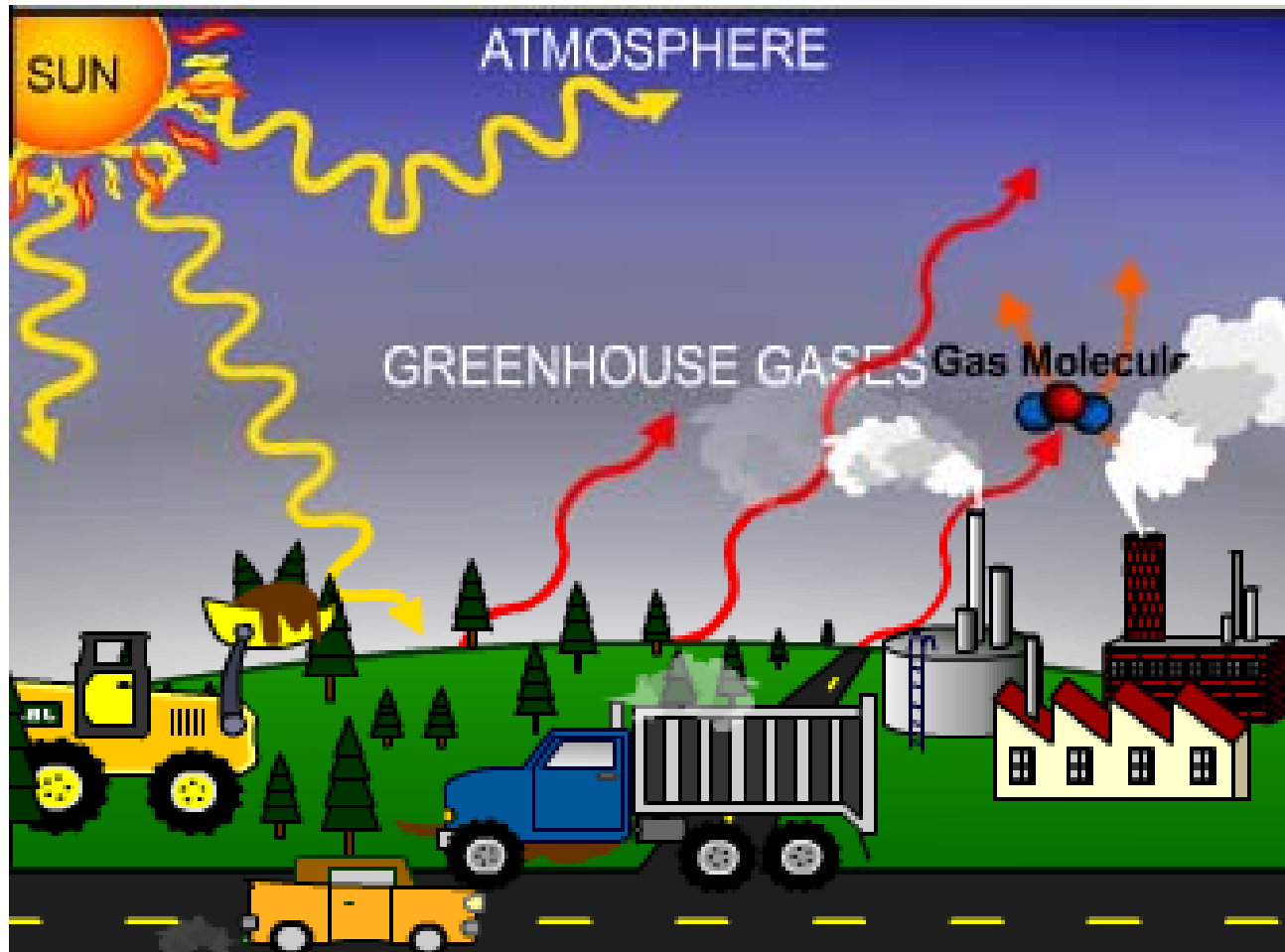


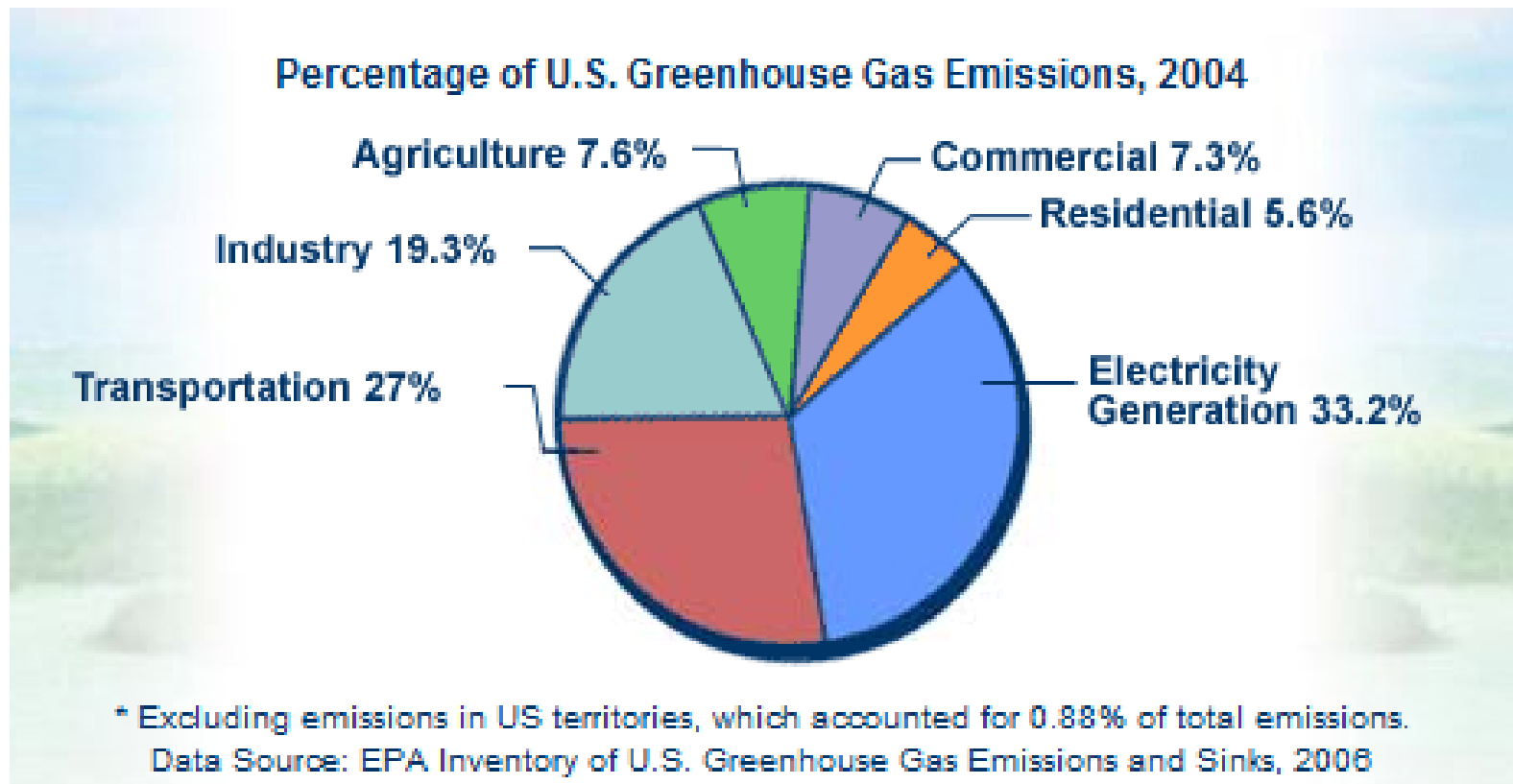
Climate Change and Greenhouse Gas (GHG) Inventory 101

December 2008

What is the Greenhouse Effect?



Where do Greenhouse Gases Come From?



What is a Ton of CO₂?

CO ₂ eq	Approximately equal to...
20 Tons	1 US Household Annually
6 Tons	1 Car Annual Emissions
6 Tons	1 Cow Annual Emissions
1 ¼ Ton	1 Acre of Pine Forest Carbon Storage
1 Ton	38 Propane BBQ Cylinders
½ Ton	1 Barrel of Oil (approx. \$80 USD)
20 Lbs	1 Gallon of Gas
1 Lb	1 Day of an Office Computer



All numbers are approximate and rounded

Benefits of a GHG Inventory

- First step to manage carbon risk and address sustainability
- Provide transparent assessment of risk and communicate progress
- Respond to requests from stakeholders and customers
- Prepare for future regulations
- Benchmark to measure progress

Getting Started – Terminology

- **Boundary Conditions:** The breadth and depth of an inventory.
- **Base Year:** A year against which GHG emissions are tracked over time.
- **The GHG Protocol:** A Corporate Accounting Standard developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).
- **Carbon Dioxide Equivalents (CO₂eq):** Standard GHG emissions reporting metric.
- **Major Greenhouse Gas (GHG) Emissions:**
 - Carbon Dioxide (CO₂)
 - Methane (CH₄)
 - Nitrous Oxide (N₂O)
 - Hydrofluorocarbons (HFC)
 - Perfluorocarbons (PFC)
 - Sulphur Hexafluoride (SF₆).

Scope 1 Emissions

- Required for GHG inventories
- Direct GHG emissions from sources owned or controlled by company:
 - ✓ On-site use of gas or other fuels
 - ✓ Fuel for fleet vehicles
 - ✓ Refrigerant leakage in heating, ventilation and air conditioning (HVAC) equipment
 - ✓ Process emissions (if applicable)



Scope 2 Emissions

- Required for GHG inventories
- Indirect GHG Emissions that occur off-site from the production of energy purchased for use at company locations:
 - ✓ Purchased electricity
 - ✓ Purchased steam
 - ✓ Purchased chilled water



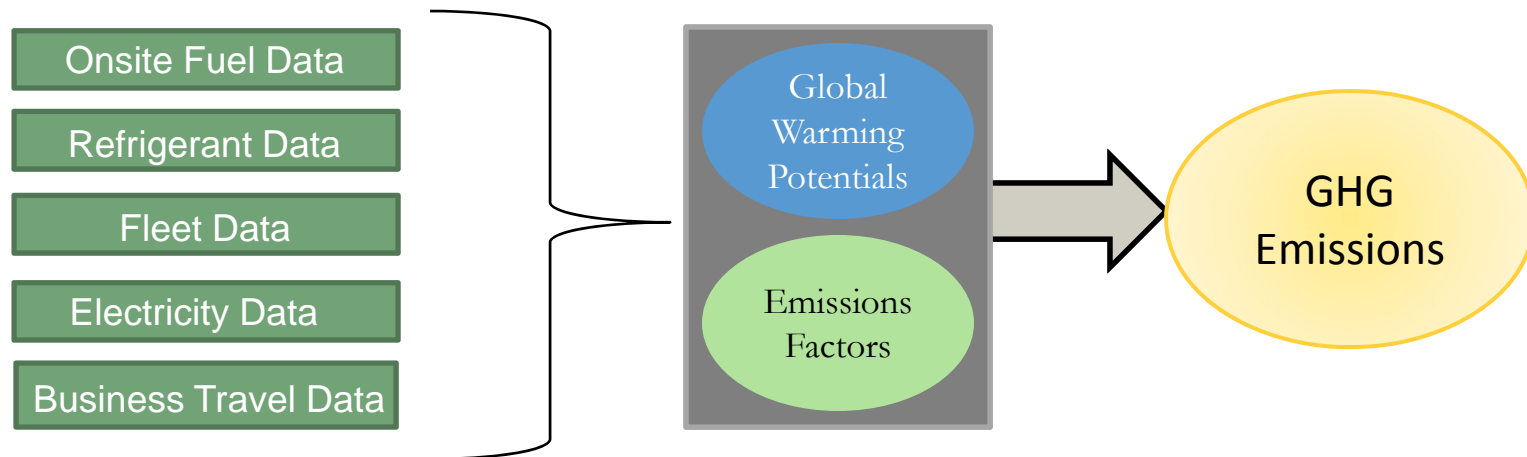
Scope 3 Emissions

- Optional for GHG inventories
- Other indirect emissions:
 - ✓ Employee business travel
 - ✓ Waste disposal
 - ✓ Outsourced activities



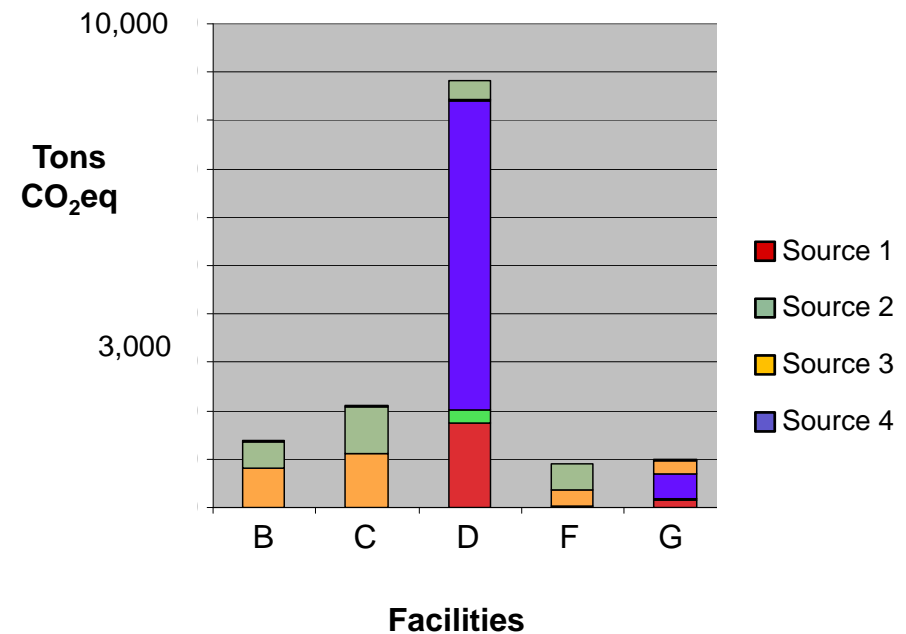
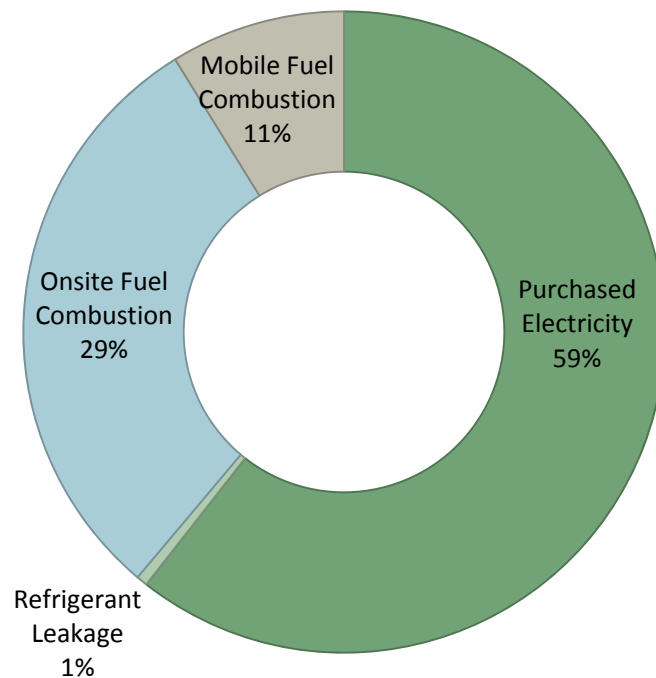
Quantifying GHG Emissions

- Once all the data have been collected, they need to be manipulated to convert energy use into GHG emissions. This is done using simple multiplication with global warming potentials and emission factors.



Reporting GHG Emissions

- After all the calculations are completed, results must be analyzed & categorized to understand what operations have the biggest impact.



Interpret Results

- What do the numbers mean?
- Identify opportunities to:
 - Improve data quality
 - Improve inventory process
 - Reduce emissions
- Define and implement a GHG reduction action plan