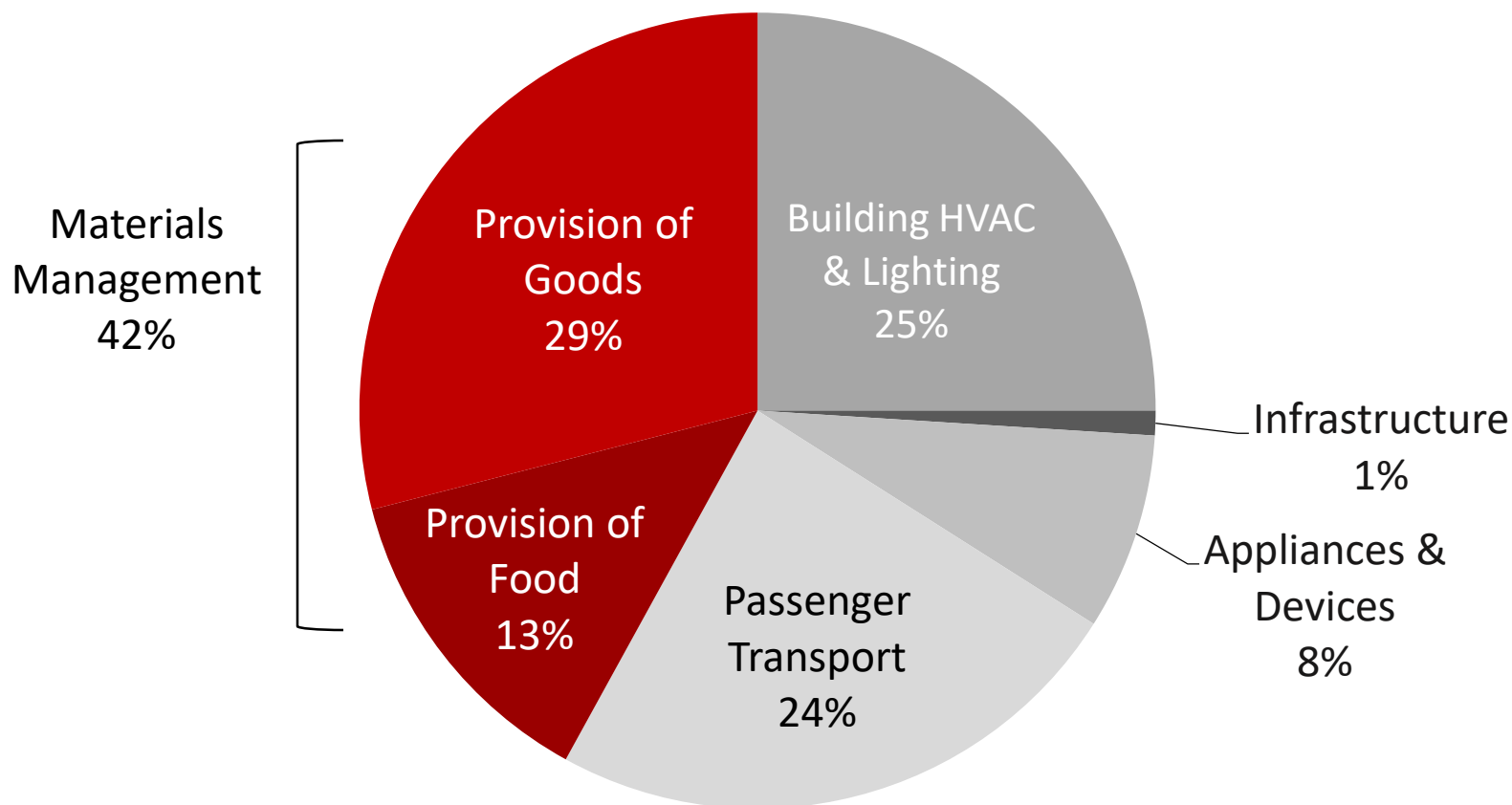
Source: U.S. Inventory of GHG Emissions and Sinks : 1990-2006 (US EPA, 2008)

# U.S. Greenhouse Gas Emissions (2006)



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

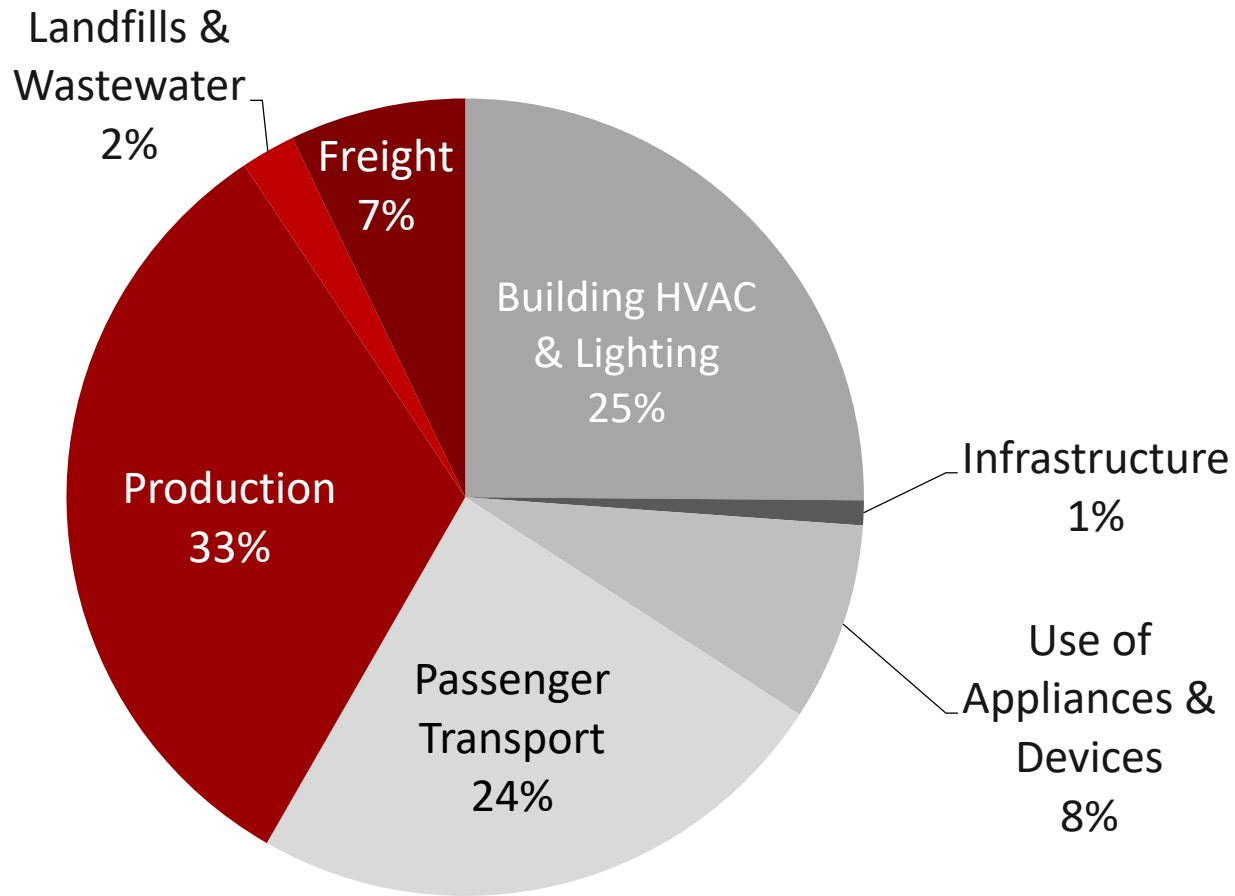
# US Greenhouse Gas Emissions (2006)



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

# US Greenhouse Gas Emissions (2006)

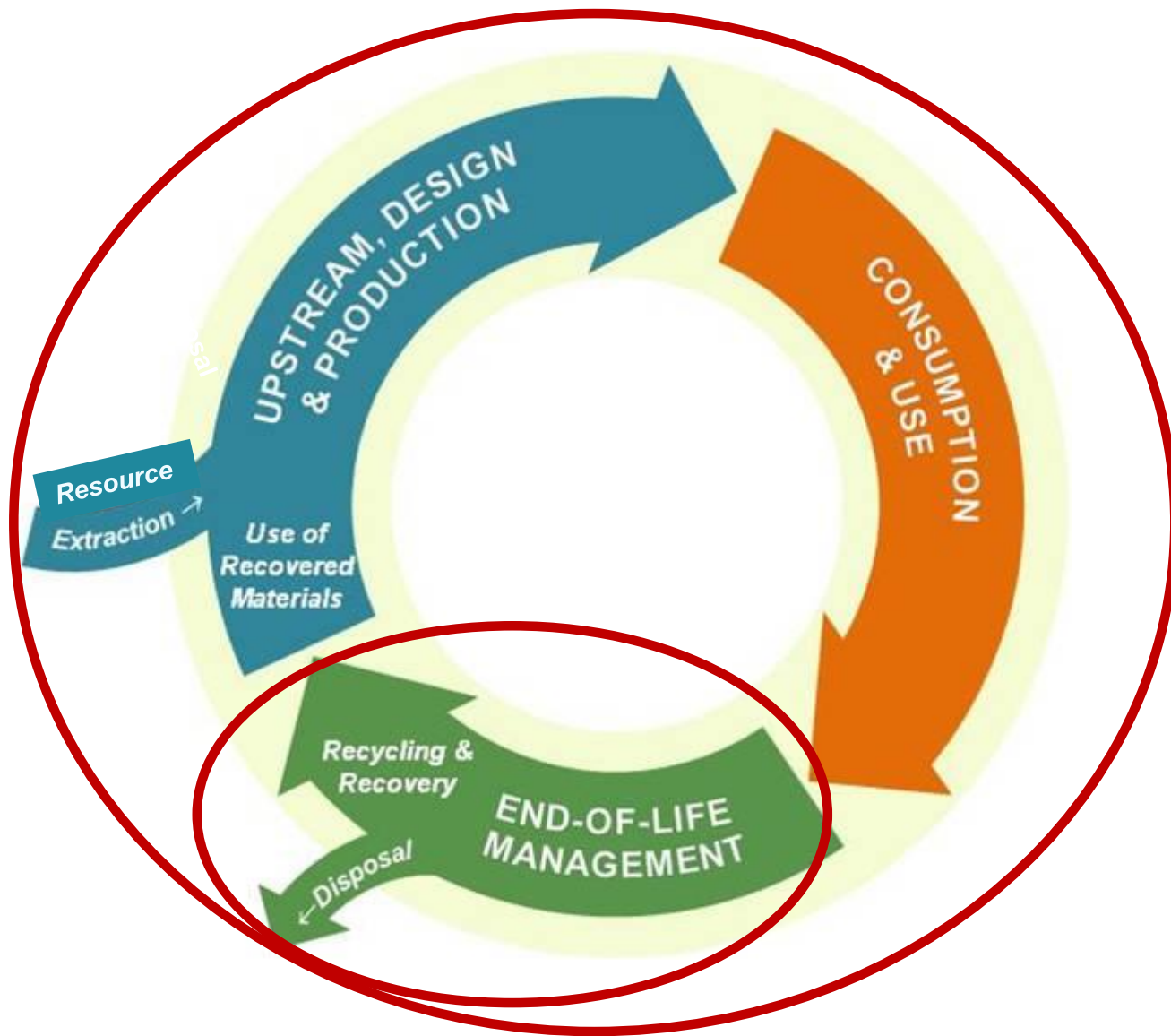




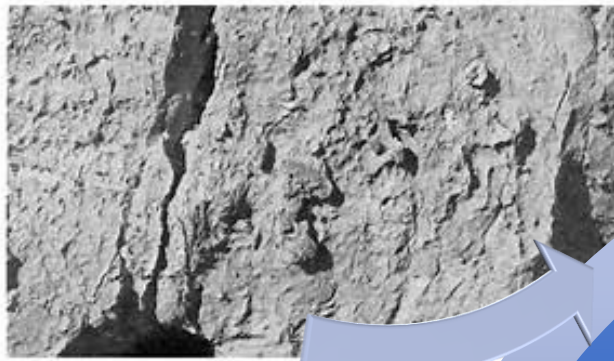
Source: *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. U.S. EPA

# Materials: Production Dominates Emissions

# END-OF-LIFE Management vs. MATERIALS Management



Material Lifecycle



Resource  
Extraction



Manufacturing



Distribution



Use

Recycling  
or  
Disposal

Landfill



Lifecycle of Concrete

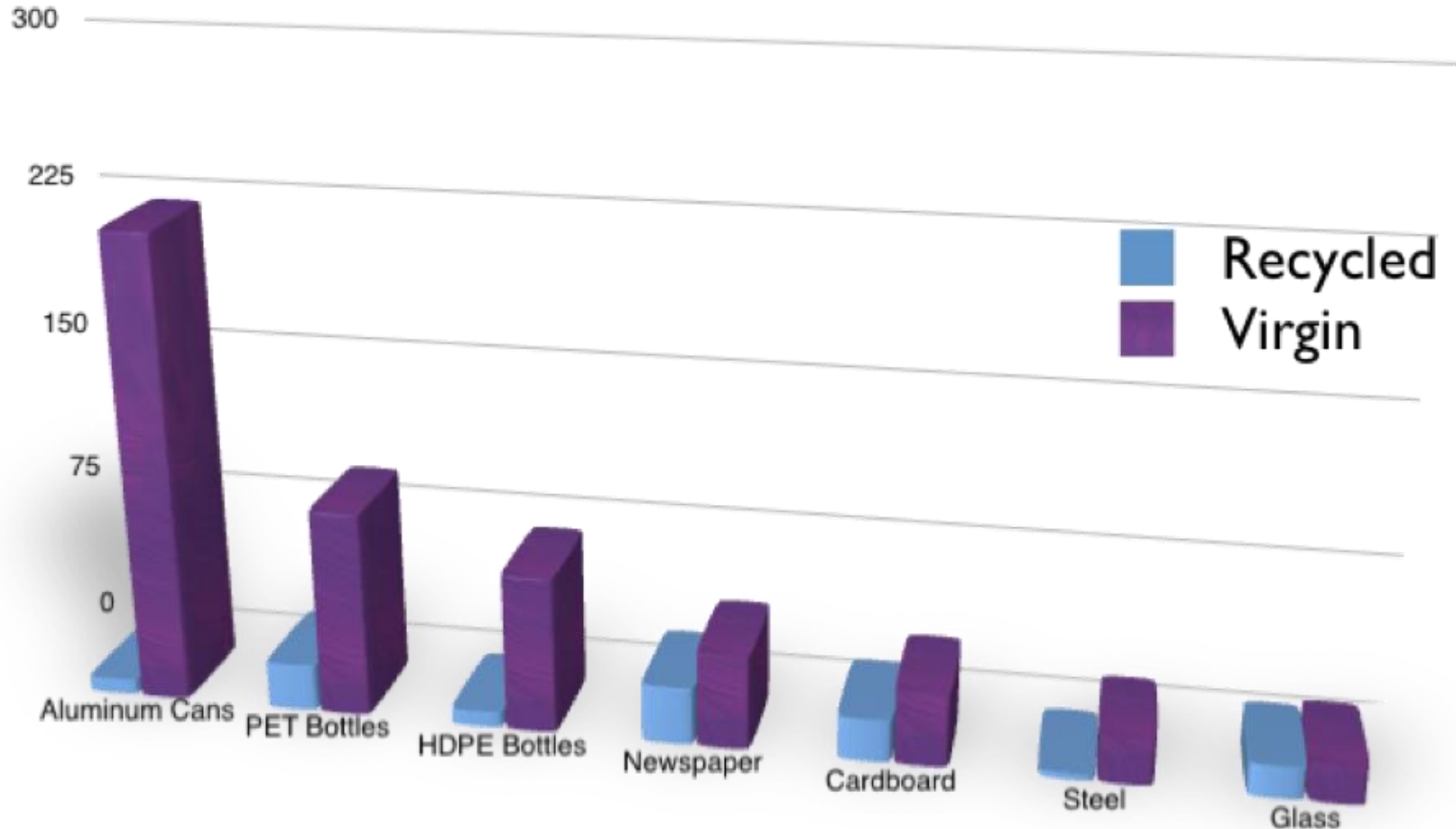
# Ways to reduce material-related greenhouse gases for governments and others

1. Recycling
2. Reusing Products
3. Reducing Material Use
4. Reducing Wasted Food
5. Reducing Building Materials
6. Climate Friendly Purchasing
7. Changing Consumption Behaviors



## Strategies to Reduce GHG Emissions

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

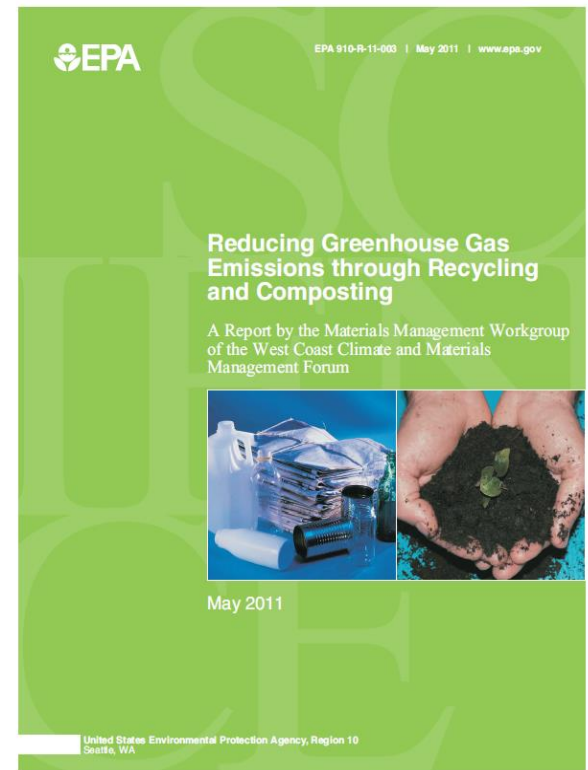


Recycling Reduces GHG Emissions

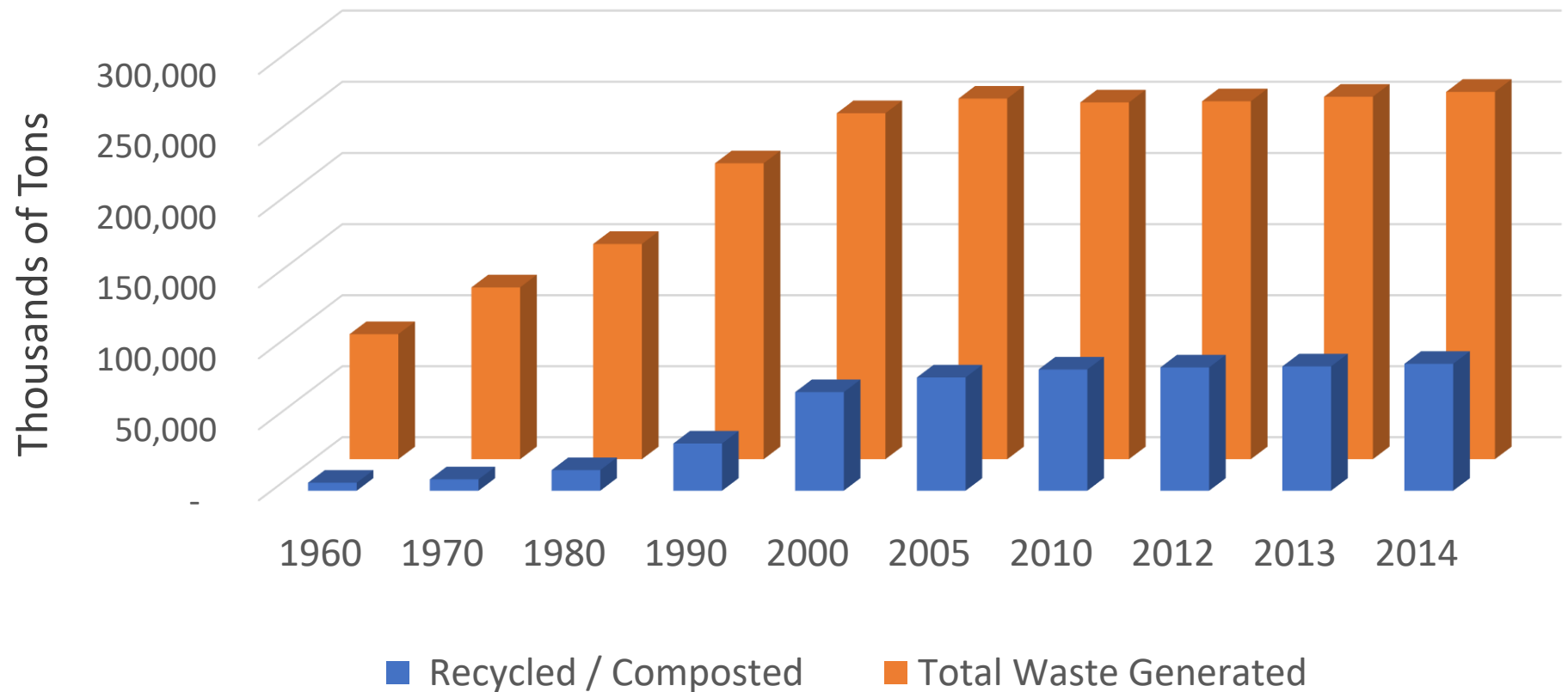


## Most Important Materials to Recycle and Compost:

1. Carpet
2. Core Recyclables
  - Aluminum & Steel Cans
  - PET & HDPE Plastics
  - Cardboard & Paper
3. Dimensional Lumber
4. Food Scraps

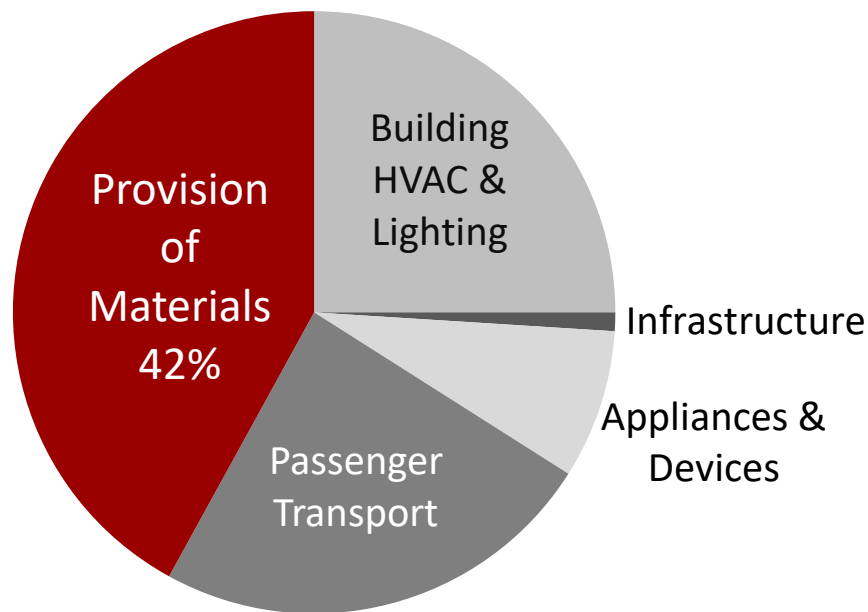


# Recycling & Composting Key Materials

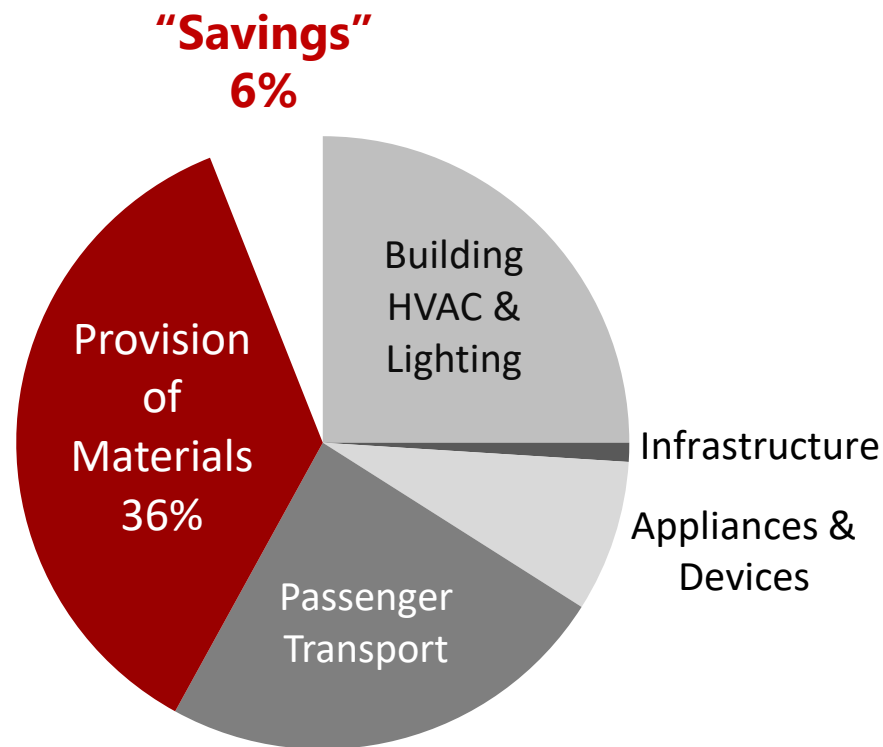


# Recycling vs. Total Waste Generated

Source: EPA Report: Advancing Sustainable Materials Management: Facts and Figures, 2014



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

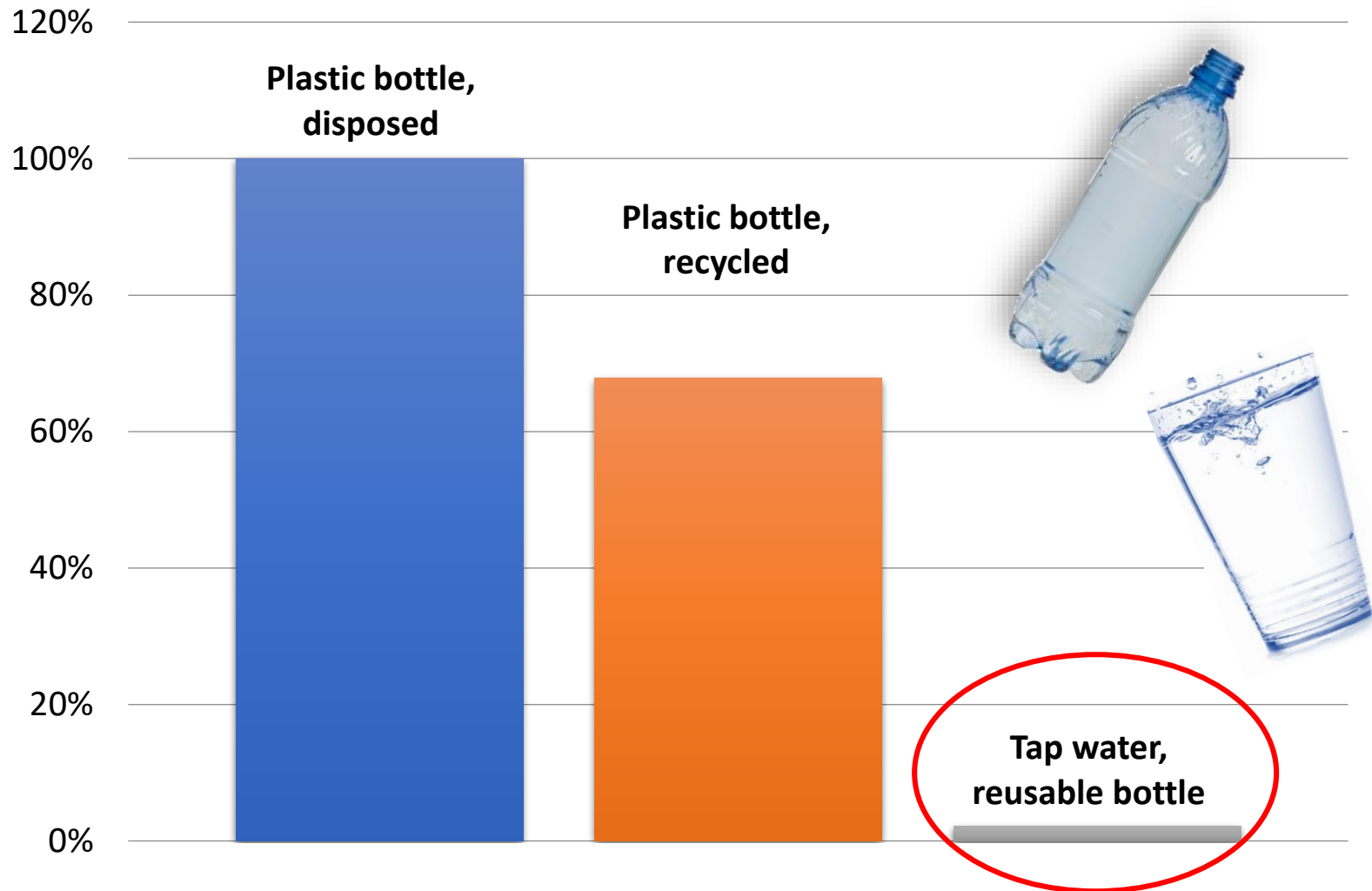


2006 U.S. GHG inventory with  
hypothetical recovery rate  
(~100% municipal solid waste + construction and  
demolition debris)

# Limits of Recycling and Composting

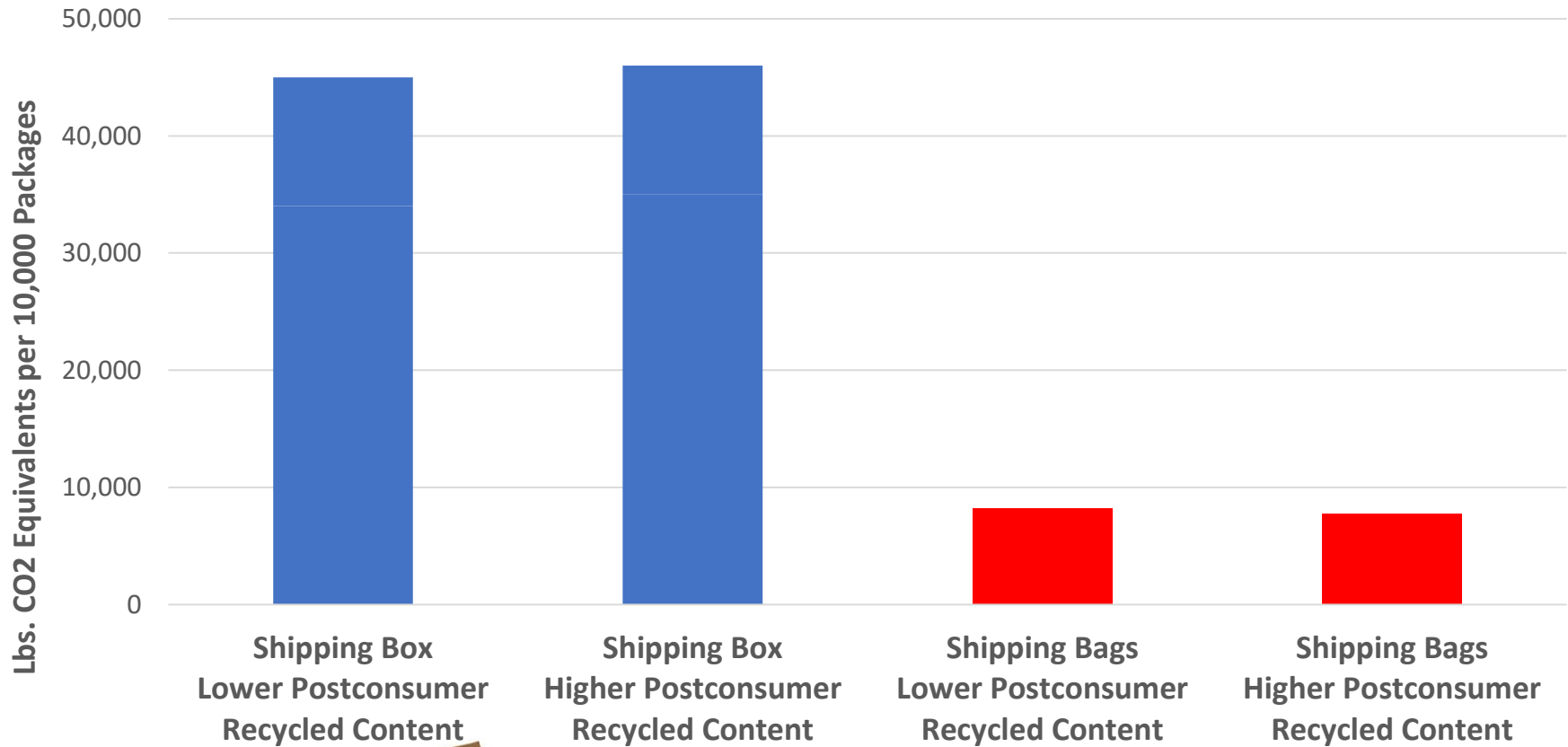


## Relative Greenhouse Gas Emissions of Water Consumption Options



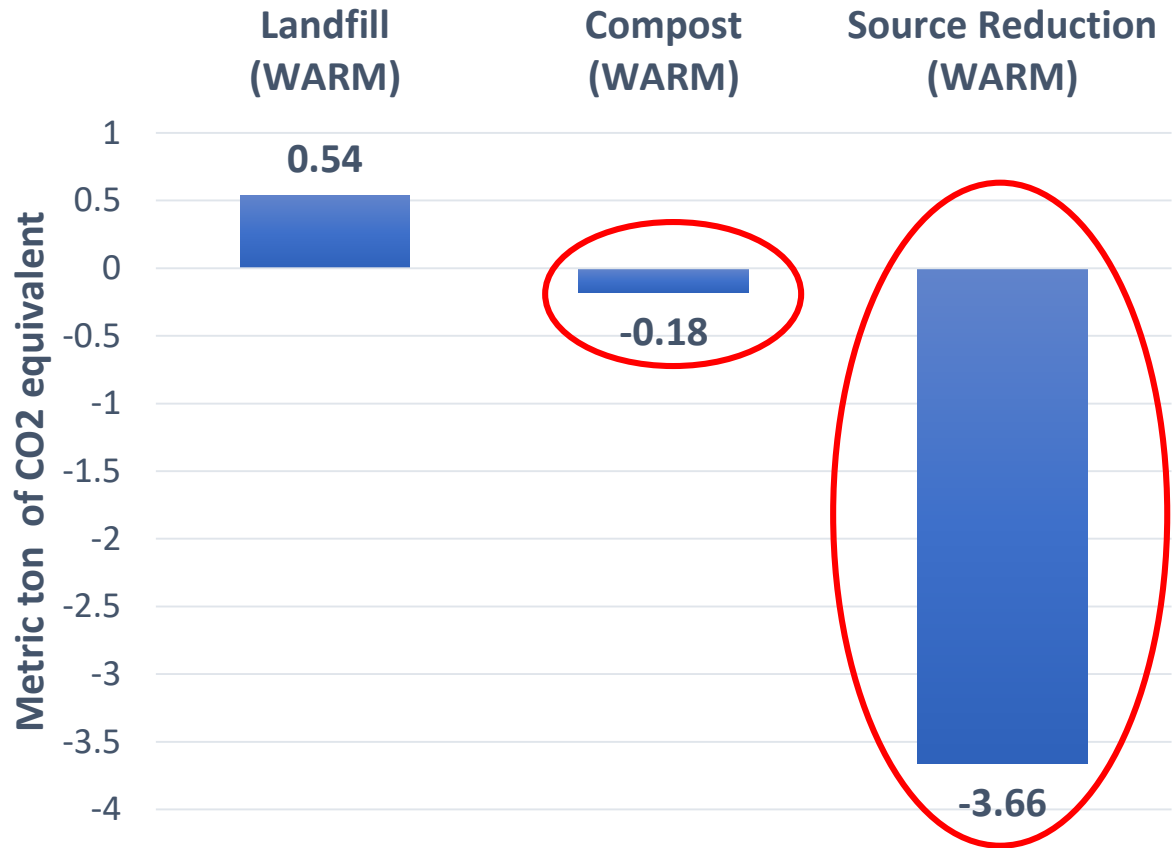
# Reuse Reduces GHG Emissions

## GHG Emissions from Shipping Materials



Reduction is Best

# Food Waste Management Activities

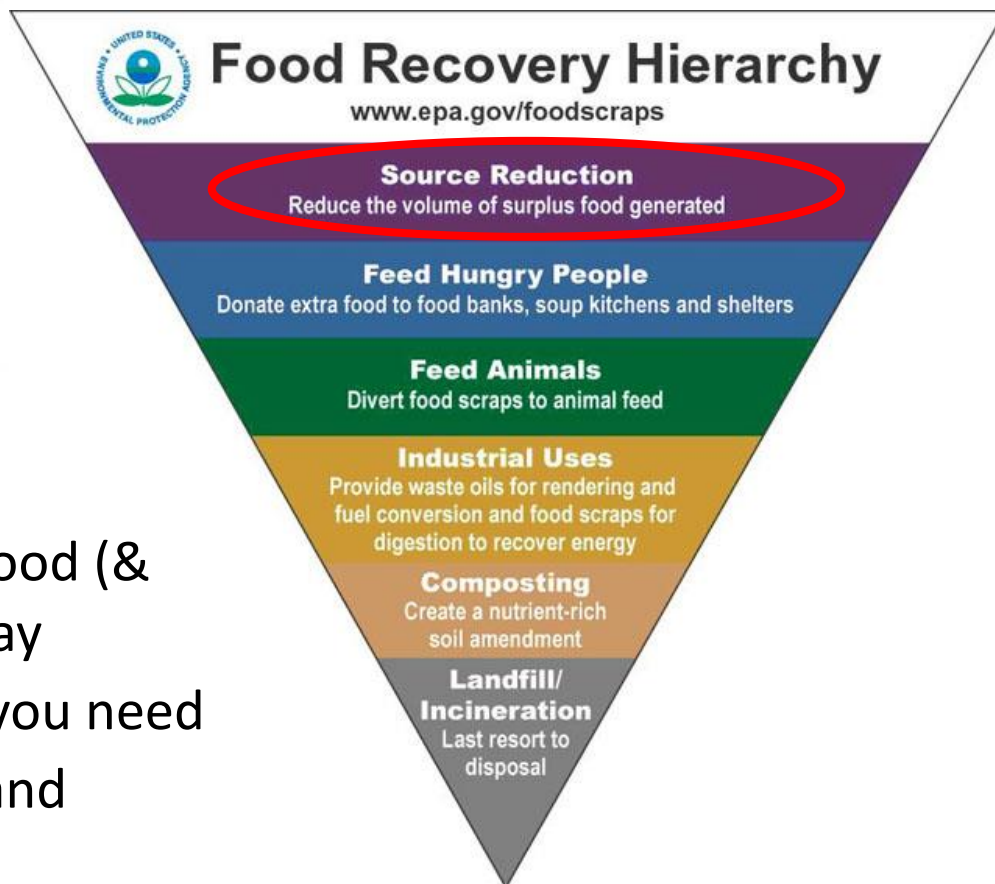


Reduction is Best





**TOO GOOD  
TO WASTE**



## • Toolkit tools:

- **Get Smart:** See how much food (& money) you're throwing away
- **Smart Shopping:** Buy what you need
- **Smart Storage:** Keep fruits and vegetables fresh
- **Smart Prep:** Prep now, eat later
- **Smart Saving:** Eat what you buy

Reducing wasted food can save a family of four about \$1600 a year!

# Food: Too Good to Waste

**Results: 50% waste reduction; \$25,000 cost savings**



**Case Study: Hospital Food Service**







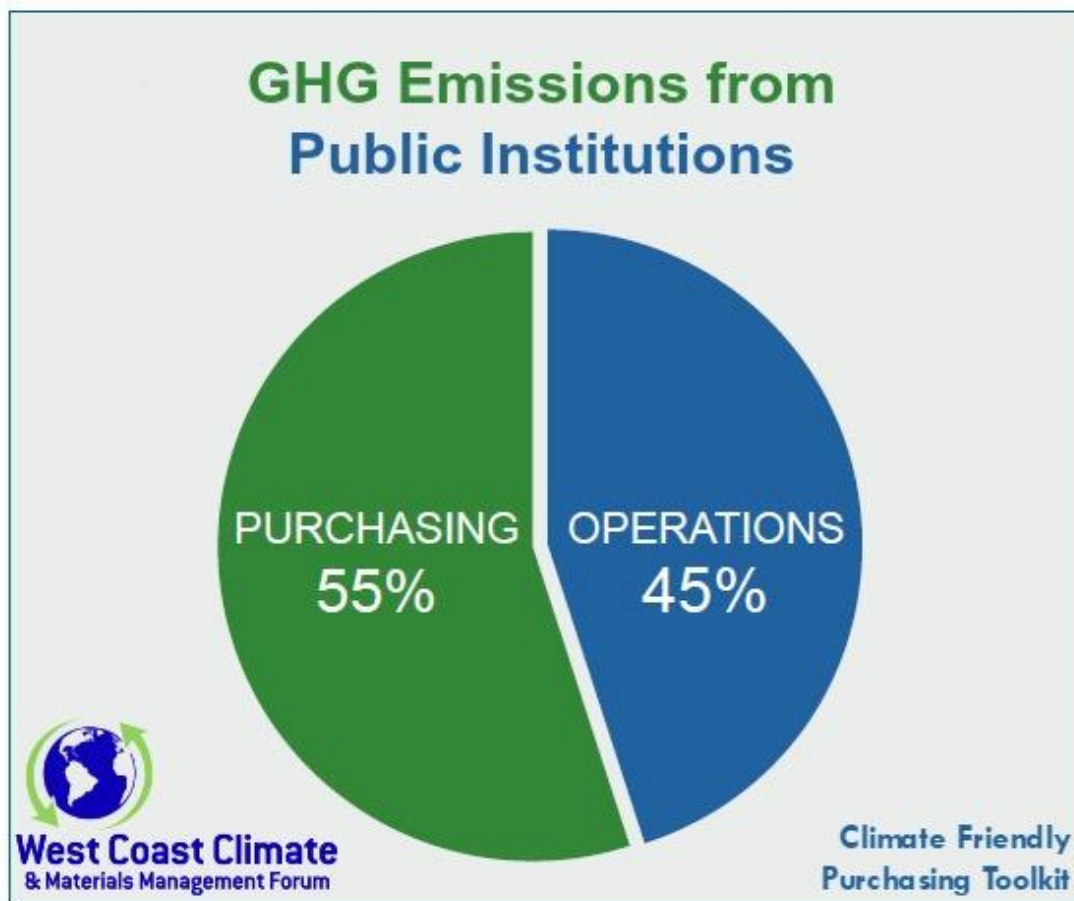
How House Sizes  
Have Changed in  
Almost 60 Years

..... 1950  
----- 2008

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

# Reducing Building Materials

Our purchases have big greenhouse gas impacts.  
These can be reduced by wise purchasing decisions



Climate Friendly Purchasing

# Climate Friendly Purchasing Toolkit Modules



Asphalt



Fuels



Concrete



Information &  
Communications Technology



Food



Professional Services



## Climate Friendly Purchasing



**Results: ~15% energy reduction; 8,700 MTCO<sub>2</sub>e reduction**



**Case Study: Warm-Mix Asphalt**

**Results: 50% energy reduction; \$685,000 cost savings**



**Case Study: Managed Print Services**





# Reduce Consumption

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



Changing Consumption Patterns

## Climate Action Toolkit



### **A materials management toolkit of:**

- Climate Protection Actions
- Example Climate Action Plans
- New Approaches to GHG Inventories
- Measurement Tools
- Links to resources
- And more...!

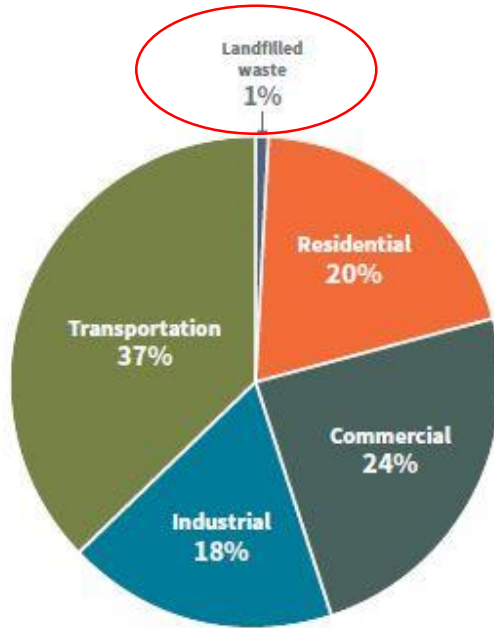
<https://westcoastclimateforum.com/toolkit/homepage>

# Climate Action Toolkit



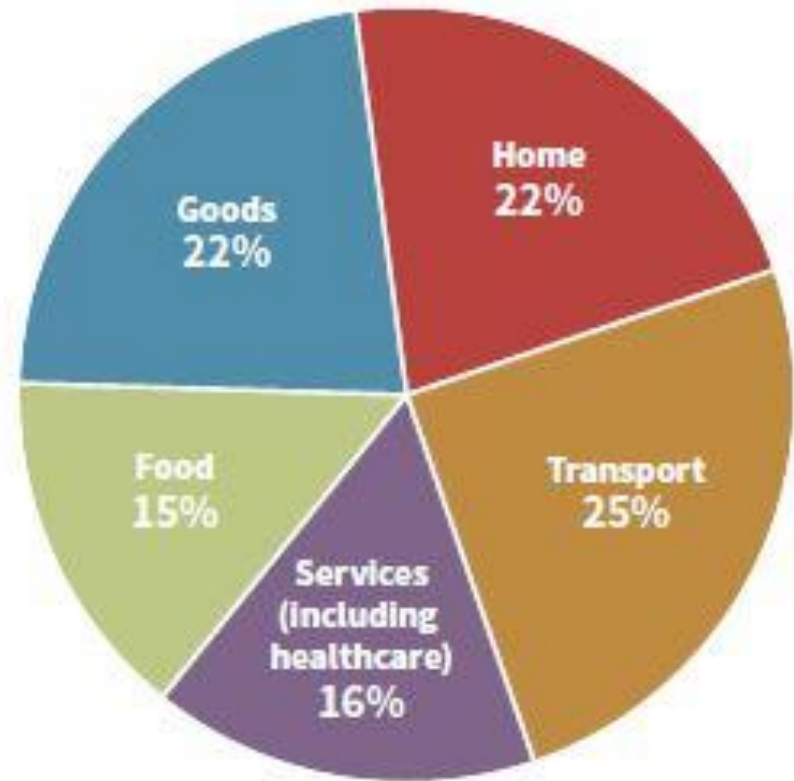
# ~ City of Portland ~

## Traditional Sector-Based Inventory



**7.7 MMTCO<sub>2</sub>e**

## Consumption-Based Inventory



**17.1 MMTCO<sub>2</sub>e**



# Consumption-Climate Connection

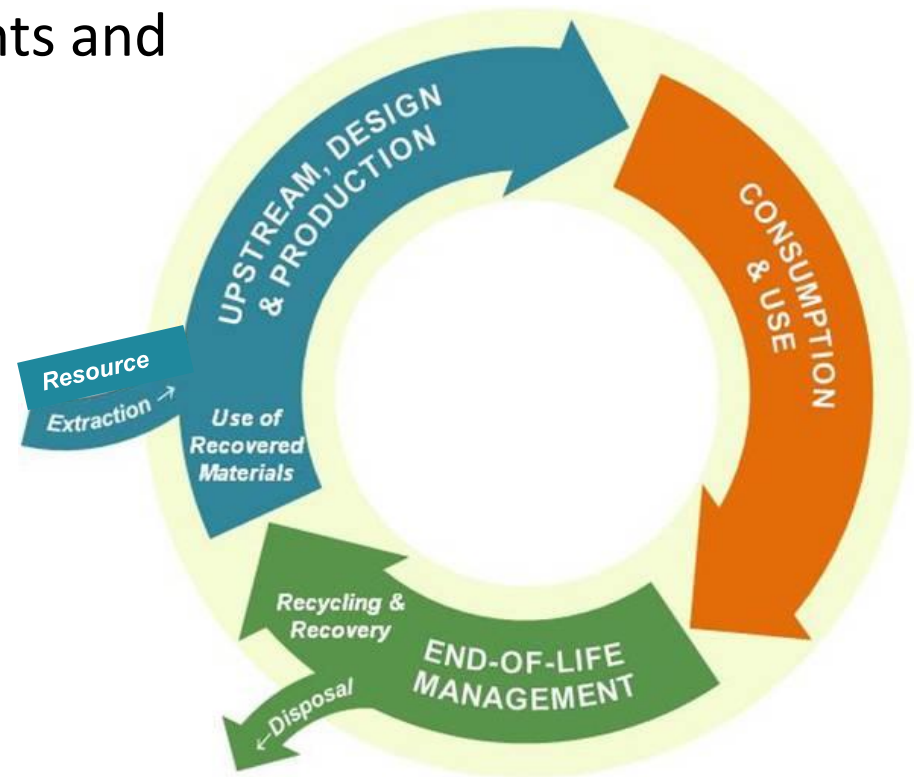


## strategic CLIMATE ACTION PLAN



# Local Climate Action Plans

- 1) Materials and Greenhouse Gas Emissions
- 2) Strategies to reduce material-related greenhouse gas for governments and others
  - a) Recycling
  - b) Reusing and Reducing
  - c) Climate Friendly Purchasing
  - d) Consuming Less
- 3) Climate Action Plans
- 4) Case Studies



Summary



Name  
Email  
Phone

We welcome your feedback and ideas



# West Coast Climate & Materials Management Forum



**STOPWASTE**  
at home • at work • at school



State of Oregon  
Department of  
Environmental  
Quality



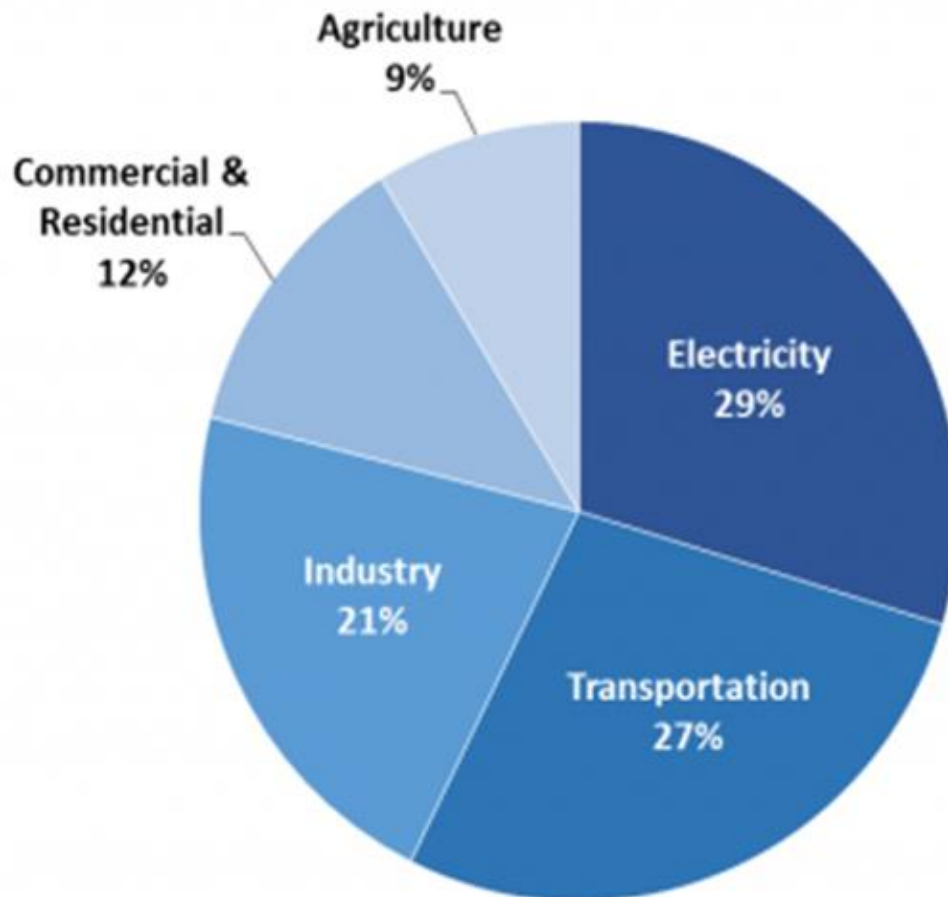
DEPARTMENT OF  
**ECOLOGY**  
State of Washington



<https://westcoastclimateforum.com>

<https://westcoastclimateforum.com>

## Sources of Greenhouse Gas Emissions in 2015



U.S. Environmental Protection Agency (2017). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015