

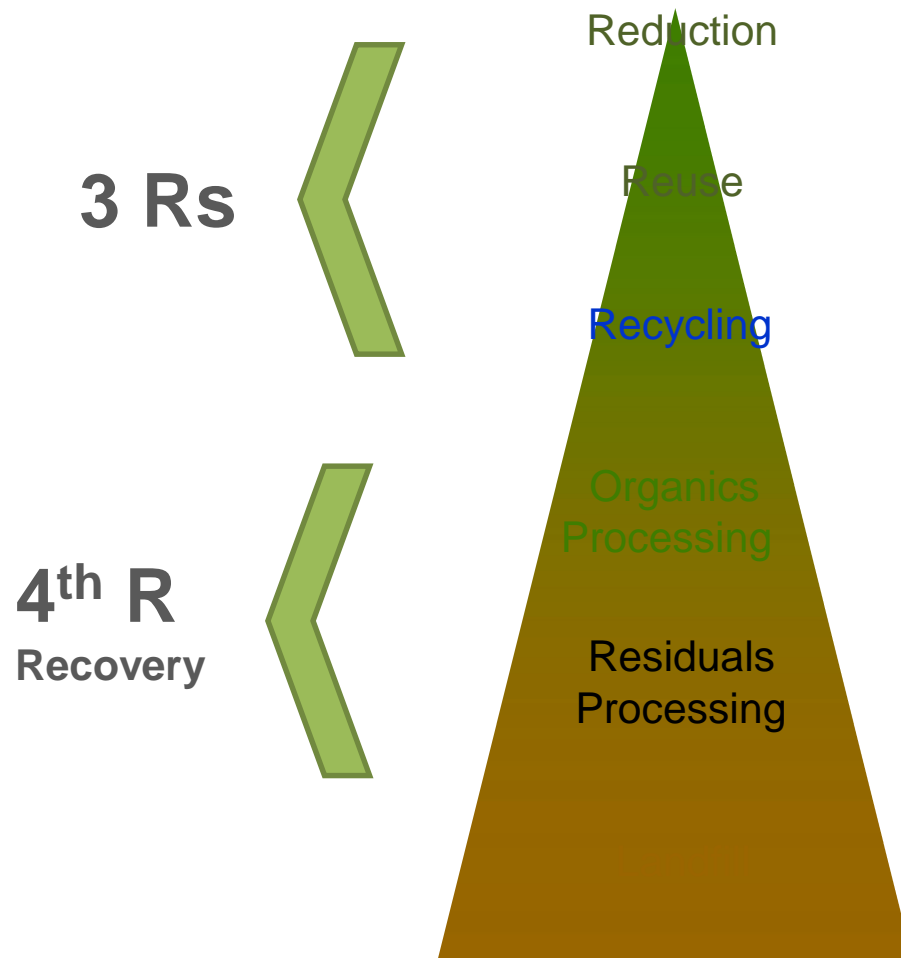
Waste and Green House Gas Impact An Introduction

AWMA Waste Management and
Greenhouse Gas Reduction Conference

October 7, 2015

- **Definitions**
 - **Waste**
 - **GHG**
 - **Carbon Tax**
 - **Cap and Trade**
- **GHG Statistics**

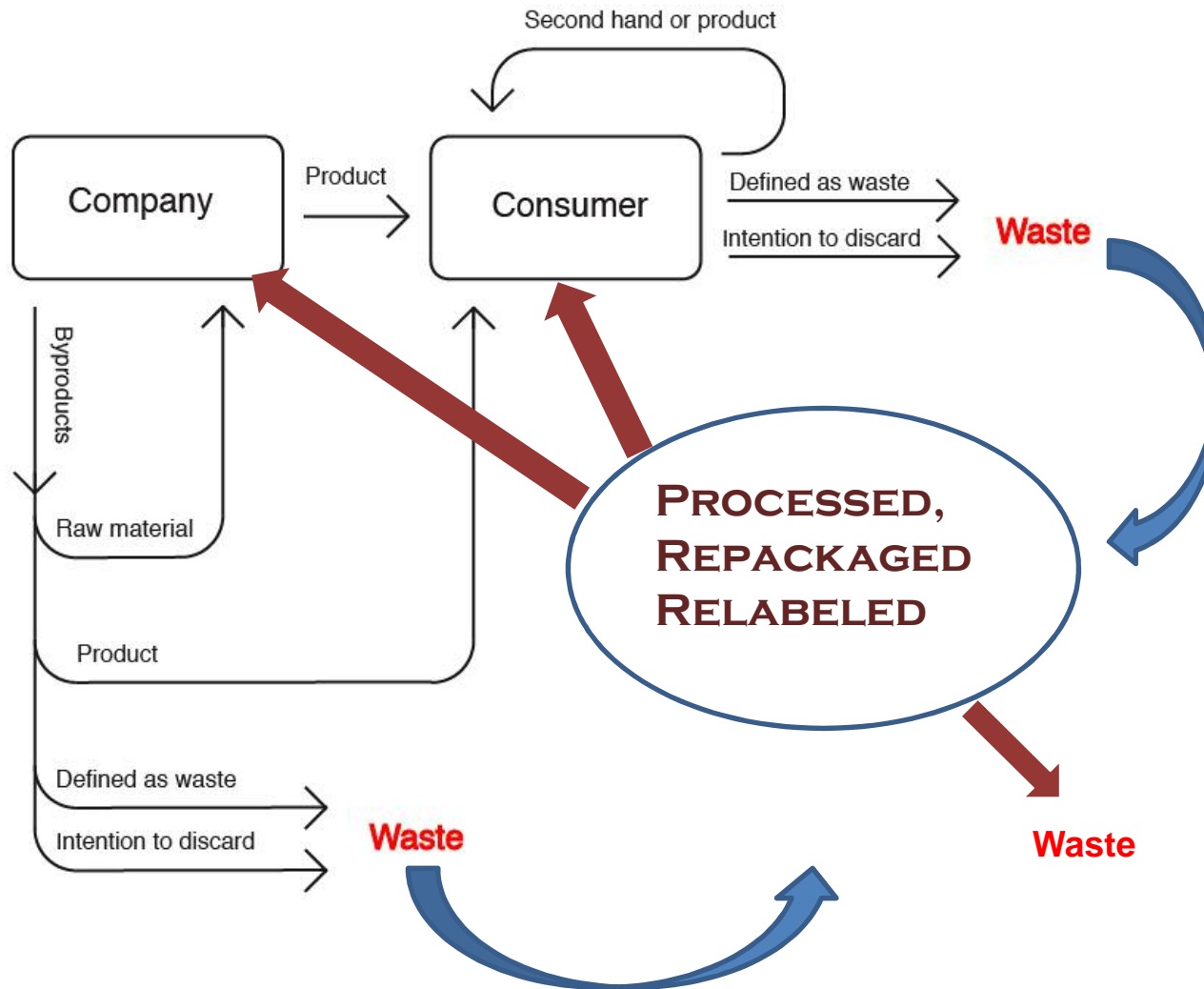
Waste – Definition & Hierarchy Planning Process



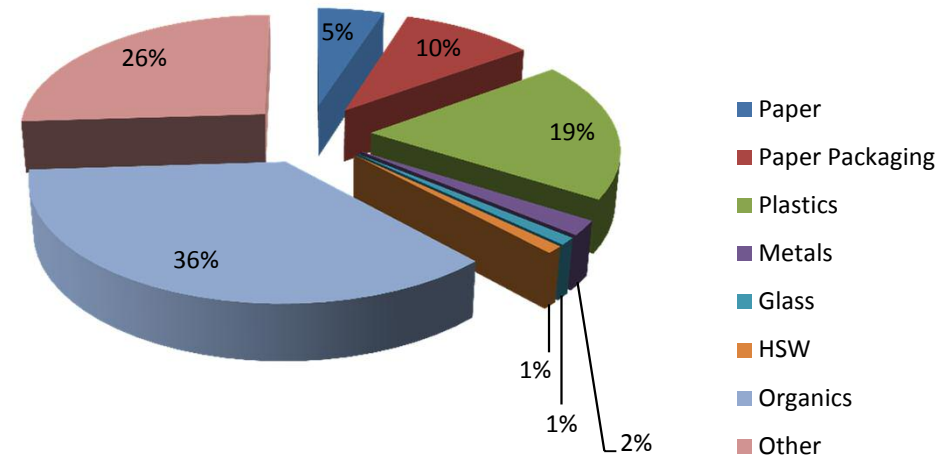
Definition of Waste:

*material that is not wanted;
the unusable remains or
byproducts of something*

Schematic of EU Legal Definition of Waste



Municipal Solid Waste - Source



- .73 tonne per capita per year
- 400 kg per capita per year from our homes

Material	2010/2011 (kg/kk/yr)	% Change from 2006/2007
Newsprint	33.4	-33%
Mixed Paper	15.2	5%
OCC	31.5	9%
PET	14	30%
Polystyrene	4.2	23%
Steel	9.7	-3%
Glass	24.8	-34%

Ontario's 60% Waste Diversion Goal, A
Discussion Paper, Ministry of Environment

Changing Composition of the Blue and Grey Box Program, Niagara Region

MSW – Processing



**Recycling
25%**



**Residue
50%**

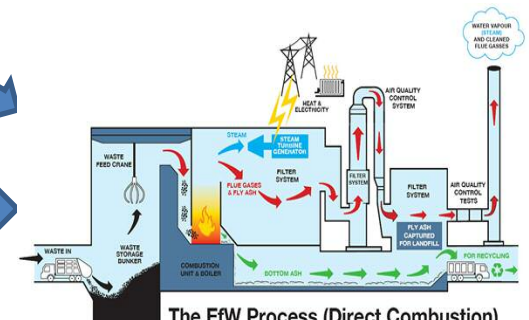


**Composting
25%**



Residue

Residue



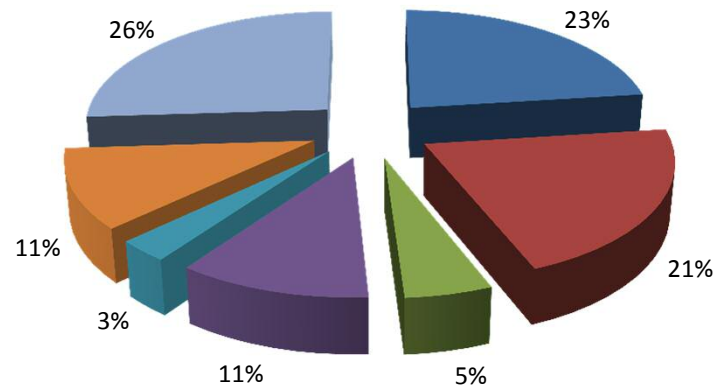
The EFW Process (Direct Combustion)

<http://www.flickr.com>

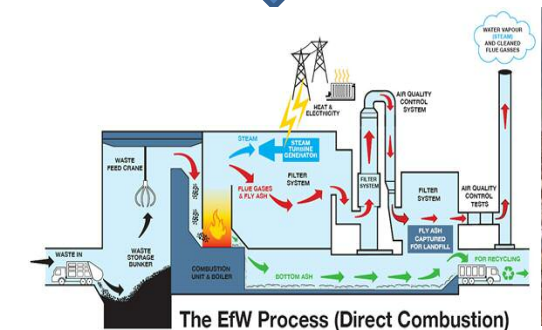
<http://consult.staffordshire.gov.uk>

<http://www.biofuelrefineries.co.uk/biomass.htm>

ICI Solid Waste - Processing



- Paper
- Wood
- Glass
- Metal
- Plastic
- Organic
- Other

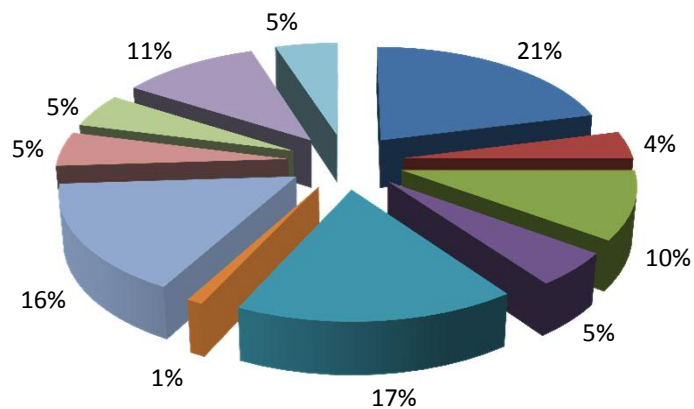


Ontario's 60% Waste Diversion Goal,
A Discussion Paper, Ministry of Environment

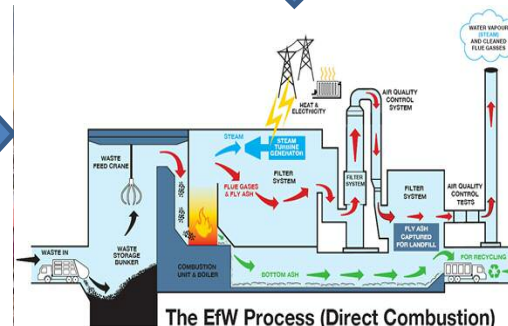
Construction and Demolition



CONSULTING ENGINEERS
& SCIENTISTS



- Paper
- Glass
- Metal
- Plastic
- Organics
- Concrete
- Wood
- Gypsum
- Aggregate



<http://consult.staffordshire.gov.uk>
<http://crossdaleconstruction.com>

GHG Definitions

a gas that contributes to the greenhouse effect by absorbing infrared radiation, e.g., carbon dioxide and chlorofluorocarbons

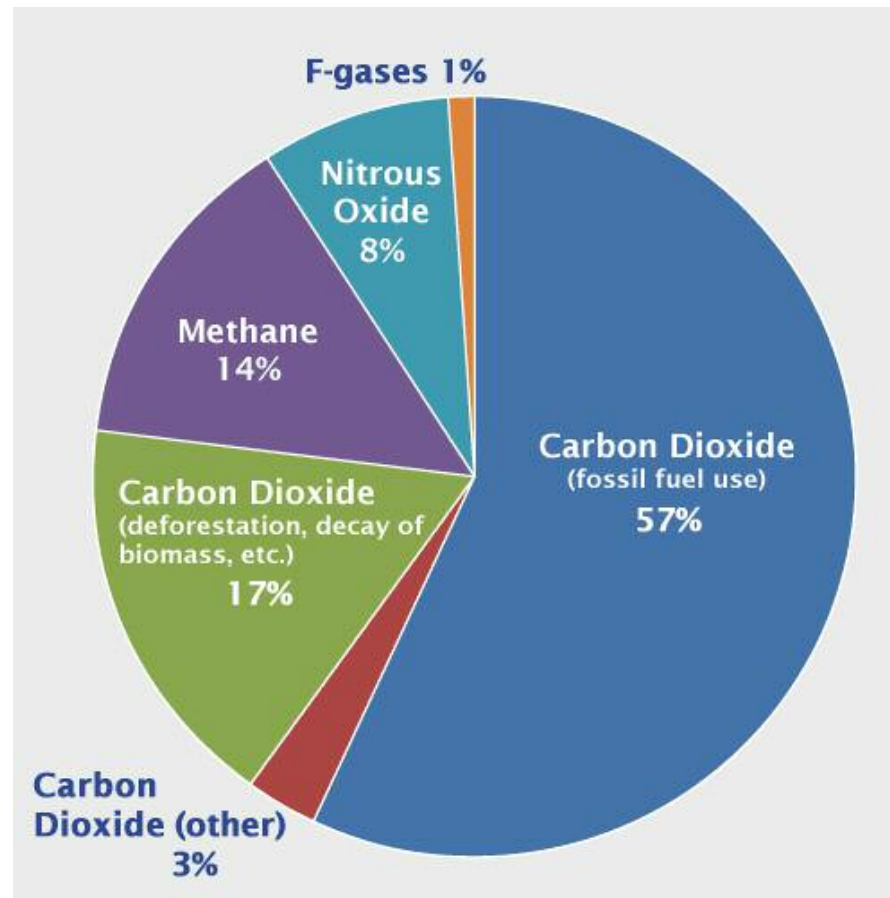
Any of the atmospheric **gases** that contribute to the **greenhouse** effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), and water vapor.

Some of the longwave radiation is not reflected and radiates out into space

Some solar energy is reflected by Earth's surface

Source: Google Definitions

GHG Emission Gases



Source: US EPA

Waste GHG Emissions

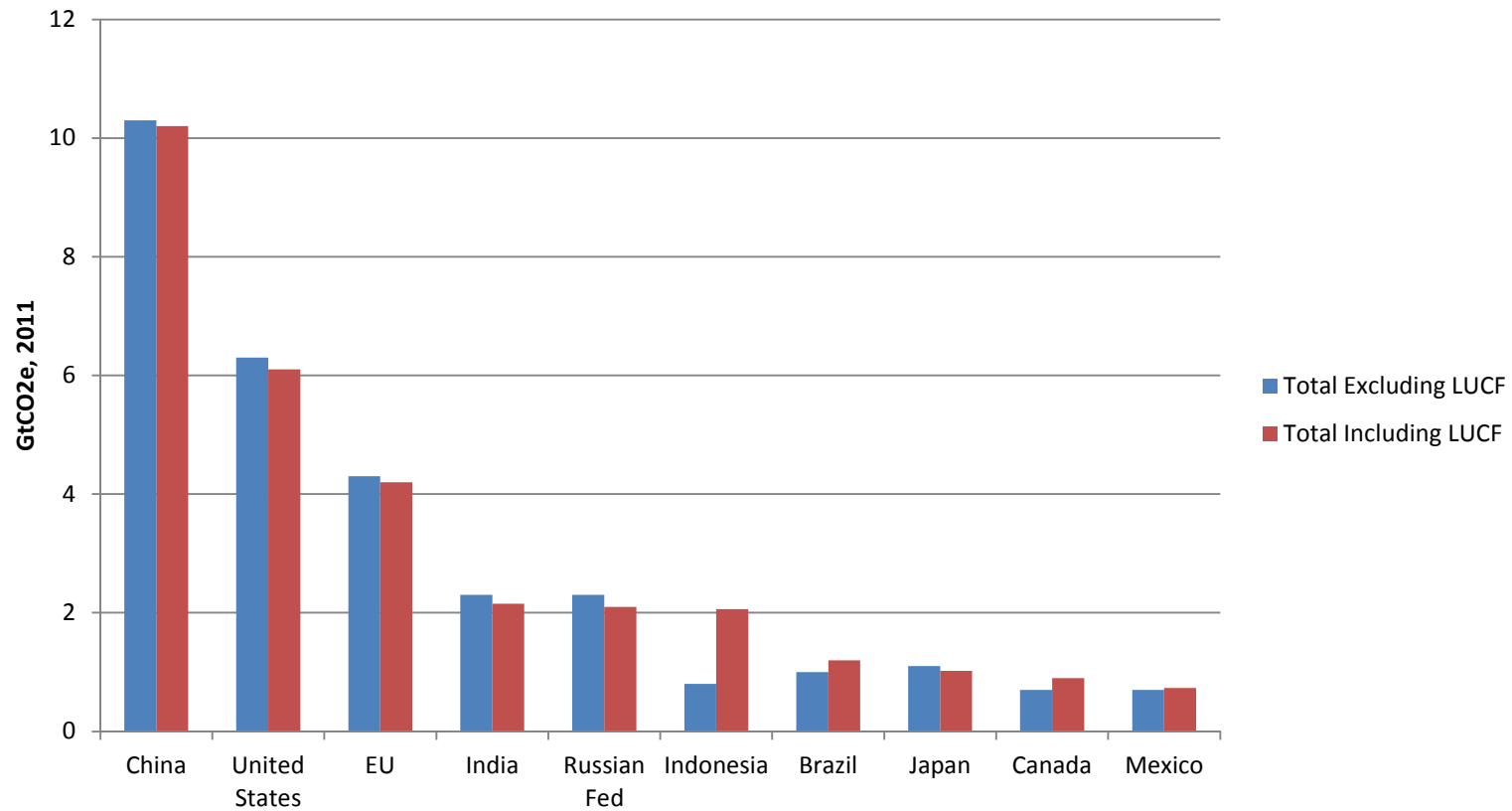


- Methane is 21 times more potent than carbon dioxide in terms of its global warming potential.
- Emissions from Canadian landfills account for 20% of national methane emissions.
- Estimates have shown that approximately 27 Megatonnes (Mt) of carbon dioxide equivalent (eCO₂) are generated annually from Canadian landfills, of which 20 Mt eCO₂ are being emitted annually.
- Approximately 7 Mt eCO₂ are captured and combusted representing the equivalent of removing about 5.5 million cars from the road.

Source: Environment Canada

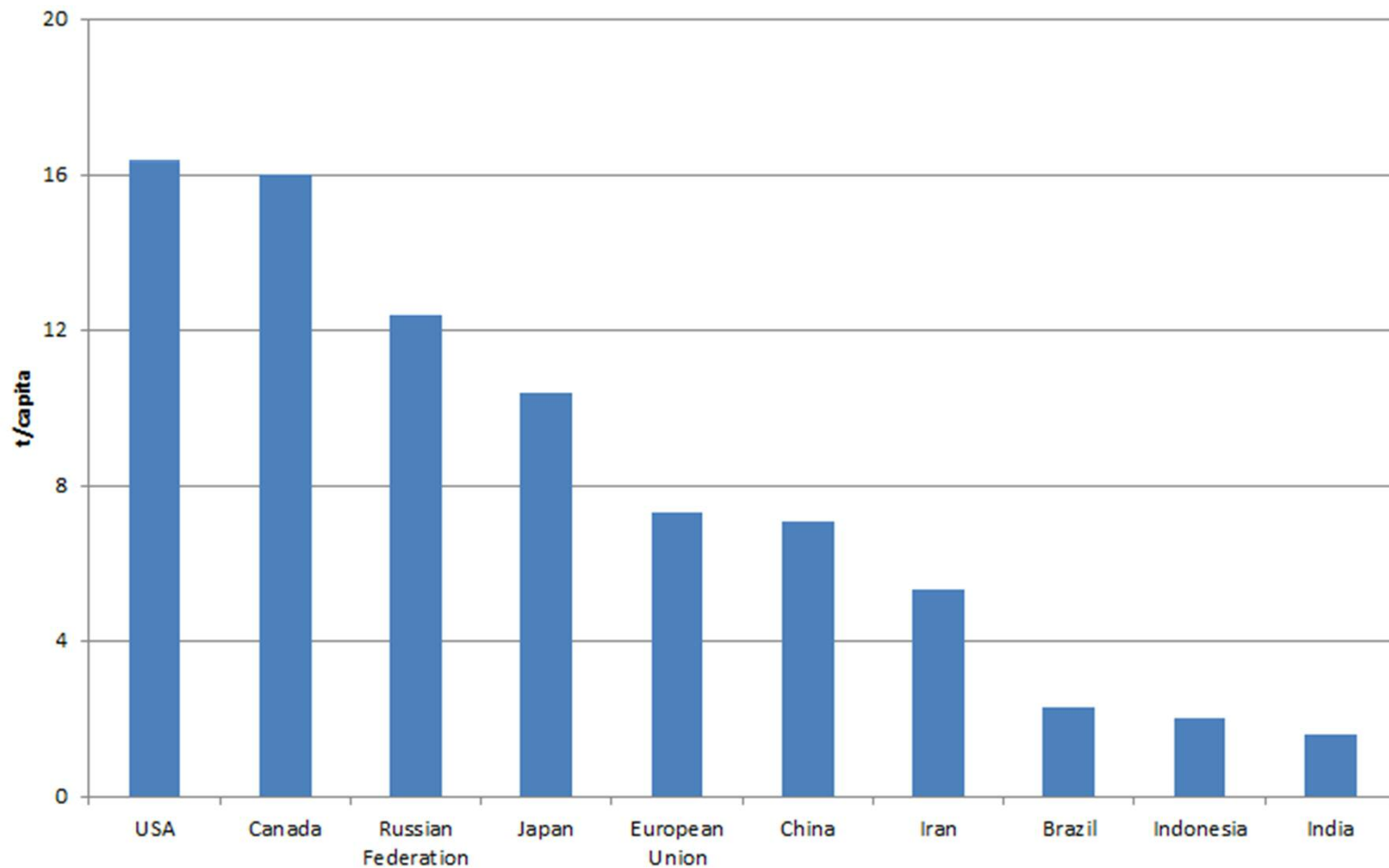
Total Emissions by Country

Top 10 Emitters



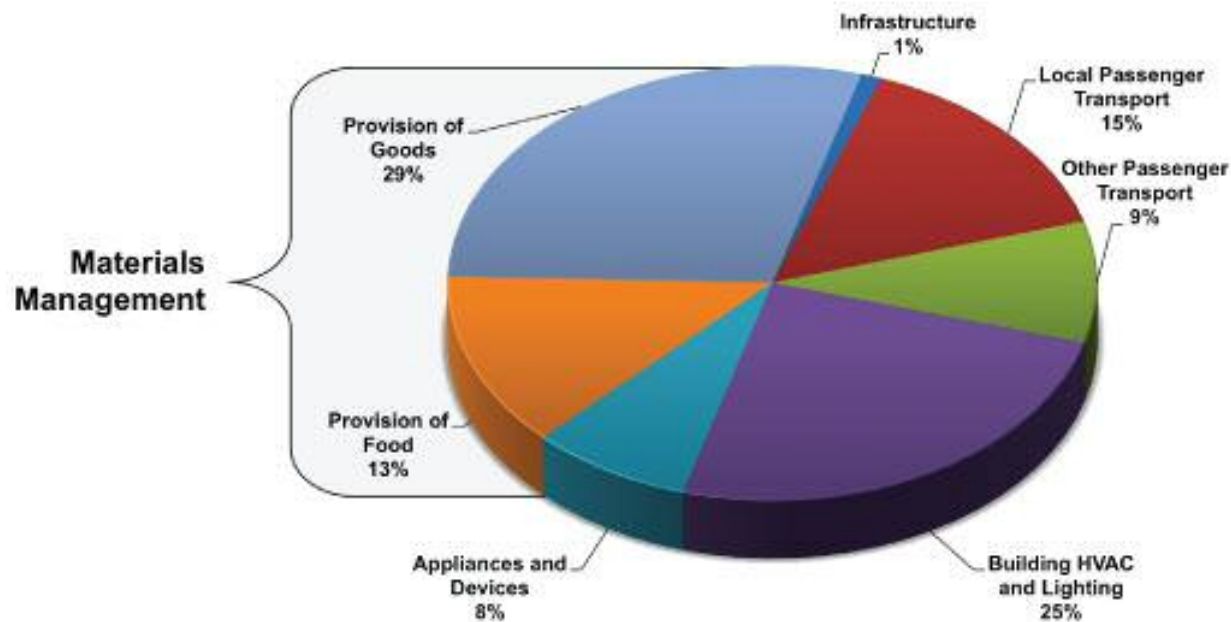
Per Capita Emissions by Country

Emission Intensity



GHG Emissions by Category

Systems-Based GHG Inventory US (Domestic) Emissions, 2006



29% Due to Provision of Goods

25% Due to Heating Cooling and Lighting

24% Due to Transportation

13% Due to Provision of Food

1-5% Due to Waste Management

LCA Study commissioned by Waterloo Region to see determine what options were available as Landfill was nearing being filled

Result:

1. Total Emissions if all waste goes to landfill
60,300 t/CO₂ eq
2. 52% Recycling Rate plus landfill
7,800 t/CO₂ eq
3. 52% Recycling Rate plus WTE plus landfill
-19,000 t/CO₂ eq
4. 52% Recycling Rate plus MBT plus landfill
-28,900 t/CO₂ eq

Carbon Tax

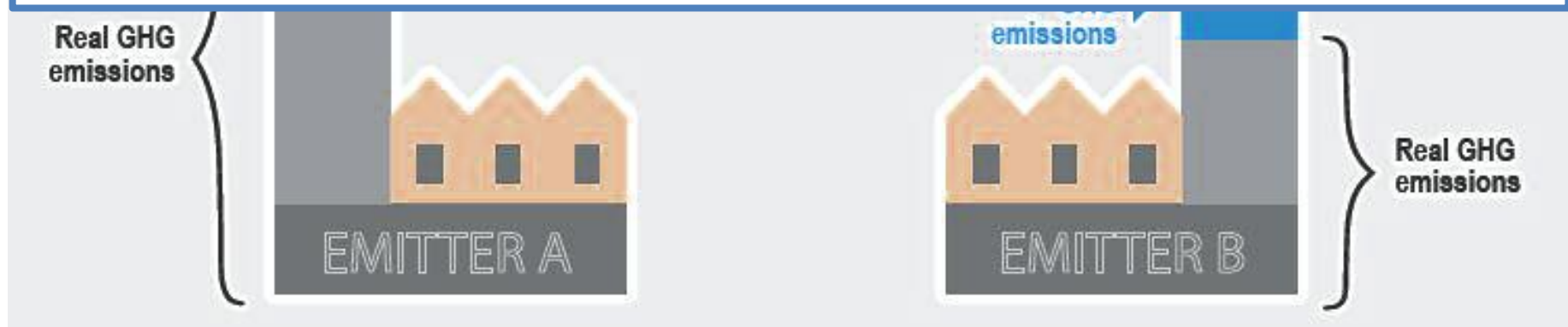
A **carbon tax** is usually defined as a **tax** based on greenhouse gas emissions (GHG) generated from burning fuels. It puts a price on each tonne of GHG emitted, sending a price signal that will, over time, elicit a powerful market response across the entire economy, resulting in reduced emissions.



Cap and Trade Definition

Sources covered by the program then receive authorizations to emit in the form of emissions allowances, with the total amount of allowances limited by the cap.

Each source can design its own compliance strategy to meet the overall reduction requirement, including the sale or purchase of allowances, installation of pollution controls, and implementation of efficiency measures, among other options.



Sources: US EPA & http://forces.si.edu/atmosphere/02_04_07.html

Conclusion



- Cap and Trade can impact waste operations
 - Landfilling
 - Operations
 - Transportation
- Companies/Municipalities may be able to have carbon based funding for projects
- Diversion will decrease GHG emissions

Questions?