

Mission:

*To advance economic prosperity, health and quality of life
in Indiana and beyond.*

PURDUE
UNIVERSITY

MANUFACTURING EXTENSION
PARTNERSHIP

Carbon Footprint & Risk Management

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MEP | Affiliate

Agenda

- **Introduction**
- Defining the Problem
- Comparing Carbon Calculators
- Carbon Mapping Steps
- Keys to Improving
- Conclusion



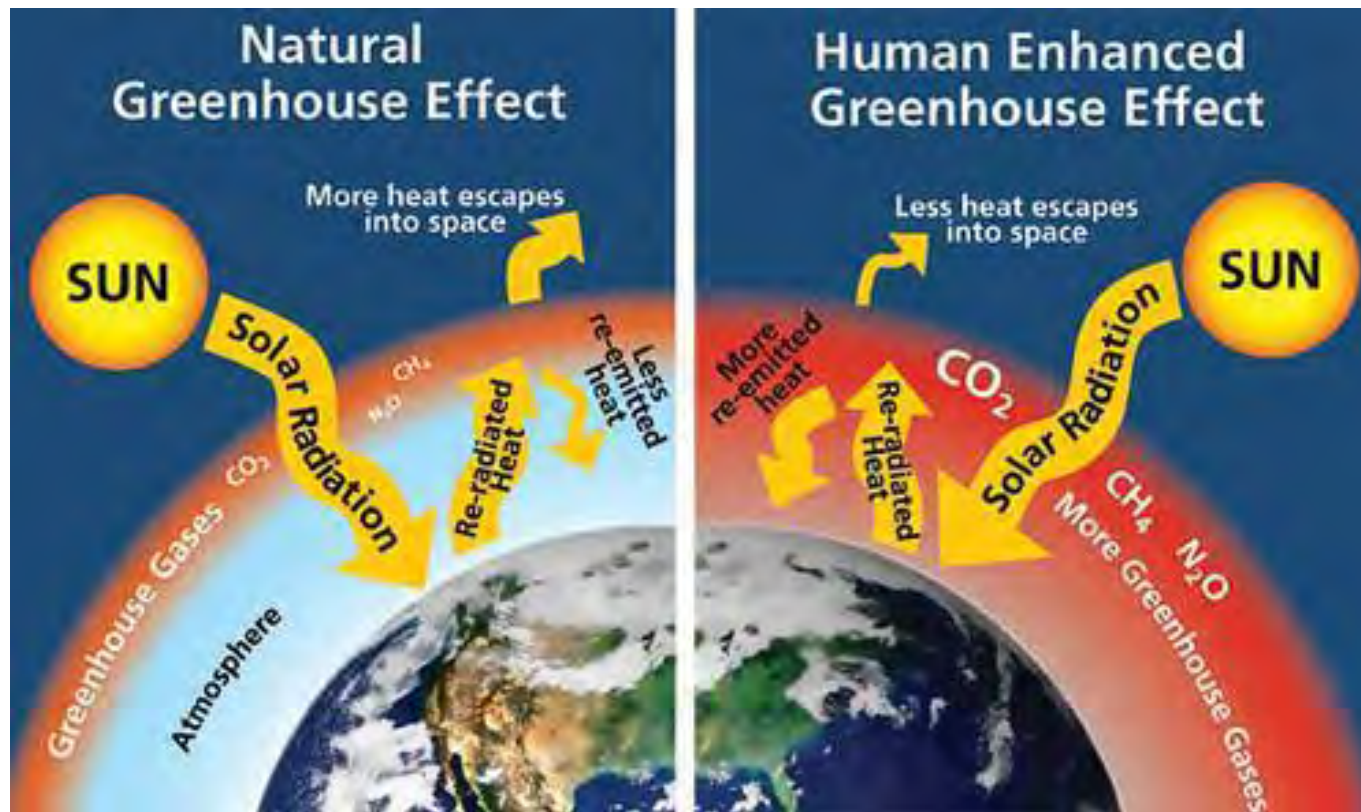
Defining the Problem



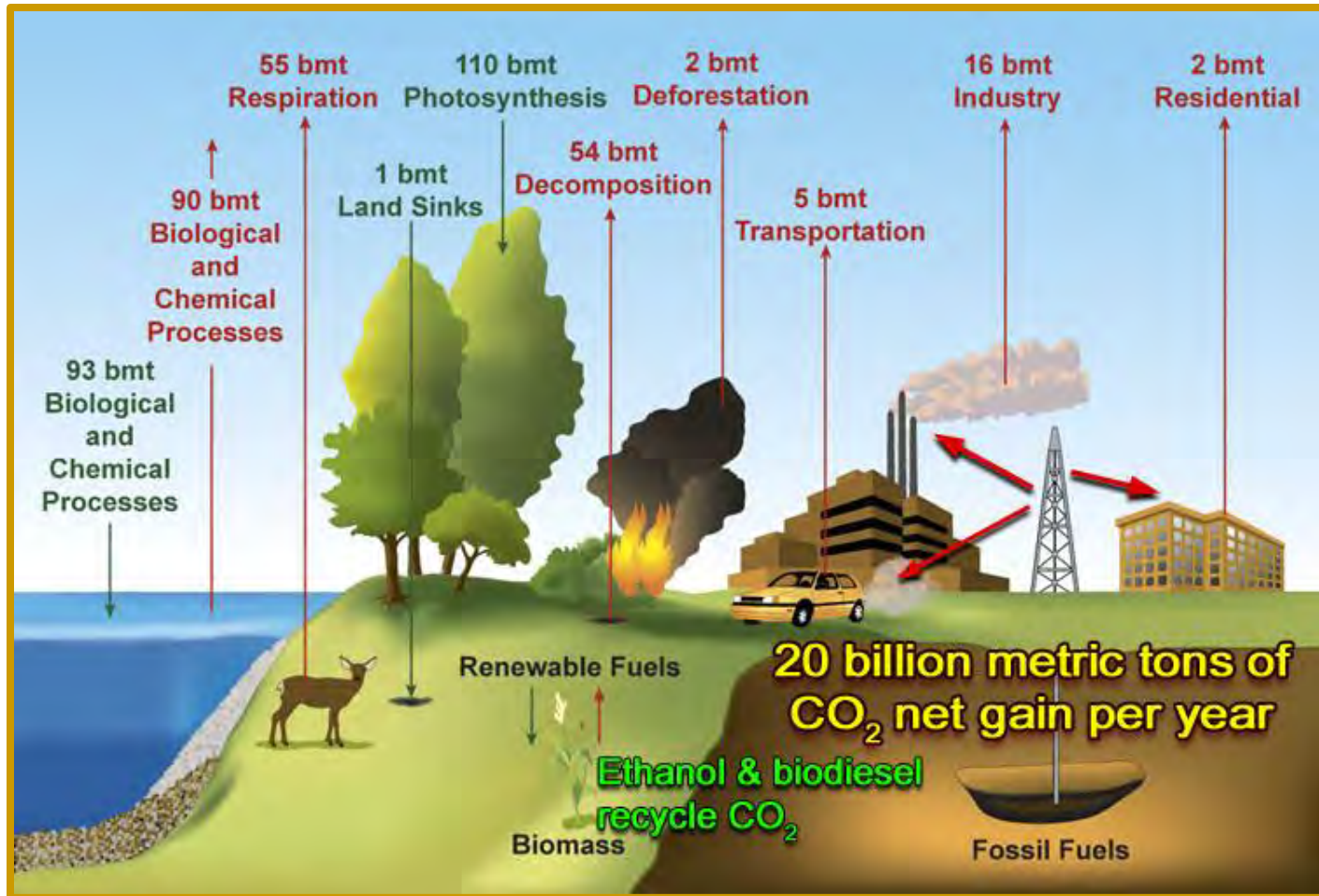
Why are we talking about “**Carbon Footprint**”?



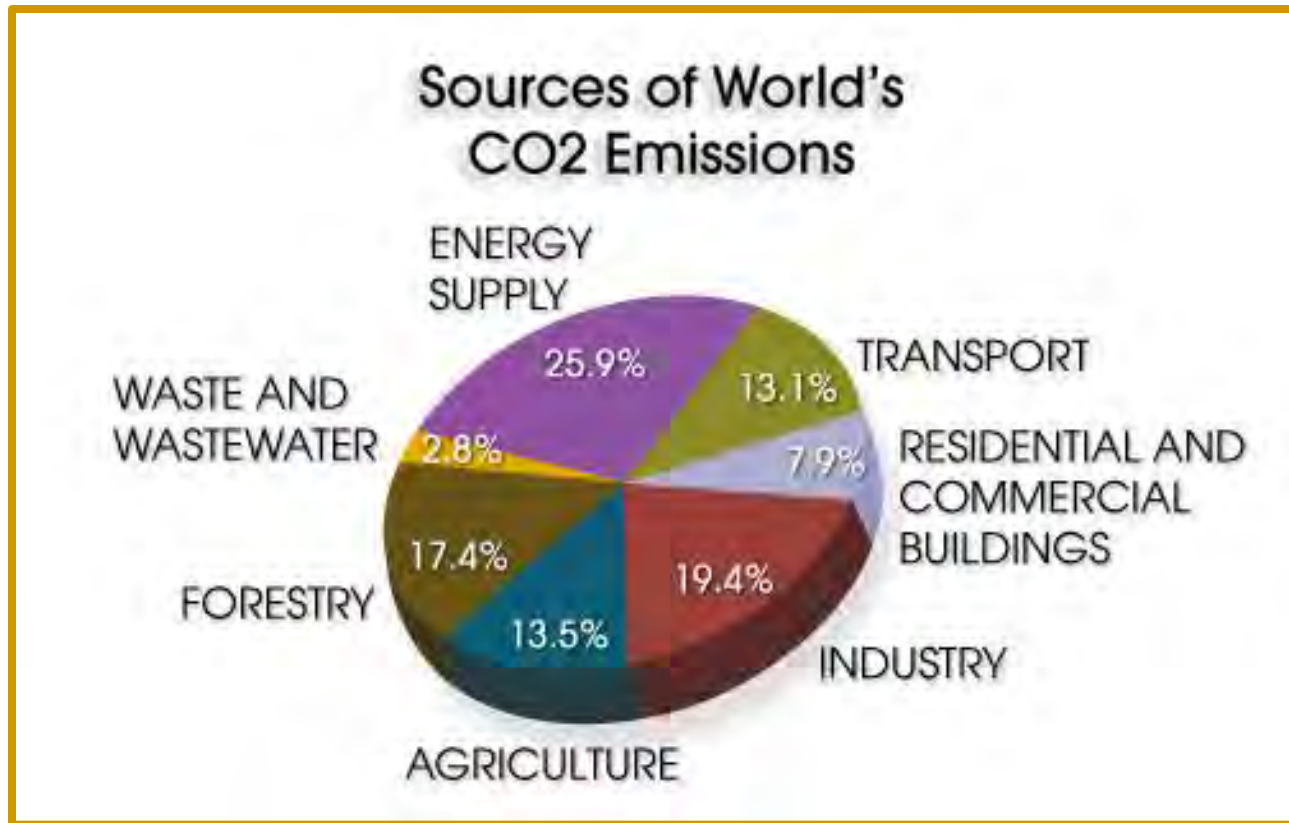
Greenhouse Gases (GHG)



Carbon Sources & Sinks



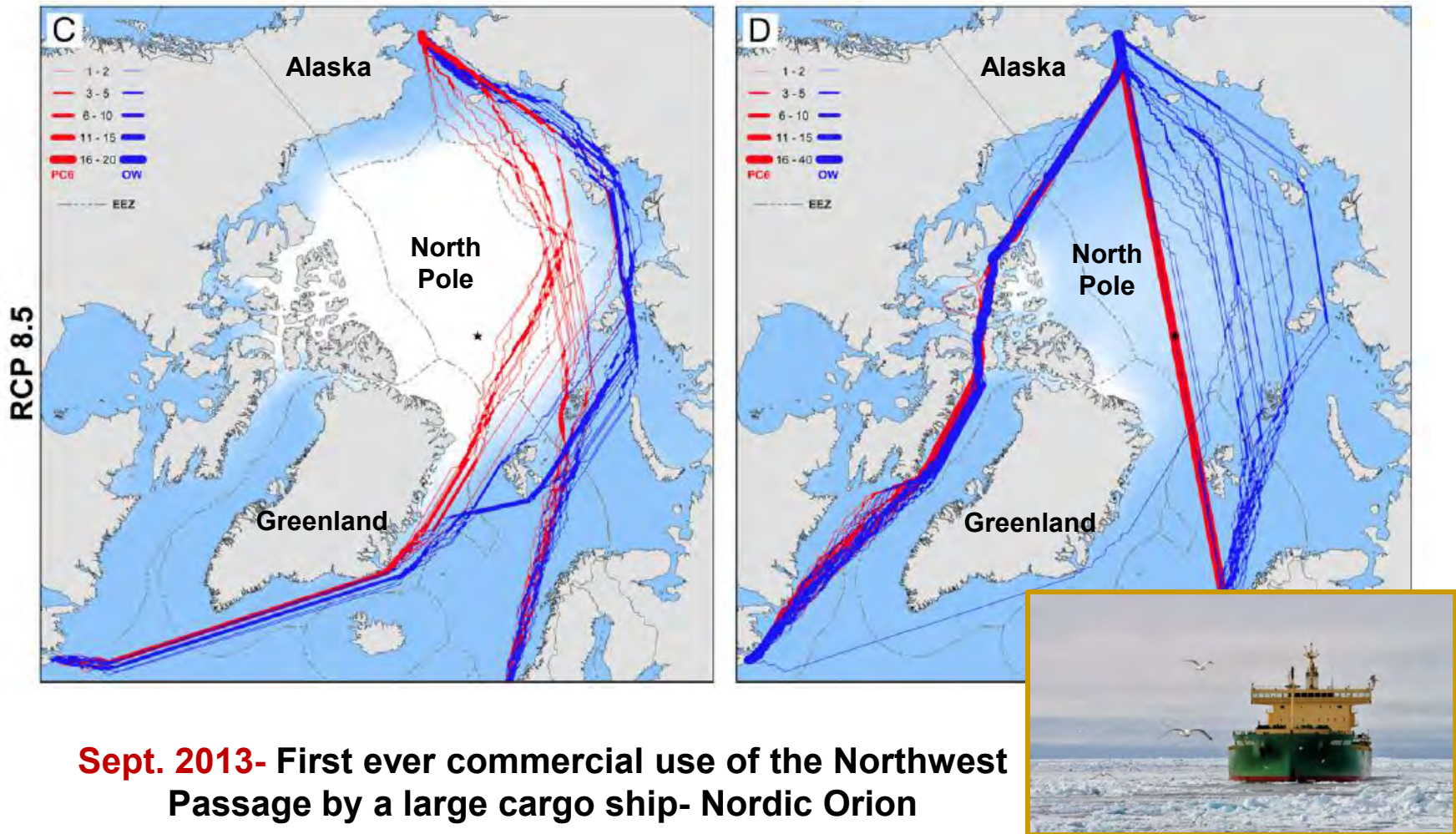
Carbon Sources



Current State – CO₂



Measurable Impacts- 2013



Measurable Impacts- 2013

the state.

Canada

Torrential downpours on June 19th triggered floods that caused billions of dollars in damages across parts of southern Alberta. This was Canada's costliest natural disaster.

Russia

Experienced its warmest November & December since national records began in 1891. Overall, Russia observed its sixth warmest year on record.

experienced its fourth driest year on record.

For the first time since 1958, two tropical systems—Hurricane Manuel (Eastern North Pacific) and Hurricane Ingrid (North Atlantic)—made landfall in Mexico nearly simultaneously on September 15th. Copious rain led to flooding and landslides.

Tropical Storm Chantal

July 7th–10th
Maximum winds - 100 km/hr
Chantal was the fastest-moving tropical cyclone observed in the deep Tropics (south of 20°N) in the Atlantic basin on record (1966–2013).

Atlantic Hurricane Season

Argentina

North and central Argentina were affected by a persistent heat wave during mid-December, causing several locations to observe new maximum, minimum, and mean temperature records for December. The warmth felt throughout the year contributed to 2013 ranking as the second warmest year on record, behind 2012.

In March, Spain received more than triple its monthly average precipitation—the wettest March since national records began in 1947.

Jerusalem
Heavy snow fell during mid-December. Snow accumulations ranged between 30 and 50 cm. This snow storm was unusually early and more intense than usual.

Ghana
Temperatures on March 6th reached 43.0°C in Navrongo, the hottest temperature ever measured in Ghana for any month.

Africa
The southern African countries of Botswana, Namibia, and Angola experienced a large rainfall deficit during much of 2013, causing one of the worst droughts in 30 years.

South Africa
Temperatures rose to 47.3°C on March 4th in Vloedsdrif—the hottest March temperature recorded anywhere in Africa.

Antarctic Sea Ice Extent

It season, the Antarctic reached its second largest minimum sea ice extent during its growth season; the Antarctic sea ice extent reached its largest since records began in 1979.

Parts of southern China experienced one of their most severe heat waves during July and August. More than 300 stations recorded daily maximum temperatures higher than 40°C. Over 40 people died due to the heat.

Cyclone Phailin

October 4th–14th
Maximum winds - 260 km/hr
Phailin was the strongest storm in the North Indian basin since the Odisha Super Cyclone in 1999.

North Indian Ocean Cyclone Season
Below-average activity:
5 storms, 3 cyclones.

Southwest Indian Ocean Cyclone Season
Near-average activity:
10 storms, 7 cyclones.

Typhoon Usagi

September 16th–24th
Maximum winds - 260 km/hr
Usagi made landfall in northern Philippine September 21st, severely damaging the area in the region and causing floods and landslides claimed 30 lives.

Typhoon Haiyan

November 3rd–11th
Maximum winds - 315 km/hr
Haiyan was the strongest record for any basin to the deadliest Philippine over 5,700 people.

Australian Cyclone Season
Below-average activity:
10 storms, 4 cyclones.

Australia
Recorded its warmest year on record. The warmest December–February, 3rd warmest June–August and warmest September–November contributed to the overall record warmth.

New Zealand

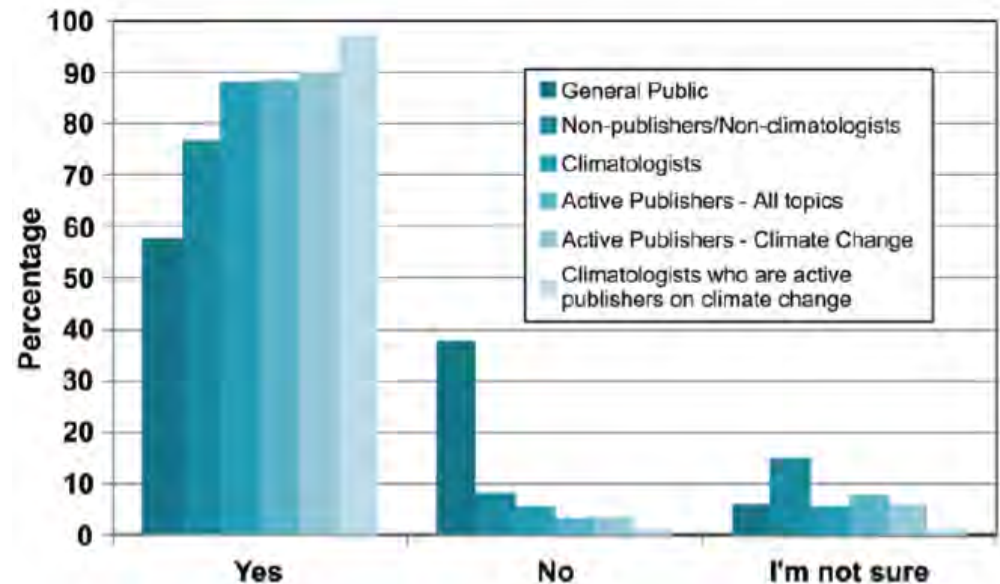
Observed its third warmest year since national records began in 1909. Also, experienced its 4th warmest July and warmest August, resulting in the warmest June–August (winter) period.

South Cyclone
Well-be
5 storms



Scientific Consensus

- **97% of climate scientists are convinced by the evidence of anthropogenic climate change** - NAS report, 2010
- This causal relationship means that humans can influence and possibly reverse climate change



Risk Management



Risk Management

- Manage your business liabilities
 - ❑ Reduce dependency on uncontrollable forces
 - ❑ Minimize risk by reducing processes that are **reliant on cheap/abundant** water or energy
 - ❑ Prepare for increasing insurance rates due to more extreme weather patterns
 - ❑ Adapt to changing business climate
 - ❑ Attract larger investors and customers



Take It Home

- What's your personal carbon footprint?
- Many residential carbon calculators to choose from
- No regulating body, just informational



Carbon Footprint Calculators

Energy usage and carbon emission calculator



- Estimations, not very accurate
- Not all calculators are created equal
- Compares to U.S. average, not global
- Company biases

16.22 TONS CO₂/ YR



Carbon Footprint Calculators

Carbon Footprint Calculator

Language: English (United States) ▾

Like 7,325 people like this. [Sign Up](#) to see what your friends like.


Welcome House Flights Car Motorbike Bus & Rail Secondary **Results**

Your Carbon Footprint:

<input checked="" type="checkbox"/> House	2.13 metric tons of CO ₂ e
<input checked="" type="checkbox"/> Flights	0.18 metric tons of CO ₂ e
<input checked="" type="checkbox"/> Car	0.27 metric tons of CO ₂ e
<input checked="" type="checkbox"/> Motorbike	0.00 metric tons of CO ₂ e
<input checked="" type="checkbox"/> Bus & Rail	0.00 metric tons of CO ₂ e
<input checked="" type="checkbox"/> Secondary	0.36 metric tons of CO ₂ e
Total = 2.95 metric tons of CO₂e	

To offset some or all of your carbon footprint, click the sections you would like to offset in the list above, and click the Offset Now button.

Total To Offset = 2.95 metric tons of CO₂e [Offset Now](#)



- Your footprint is 2.95 metric tons, which equates to 36.86 metric tons per year
- The average footprint for people in United States is 20.40 metric tons
- The average for the industrial nations is about 11 metric tons
- The average worldwide carbon footprint is about 4 metric tons
- The worldwide target to combat climate change is 2 metric tons

If you're using a public computer, or want to try again, you can [clear your carbon footprint data](#)

For ideas on how to reduce your carbon footprint, see the [CO₂ Reduction section](#) of our website.

Why not [sign up for our newsletter](#) to keep informed of other ways you can reduce your carbon footprint?

[< Secondary](#)

- Carbonfootprint.com/calculator
- Actual energy data used
- Specific vehicle & flight info
- Dietary choices
- Consumer choices
- Compares to global targets

36.86 TONS CO₂/ YR



Carbon Footprint Calculators



- coolclimate.berkeley.edu/carboncalculator
- Levels of analysis
- More questions on consumer choices
- Compares to local peers in same zip code (skewed?)

51.4 TONS CO₂/YR

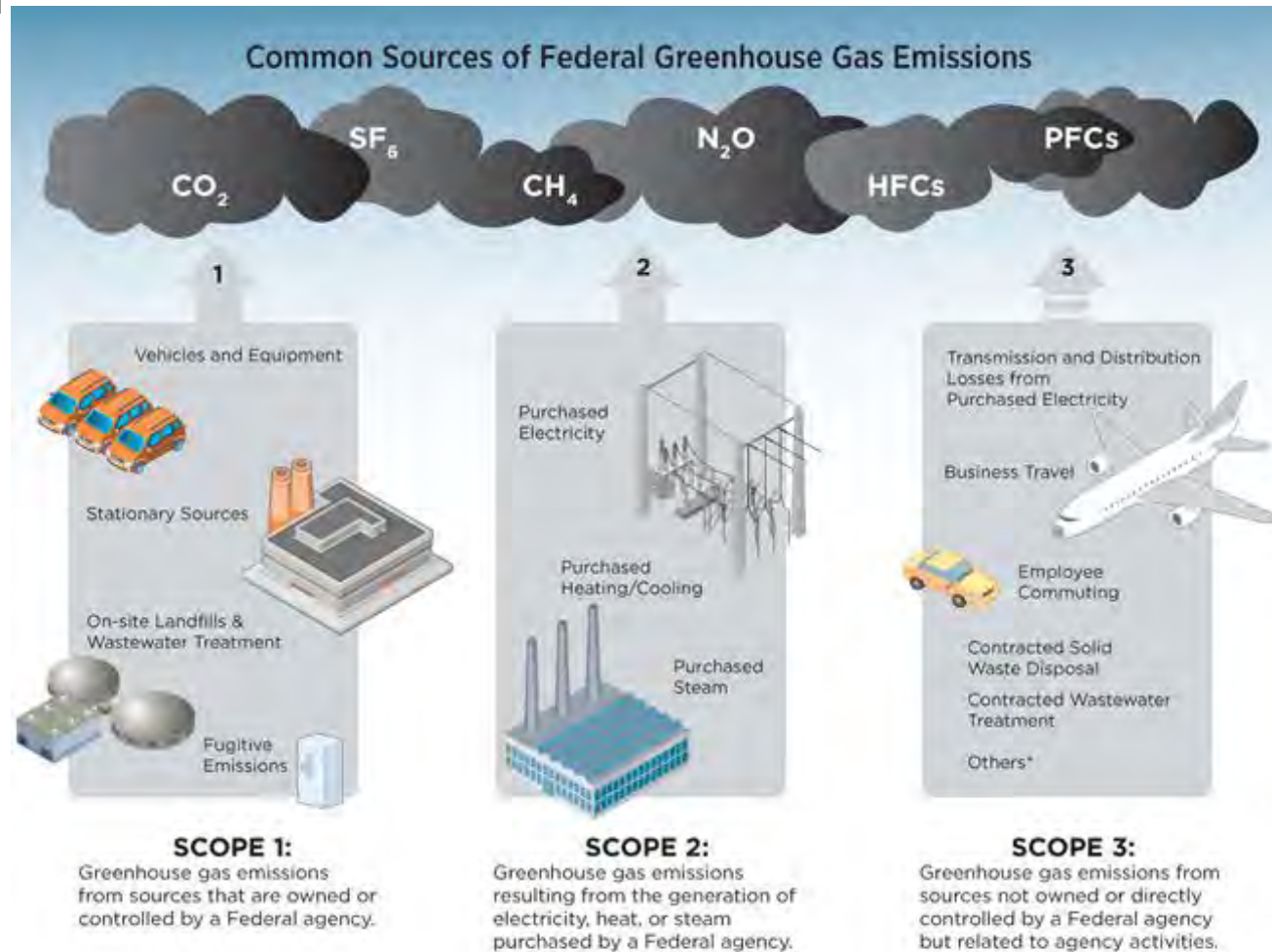


Carbon Footprint for Business

- Established calculation methods
- Based on the methodology of the **Greenhouse Gas Protocol**
- Several reputable bodies overseeing claims
- Much more in depth than personal calculators!



Scope

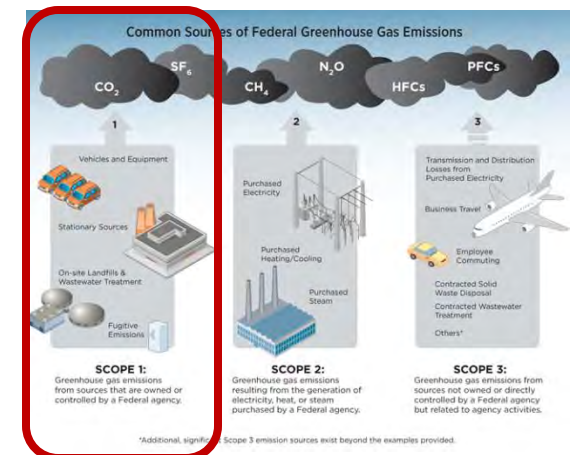


*Additional, significant Scope 3 emission sources exist beyond the examples provided.



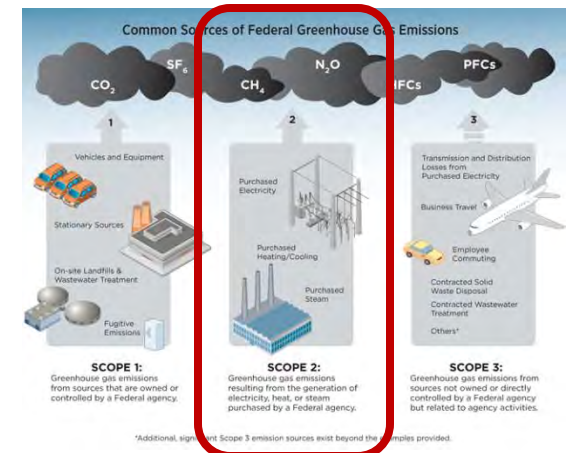
Scope

- **Scope 1:** Includes those emissions that stem from processes which belong to, or occur from the direct control of the organizations (e.g., heating boilers, corporate cars). This scope is **mandatory** for the measurement of carbon footprint



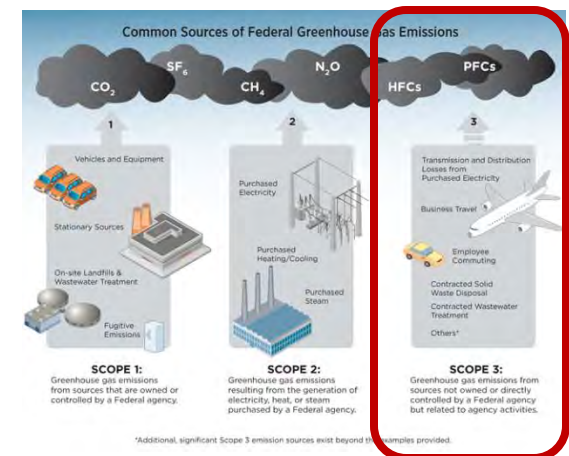
Scope

- **Scope 2:** Includes those emissions that stem from the consumption of electric energy within an organization (e.g., lighting, office equipment). The indirect emissions are often the largest component of total emissions. This scope is **mandatory** for the measurement of the Carbon Footprint

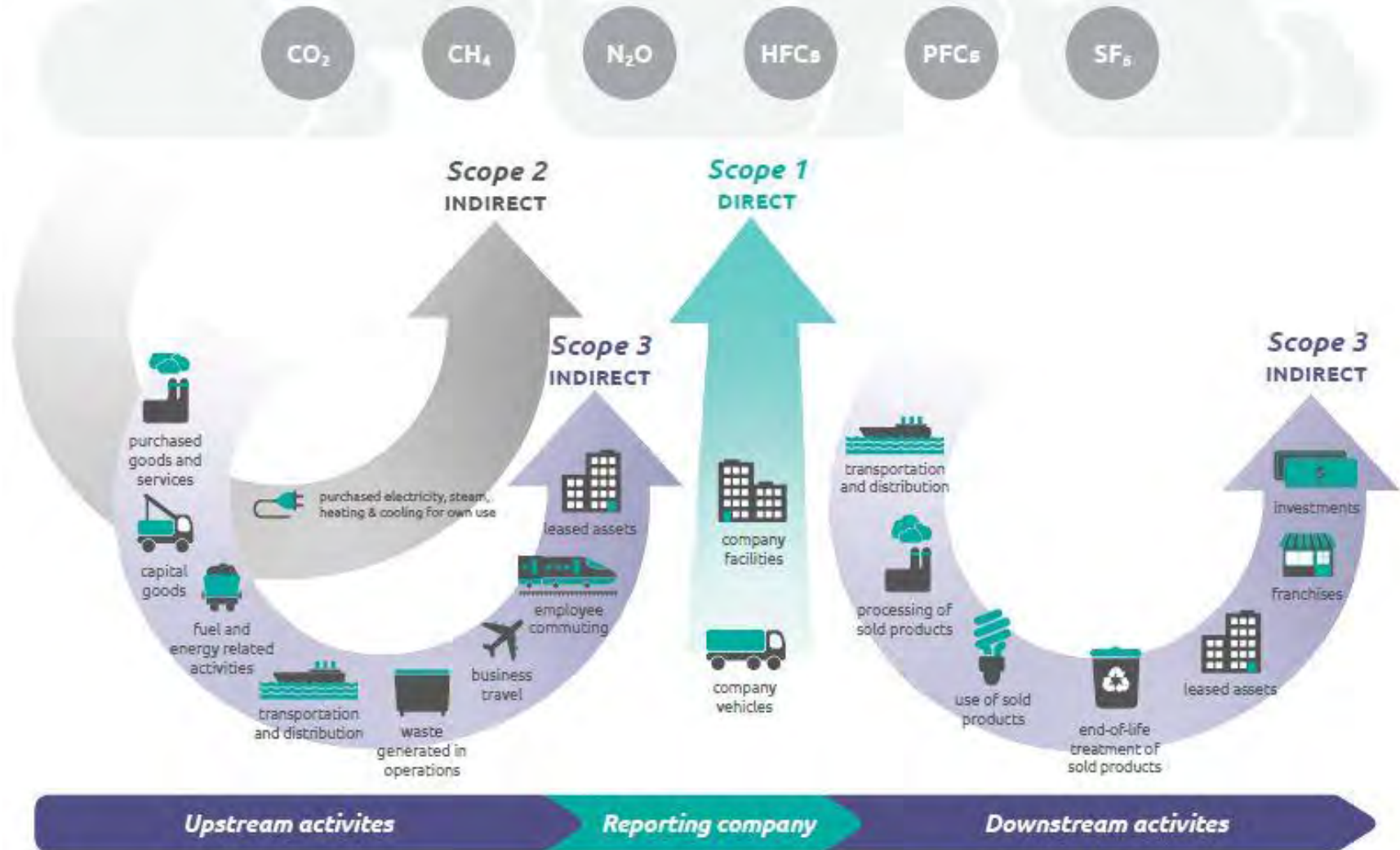


Scope

- **Scope 3:** Includes all emissions that indirectly stem from the operation of the organization (e.g., air travel, emissions from suppliers). This scope is **optional** for the measurement of the Carbon Footprint



Scope



Calculating GHG Emissions

- Two primary methods for calculating:
 1. CO₂ Equivalents
 2. Kilograms as CO₂
 3. Grams Carbon (mostly used in wood products)
- NOT interchangeable
- Check for consistent units



CO₂ CH₄ N₂O HFC PFC SF₆



Calculating GHG Emissions

1. CO₂ equivalents

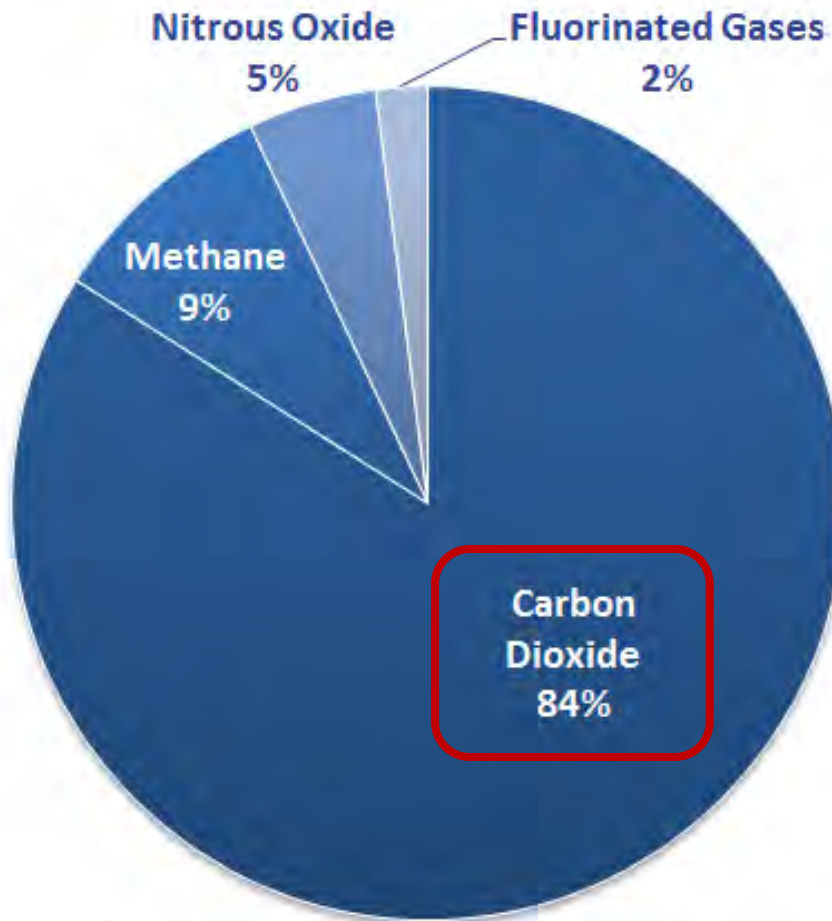
- ❑ Used under Carbon Disclosure Project
- ❑ Most accurate
- ❑ Factors in global warming impact per mole or gram of a given GHG compared to the baseline CO₂



CO₂ CH₄ N₂O HFC PFC SF₆



Global Warming Potential



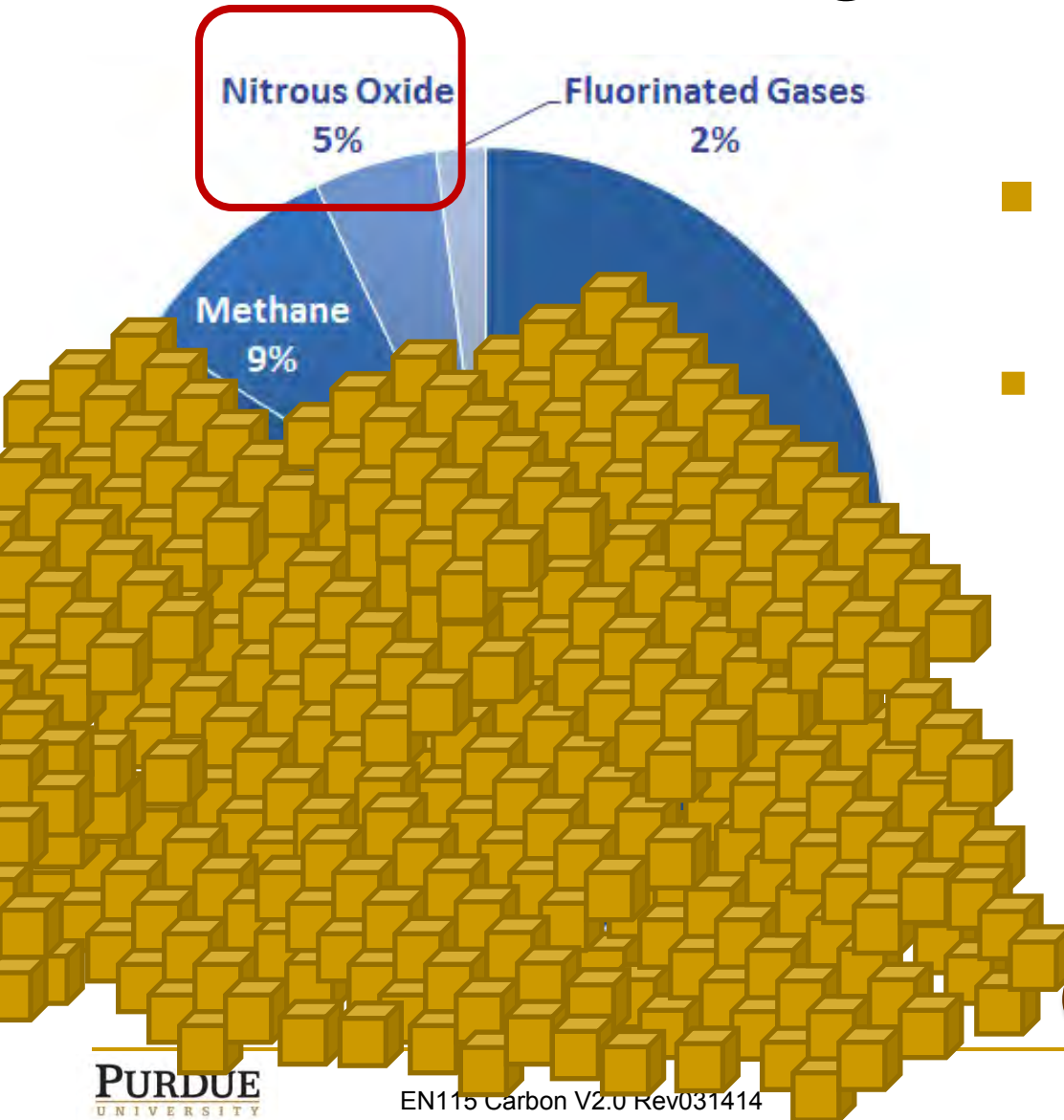
- Carbon Dioxide (CO_2)
- Enters air by burning fossil fuels (coal, nat. gas, oil), solid waste, trees, wood products, some chemical reactions
- Removed when absorbed by plants



Global Warming Potential (GWP) = 1 (Baseline)



Global Warming Potential



- Nitrous Oxide (N₂O)
- Agricultural and industrial activities, burning fossil fuels (coal, natural gas, oil), and solid waste; also an aerosol propellant & anesthesia

GWP = 310



Calculating GHG Emissions

2. Kilograms as CO₂ / emission rate

- ❑ Used for when combustion or decomposition are most prevalent causes
- ❑ Used by EPA Clean Air Act Data & EIA
- ❑ Converts grams of carbonic material to grams of CO₂ using molar mass conversion
- ❑ 100 kg Carbon x (factor) = 366 kg CO₂



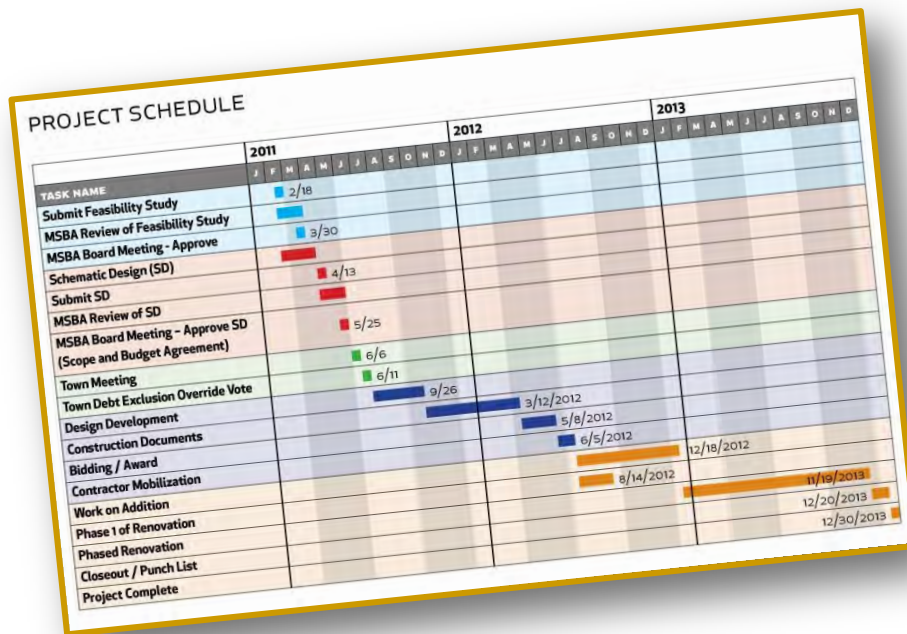
CO₂ CH₄ N₂O HFC PFC SF₆



Getting Started

■ Step 1: Get Organized

- ❑ Form a team
- ❑ Prepare a project schedule
- ❑ Establish regular check-ins
- ❑ Set internal deadlines



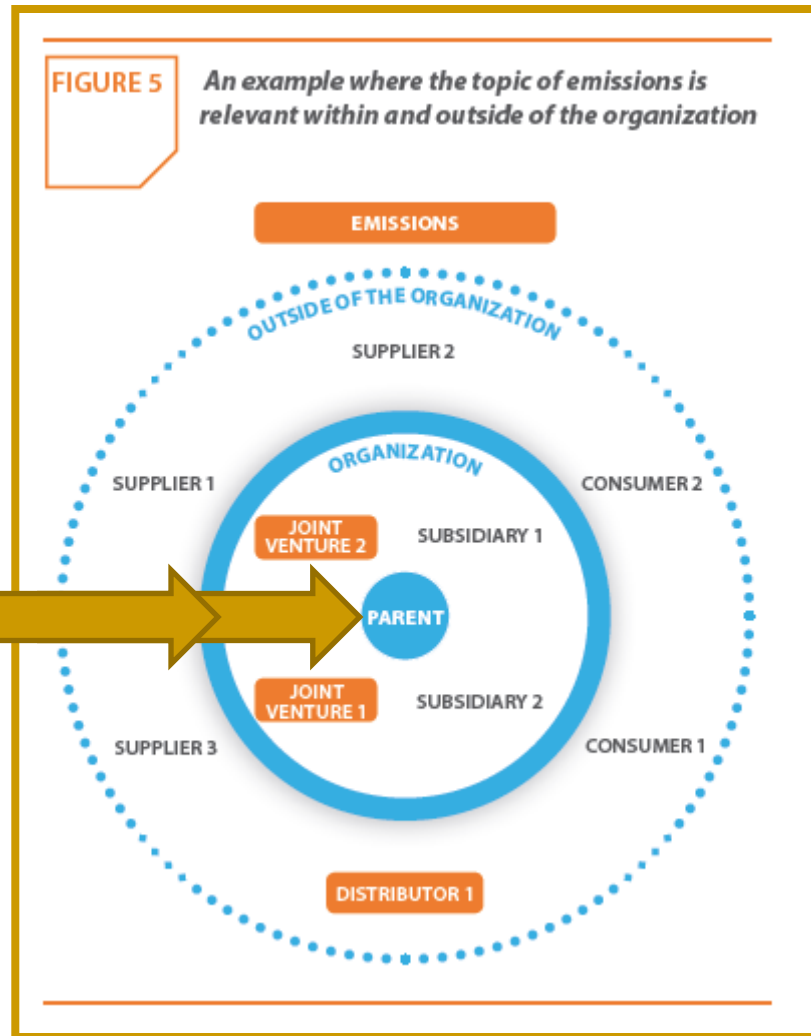
Getting Started



- Choosing a base year
 - ❑ Select a recent year with **most complete** information available
 - ❑ For leased spaces, get data from landlord, or use averages as a last resort: EIA Commercial Buildings Energy Consumption Survey
 - ❑ **Avoid** years with anomalies (low production, new equipment, etc.)



Getting Started



Calculate GHG Emissions

■ Step 2: calculate GHG emissions

- Sources covered by the inventory calculator
- Using the inventory calculator and guidance
- Identifying emission source types and quantifying

CO₂ CH₄ N₂O HFC PFC SF₆



Make a Plan

■ **Step 3: create an inventory management plan**

- ❑ Documenting inventory procedures
- ❑ Inventory management plan
- ❑ Additional IMP tools



Goals and Progress

■ Step 4: set a reduction goal and track progress

- ❑ Annual GHG inventory summary and goal tracking form
- ❑ Setting a GHG reduction goal
- ❑ Resources for reducing GHG emissions
- ❑ Going “carbon neutral”



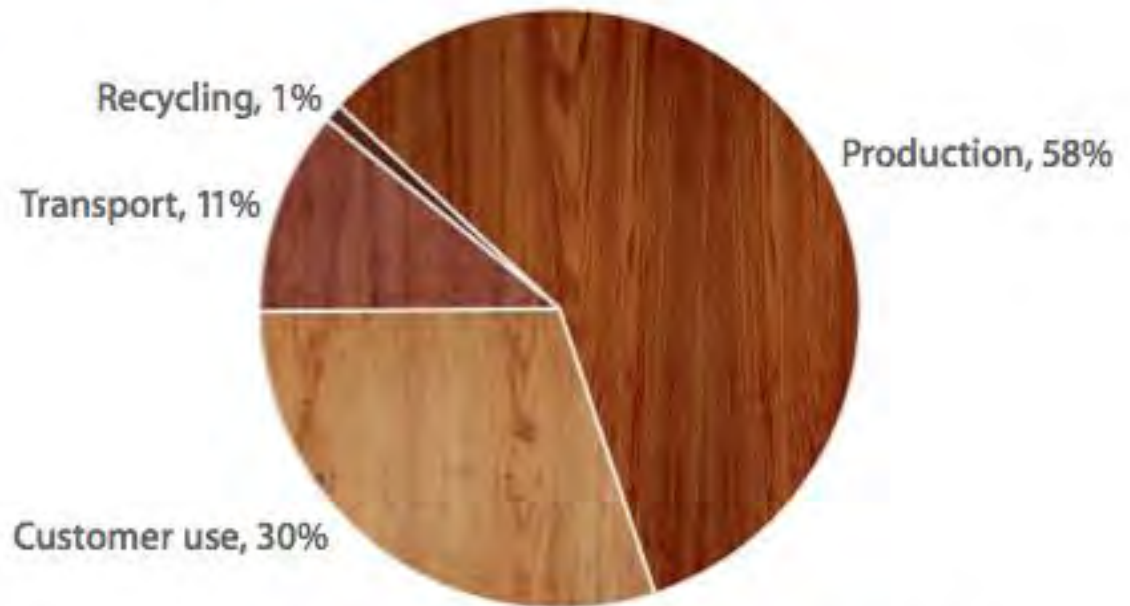
Goals and Progress

ANNUAL GHG INVENTORY SUMMARY AND GOAL TRACKING FORM									
Company Inventory - U.S.		Base Year		Year 2					
		Year		--					
EMISSIONS - Annual CO ₂ -eq. (metric tons)									
Direct Emissions									
Stationary Combustion Sources									
Mobile Combustion Sources									
Refrigeration / AC Equip. Use									
Process / Fugitive (specify source):									
Indirect Emissions									
Total Direct Emissions		0		0					
Indirect Emissions									
Purchased and Used Electricity									
Purchased and Used Steam									
Purchased and Used Hot Water									
Purchased and Used Chilled Water									
Total Indirect Emissions		0		0					
Optional Emissions (specify source):									
Total Mobile - Biomass CO ₂									
Total Indirect - Biomass CO ₂									



Who is Tracking Already?

Greenhouse Gas Emissions for iPad (Wi-Fi + 3G model)



Total greenhouse gas emissions: 130 kg CO₂e



Goal Achievers



■ Caterpillar Inc.

- ❑ Pledges to reduce total global GHG emissions by **3%** from 2006 to 2015
- ❑ Initial goal: reduced global GHG emissions by **28% per dollar** revenue from 2002 to 2006



Goal Achievers

Raytheon

- Raytheon Company

- Pledges to reduce total U.S. GHG emissions by **10%** from 2008 to 2015
- Initial goal: reduced U.S. GHG emissions by **38% per dollar** revenue from 2002 to 2008



Goal Setters



- KOHL'S department stores
 - ❑ Pledged to achieve **net zero** emissions by 2010 and maintain that level through 2012
- Cummins Inc.
 - ❑ Pledged to reduce global GHG emissions by **25%** per dollar revenue from 2005 to 2010



Supply Chain



Emerging Trends in Managing Supply Chain GHG Emissions



Conclusion

CO₂ = \$\$\$

- Carbon emissions tracking is on the rise
- Optional today, but driven by consumer and customer demands
- **Measuring & tracking** can lead to significant reductions in emissions, energy use, and **operational costs**
- Get started this year by establishing a baseline
- Increase competitive edge, and save money!



Thank you!



TECHNICAL ASSISTANCE PROGRAM

**Purdue TAP's mission is to help Indiana companies to succeed.
For more information about other ways that Purdue TAP can assist
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