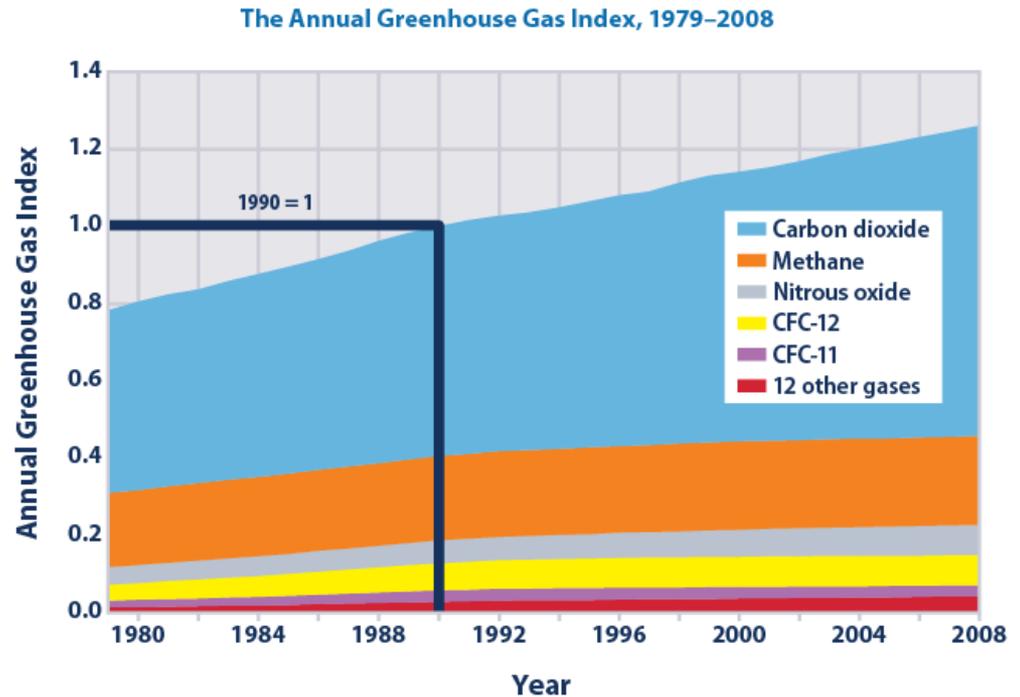
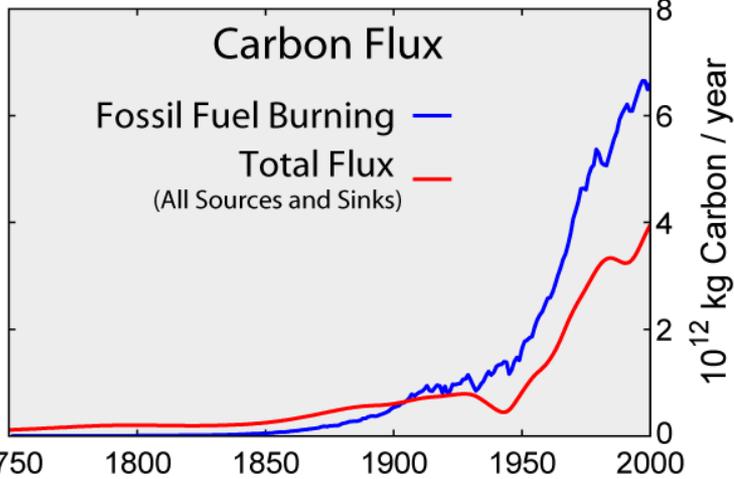
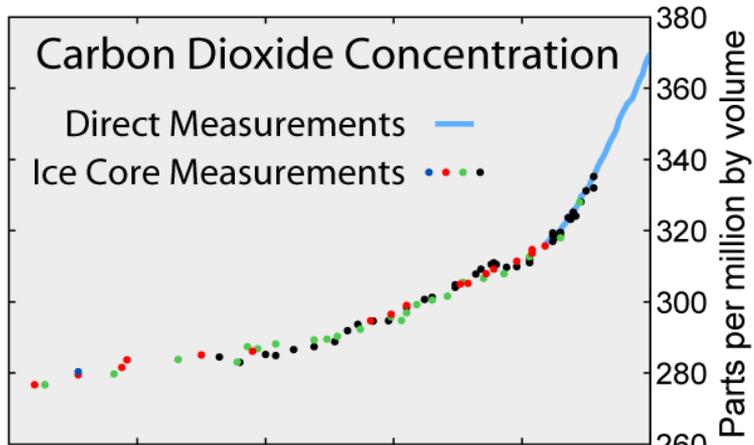


Why CO₂?



Data source: NOAA (National Oceanic and Atmospheric Administration), 2009. The NOAA Annual Greenhouse Gas Index. Accessed April 2009. www.esrl.noaa.gov/gmd/aggl.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climatechange/science/indicators.

Your Breakfast Footprint



Date: October 19, 2012

Choose one item from each category

Cereal

Cheerios

Frosted Mini-Wheats

Milk

Horizon Organic

Giant Brand

Fruit

Fresh Strawberries

Fresh Raspberries

Juice

Orange Juice

Apple Juice

Carbon Cost*

lbs. of CO₂



Your Breakfast Footprint

Assumptions

What values do we need to search for and/or determine

- All items are produced or packaged at a known facility prior to shipping.

Find the mileage from origin to Shippensburg.

- All products are transported by diesel burning semis. Each produces 22.27 lbs. of CO₂ per gallon of fuel consumed and averages 5.20 miles per gallon.

Calculate the total number of gallons needed to transport your breakfast items.

- All items travel in 3,200 ft³ semi-tractor trailers.

Approximate the portion of a trailer your breakfast would fill.

Combine values in a meaningful way



Your Breakfast Footprint



Date: October 19, 2012

Choose one item from each category

Cereal	Origin*	Miles**	Size (ft ³)	Carbon Cost ⁺
Cheerios	Buffalo, NY			lbs. of CO ₂
Frosted Mini-Wheats	Lancaster, PA			lbs. of CO ₂
Milk				
Horizon Organic	Allentown, PA			lbs. of CO ₂
Giant Brand	Carlisle, PA			lbs. of CO ₂
Fruit				
Fresh Strawberries	Oxnard, CA			lbs. of CO ₂
Fresh Raspberries	Biglerville, PA			lbs. of CO ₂
Juice				
Orange Juice	Lake Wales, FL			lbs. of CO ₂
Apple Juice	Aspers, PA			lbs. of CO ₂

- * "Origin" defined to be location of final processing/packing facility.
- ** Miles from origin to Shippensburg, PA according to Google Maps
- + Assume all items travel in 3,200 ft³ semi-tractor trailer



Basic Footprint Math



Carbon footprint of one box of Cheerios

Assuming the following:

- They are processed 268 miles away
- The truck transporting the Cheerios
 - gets 5.20 miles per gallon
 - burns 22.27 lbs. of CO₂ per gallon
 - has a 3,200 ft³ trailer.
- The volume of the box is .17 ft³



$$\frac{268 \text{ miles}}{5.20 \frac{\text{miles}}{\text{gallon}}} = 51.54 \text{ gallons of gas needed for the trip}$$



$$51.54 \text{ gallons} \cdot 22.27 \frac{\text{lbs}}{\text{gallon}} = 1147.76 \text{ lbs of CO}_2 \text{ emitted during the trip}$$



$$1147.76 \text{ lbs} \cdot \frac{0.17 \text{ ft}^3}{3200 \text{ ft}^3} = 0.0610 \text{ lbs}$$

Is the CO₂ “cost” of one box of Cheerios



Breakfast Footprint



Date: October 19, 2012

Choose one item from each category

Cereal	Origin*	Miles**	Size (ft ³)	Carbon Cost ⁺
Cheerios	Buffalo, NY	268	0.17	0.0610 lbs. of CO ₂
Frosted Mini-Wheats	Lancaster, PA	80	0.17	0.0182 lbs. of CO ₂
Milk				
Horizon Organic	Allentown, PA	120	0.10	0.0161 lbs. of CO ₂
Giant Brand	Carlisle, PA	20	0.10	0.0027 lbs. of CO ₂
Fruit				
Fresh Strawberries	Oxnard, CA	2633	0.08	0.2819 lbs. of CO ₂
Fresh Raspberries	Biglerville, PA	20	0.02	0.0005 lbs. of CO ₂
Juice				
Orange Juice	Lake Wales, FL	1005	0.10	0.1345 lbs. of CO ₂
Apple Juice	Aspers, PA	25	0.10	0.0033 lbs. of CO ₂

* "Origin" defined to be location of final processing/packing facility.

** Miles from origin to Shippensburg, PA according to Google Maps

+ Assume all items travel in 3,200 ft³ semi-tractor trailer



The smallest Breakfast Footprint



Analysis

- What did you learn from this model?
- What improvements, if any, should be made to this model?
- How portable is this model?
- Is your breakfast footprint big? (group discussion)

Is YOUR footprint BIG?

Identify a group of trees to offset your group's breakfast footprint.

(Assume all trees will survive the year)

Calculate the CO₂ sequestered by this collection of trees on a daily basis.



Tree	#	Type	Age	C seq./year
Maple	1	H/M	20	
Walnut	3	H/F	25	
Elm	1	H/F	10	
Scotch Pine	1	C/S	15	
		Total CO ₂ /year		
		Total CO ₂ /day		



Is YOUR footprint BIG?

Identify a group of trees to offset your group's breakfast footprint.

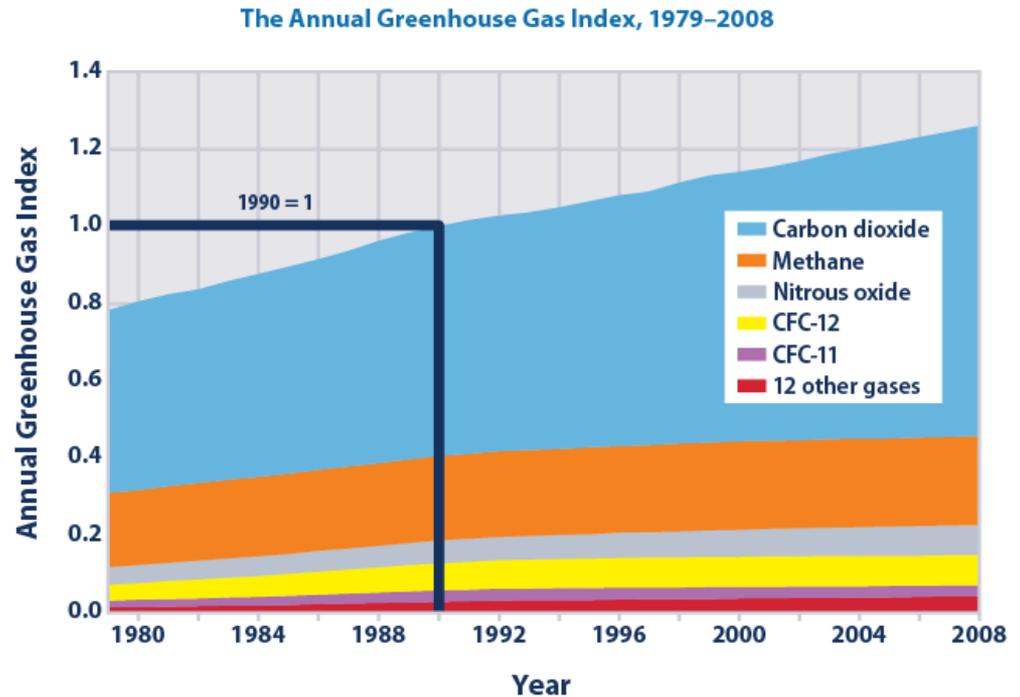
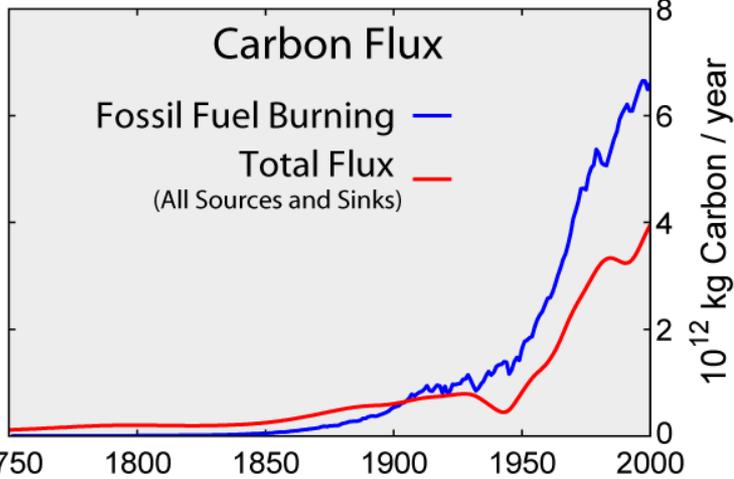
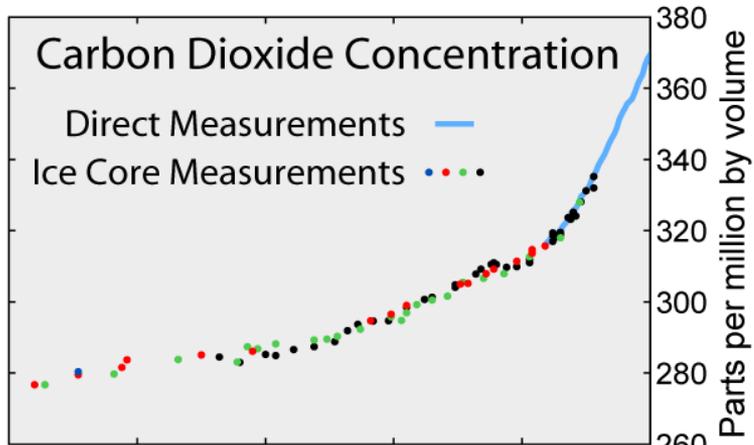
(Assume all trees will survive the year)



Tree	#	Type	Age	C seq./year
Maple	1	H/M	20	23.2 lbs.
Walnut	3	H/F	25	3*53.1 lbs.
Elm	1	H/F	10	19.3 lbs.
Scotch Pine	1	C/S	15	5.3 lbs.
		Total CO2/year		760.1 lbs.
		Total CO2/day		2.08 lbs.



Think BIG



Data source: NOAA (National Oceanic and Atmospheric Administration), 2009. The NOAA Annual Greenhouse Gas Index. Accessed April 2009. www.esrl.noaa.gov/gmd/aggl.

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Is 1% a BIG number?

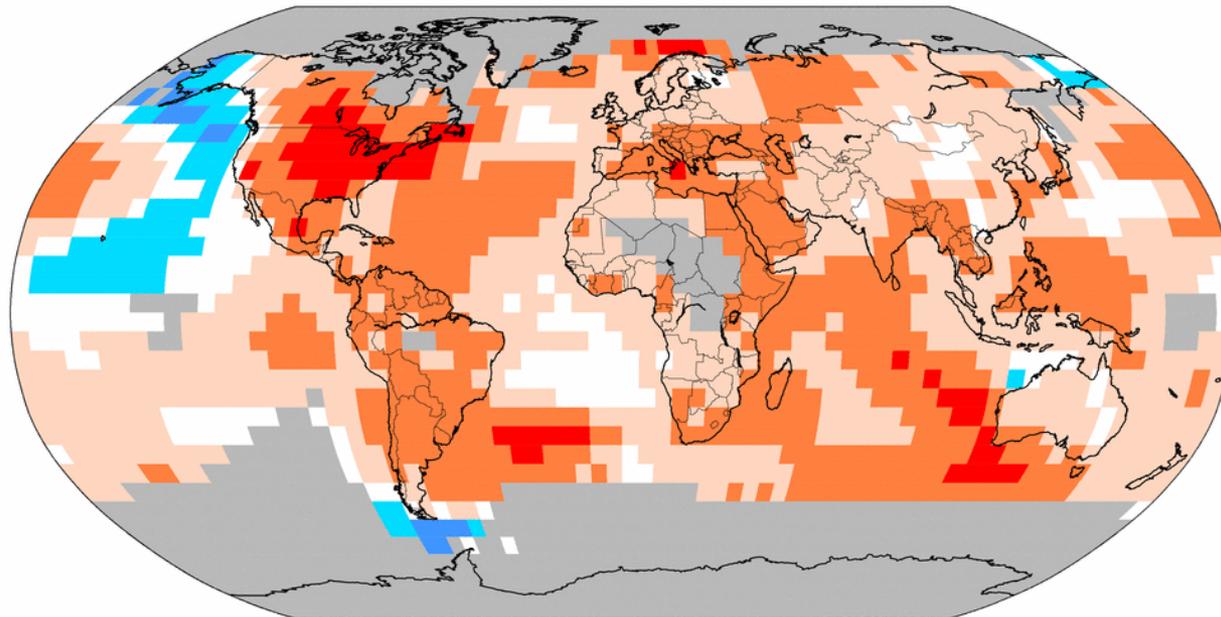
September	Anomaly		Rank (out of 133 years)	Records		
	°C	°F		Year(s)	°C	°F
Global						
Land	$+1.02 \pm 0.25$	$+1.84 \pm 0.45$	3 rd Warmest	Warmest: 2009	+1.06	+1.91
			131 st Coolest	Coollest: 1912	-0.79	-1.42
Ocean	$+0.55 \pm 0.04$	$+0.99 \pm 0.07$	2 nd Warmest	Warmest: 2003	+0.58	+1.04
			132 nd Coolest	Coollest: 1912	-0.46	-0.83
			Ties: 1997			
Land and Ocean	$+0.67 \pm 0.11$	$+1.21 \pm 0.20$	1 st Warmest	Warmest: 2005, 2012	+0.67	+1.21
			133 rd Coolest	Coollest: 1912	-0.55	-0.99
			Ties: 2005			
Northern Hemisphere						
Land	$+1.04 \pm 0.26$	$+1.87 \pm 0.47$	3 rd Warmest	Warmest: 2005	+1.18	+2.12
			131 st Coolest	Coollest: 1912	-0.93	-1.67
Ocean	$+0.61 \pm 0.04$	$+1.10 \pm 0.07$	4 th Warmest	Warmest: 2003	+0.67	+1.21
			130 th Coolest	Coollest: 1912	-0.56	-1.01
Land and Ocean	$+0.77 \pm 0.15$	$+1.39 \pm 0.27$	2 nd Warmest	Warmest: 2005	+0.83	+1.49
			132 nd Coolest	Coollest: 1912	-0.70	-1.26

Global Changes

Land & Ocean Temperature Percentiles Jan–Sep 2012

NOAA's National Climatic Data Center

Data Source: GHCN–M version 3.2.0 & ERSST version 3b




Record
Coldest


Much
Cooler than
Average


Cooler than
Average


Near
Average


Warmer than
Average


Much
Warmer than
Average


Record
Warmest



“Frankenstorm”

