

Being mindful: Your Carbon Footprint



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What do you
already know about
carbon footprints?



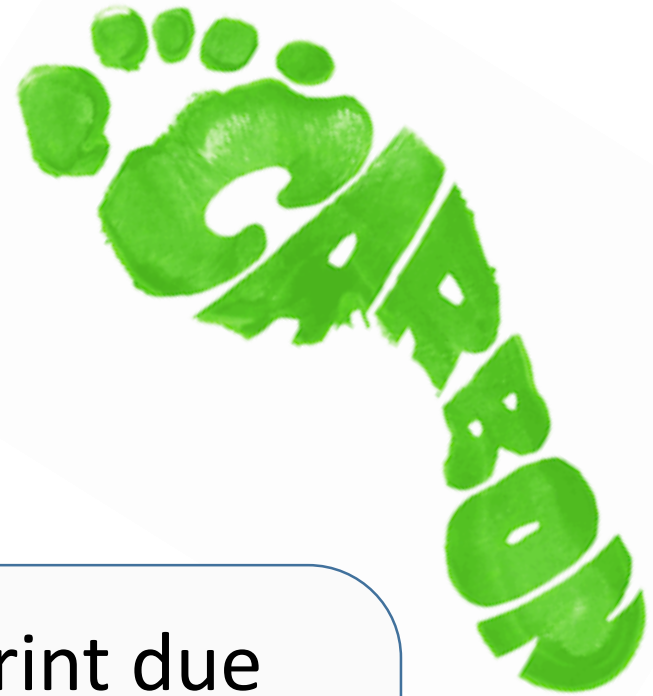
What is the difference between expressing carbon footprints as CO₂ and CO₂e?



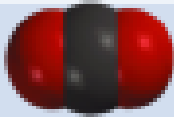

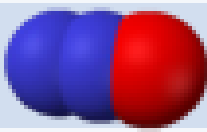

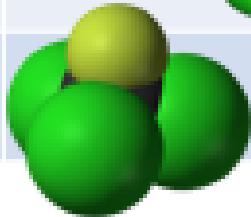
What is the difference between expressing carbon footprints as CO₂ and CO₂e?

CO₂ is the carbon footprint due only to the greenhouse gas CO₂.

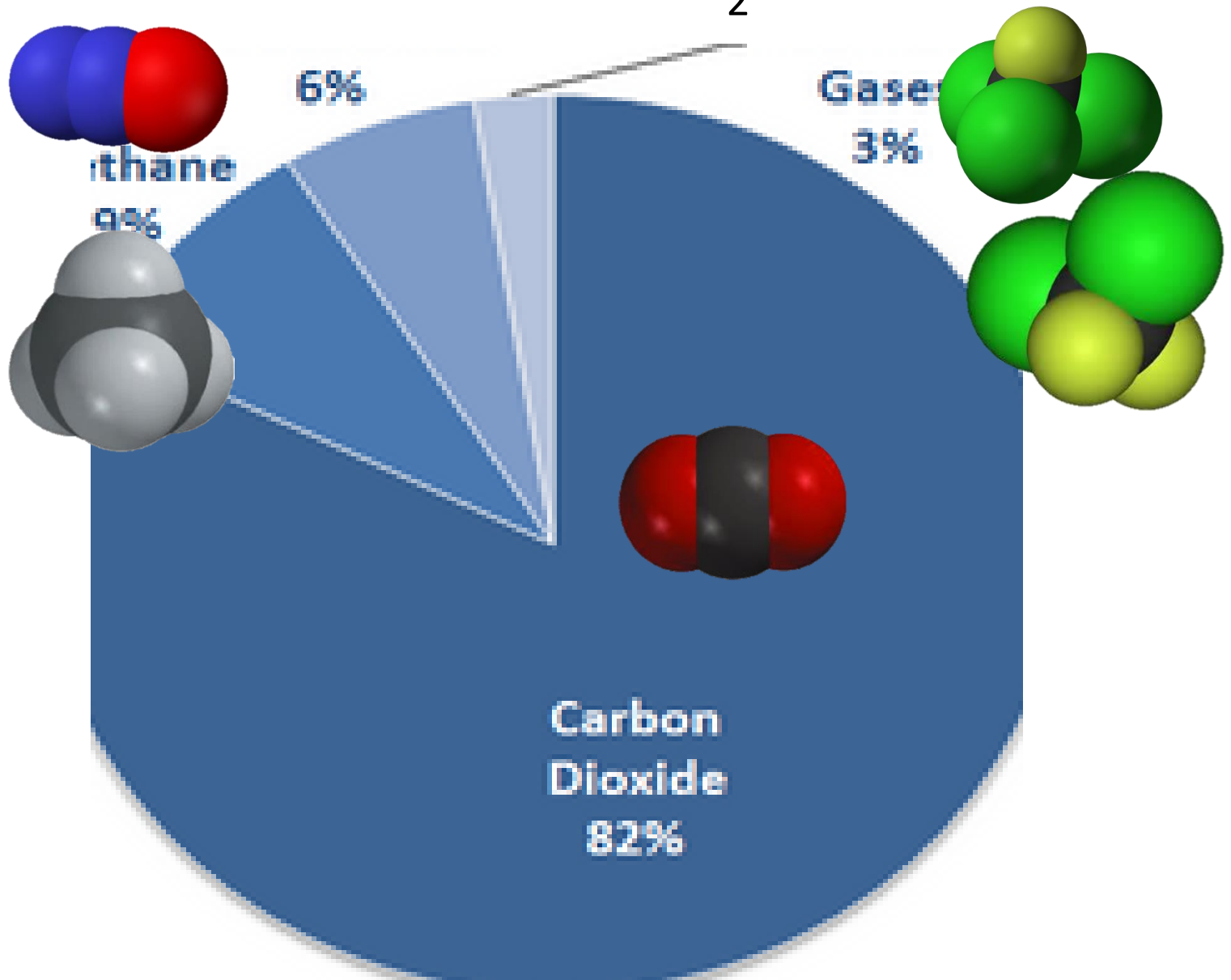
CO₂e includes the impact of all greenhouse gases, not just CO₂.



Greenhouse Gases

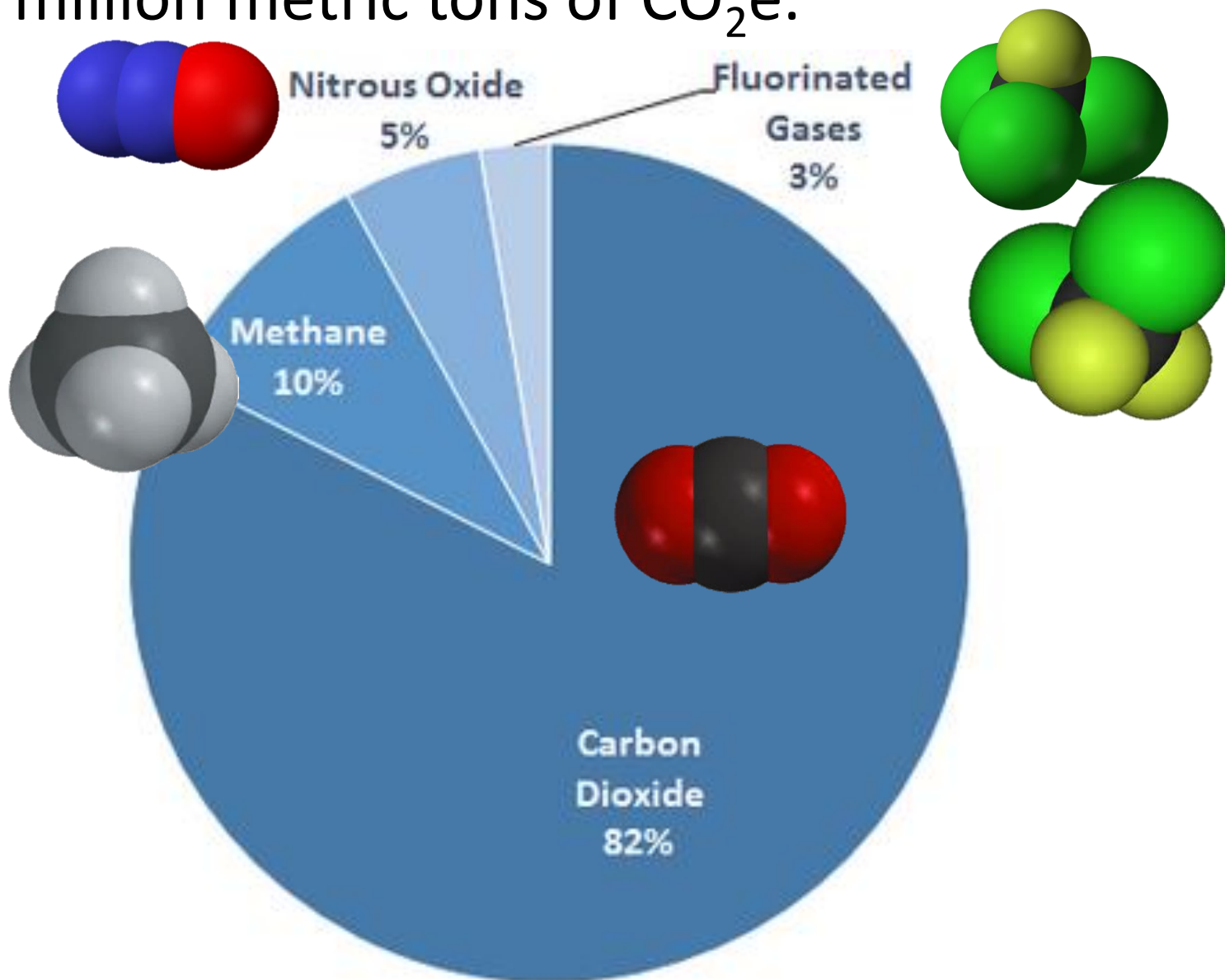
		GWP	Lifetime
CO ₂		1	50-200 years
CH ₄		25	12 years
N ₂ O		298	114 years
CFC-11		4750	45 years
CFC-12		10,900	100 years

2012 U.S. greenhouse gas emissions totaled 6,526 million metric tons of CO₂e.



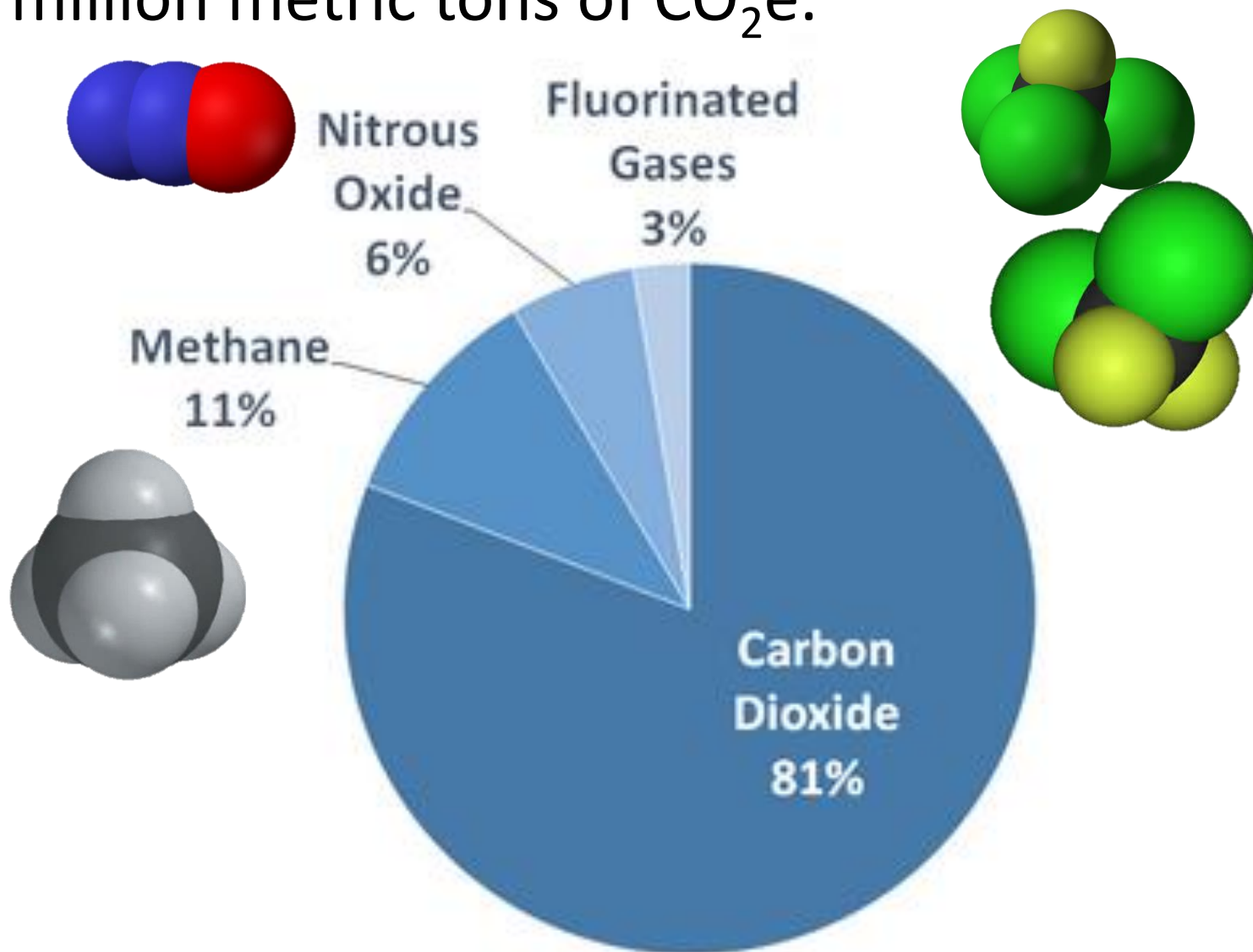
United States Environmental Protection Agency

2013 U.S. greenhouse gas emissions totaled 6,673 million metric tons of CO₂e.



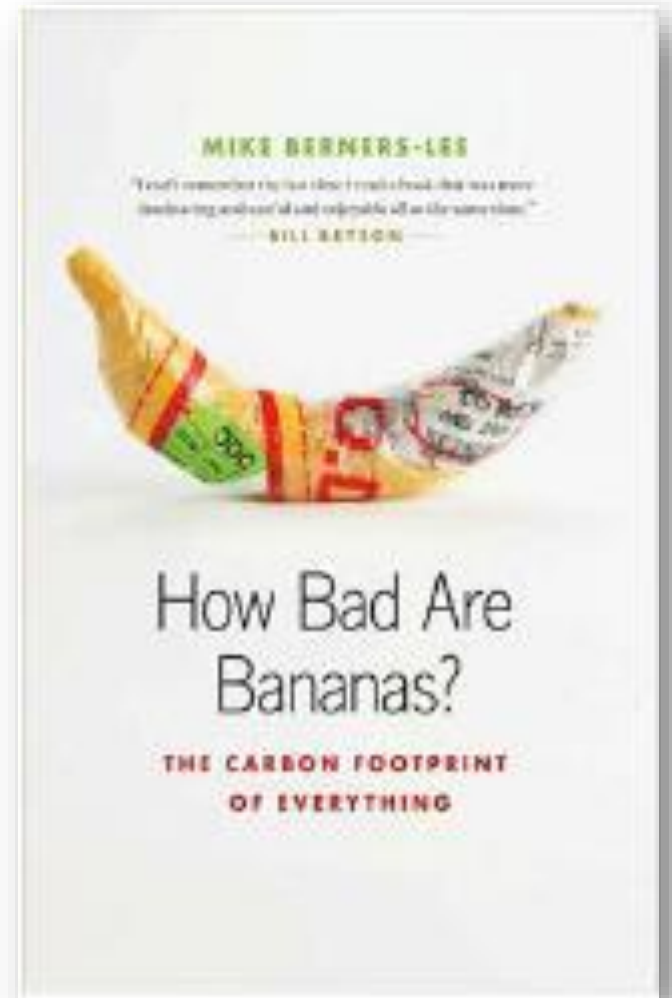
United States Environmental Protection Agency

2014 U.S. greenhouse gas emissions totaled 6,870 million metric tons of CO₂e.





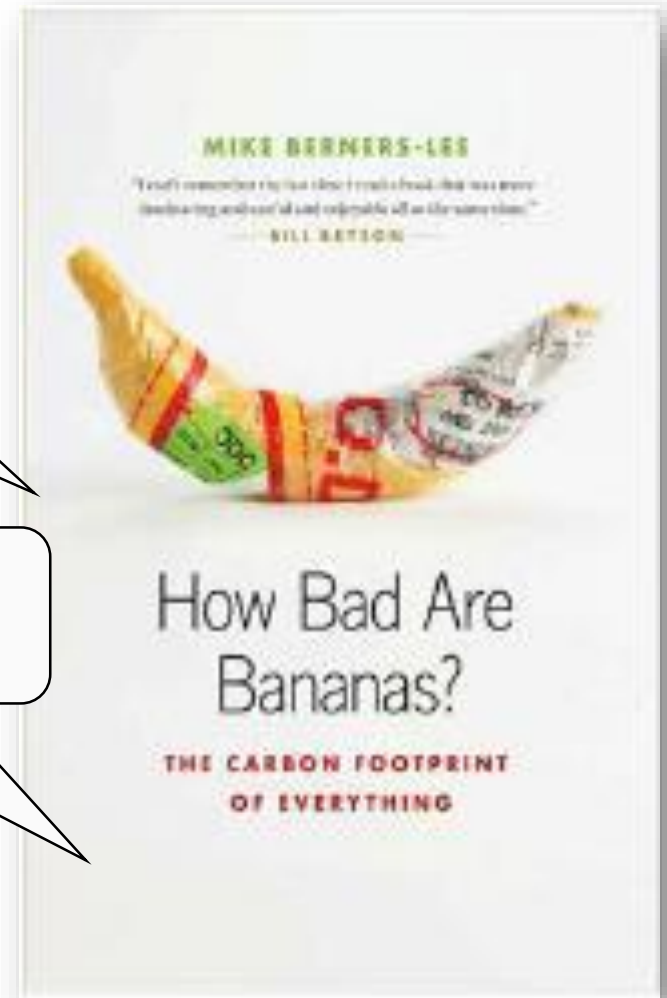
Questions ...?



Carbon footprint

A metaphor

A shorthand



Rank these four items by their carbon footprint

- A mug of hot black coffee
- A diaper (reusable, line-dried)
- Sending a text
- A plastic bag from a supermarket

Rank these four items by their carbon footprint

	CO ₂ e
• Sending a text	0.014 g
• A plastic bag from a supermarket	10 g
• A mug of hot black coffee	23 g
• A disposable diaper	145 g

How about these
two items?

- Bottled water, 16 oz.
- Strawberries, pint basket



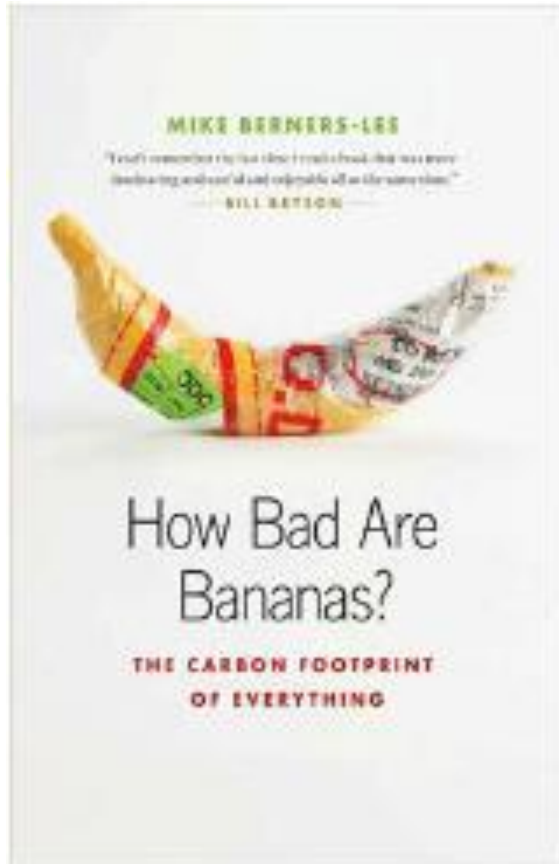


A 500 mL (16 oz.) bottle of water

110 g CO₂e locally sourced and using local distribution

160 g CO₂e average

215 g CO₂e traveling 600 miles by road



A basket of strawberries

150 g CO₂e (or 600 g per kilo/270 g per pound) grown in season in your own country

1.8 kg CO₂e (or 7.2 kg per kilo/3.3 kg per pound) grown out of season and flown in, or grown locally in a hothouse



Under 10 grams

A text message

0.014 g CO₂e one message

32,000 tons CO₂e all world's texts for a year

An email

0.3 g CO₂e a spam email

4 g CO₂e a proper email

50 g CO₂e an email with long and tiresome attachment that you have to read

A cup of tap water

0.06 g CO₂e one cup

23 kg (51 lbs.) CO₂e a year's tap water for a typical U.S. citizen

A plastic carrier bag

3 g CO₂e very lightweight variety

10 g CO₂e standard disposable supermarket bag¹²

50 g CO₂e heavyweight, reusable variety

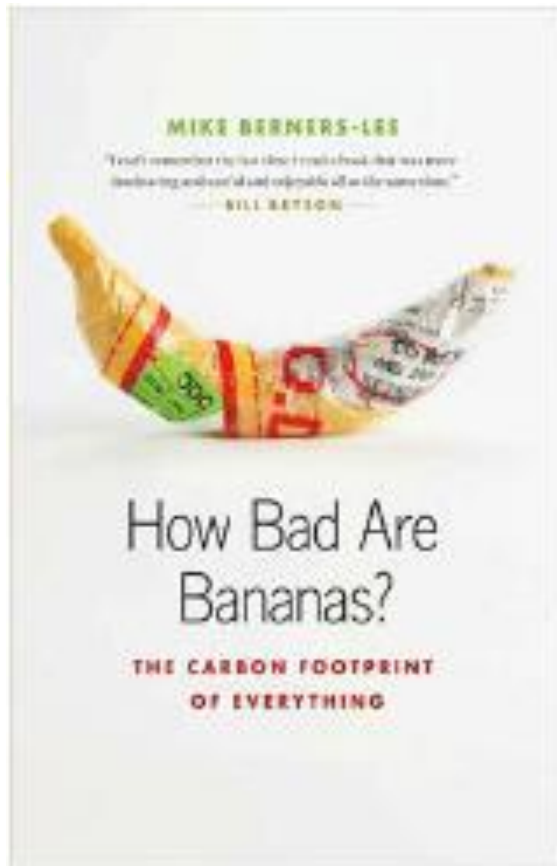
Drying your hands

Zero CO₂e letting them drip

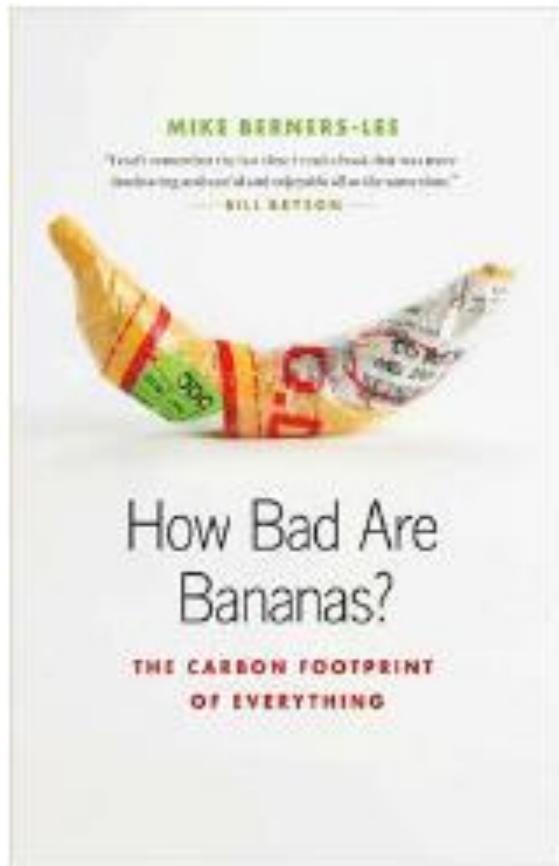
3 g CO₂e Dyson Airblade

10 g CO₂e one paper towel

20 g CO₂e standard electric drier



10 grams to 1 kilo



A mug of tea or coffee

23 g CO₂e black tea or coffee, boiling only what you need

55 g CO₂e with milk, boiling only what you need

236 g CO₂e a large cappuccino

343 g CO₂e a large latte

A diaper

89 g CO₂e reusable, line-dried, washed at 60°C (140°F) in a large load, passed on to a second child

145 g CO₂e disposable

A 500 mL (16 oz.) bottle of water

110 g CO₂e locally sourced and using local distribution

160 g CO₂e average

215 g CO₂e traveling 600 miles by road

A basket of strawberries

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1.8 kg CO₂e (or 7.2 kg per kilo/3.3 kg per pound) grown out of season and flown in, or grown locally in a hothouse

10 tons to 100 tons

A new car

6 tons CO₂e Smart car, basic specification

17 tons CO₂e Ford Taurus

35 tons CO₂e Land Rover Discovery, top of the range

A car crash

Zero g CO₂e a tiny bump that you can live with

7 tons CO₂e a write-off on an empty road

50 tons CO₂e a double write-off on a busy highway

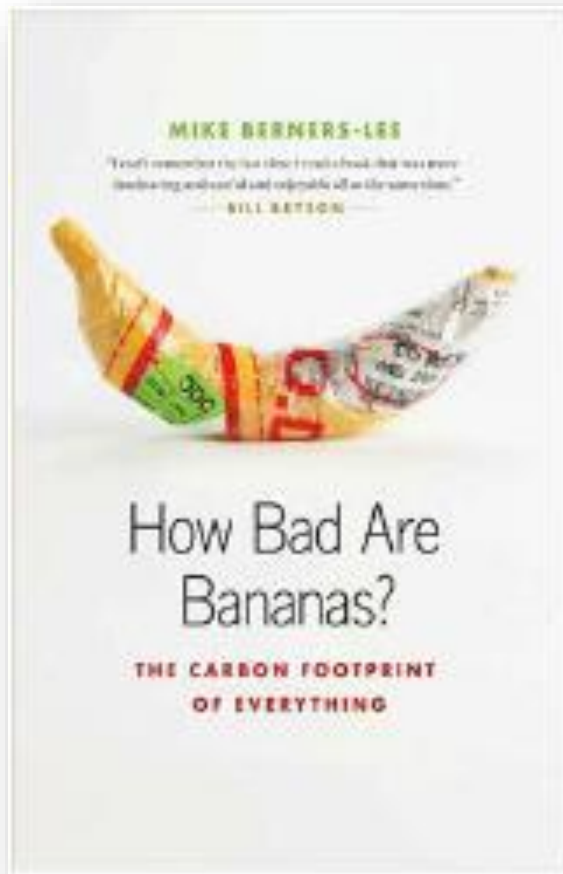
A wind turbine

30 tons CO₂e a 15-kilowatt turbine, installed

500 tons CO₂e net savings over a 20-year lifetime

A house

80 tons CO₂e





Questions ...?

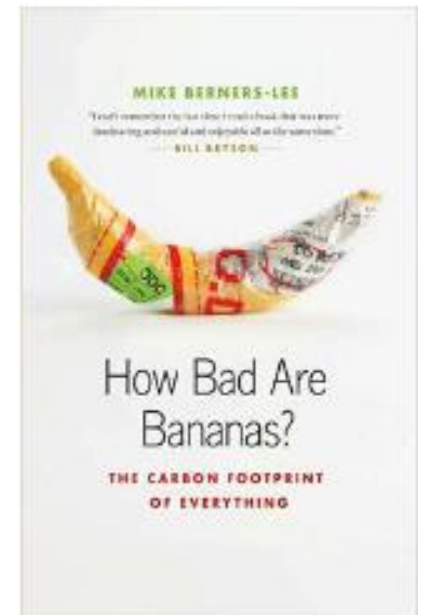
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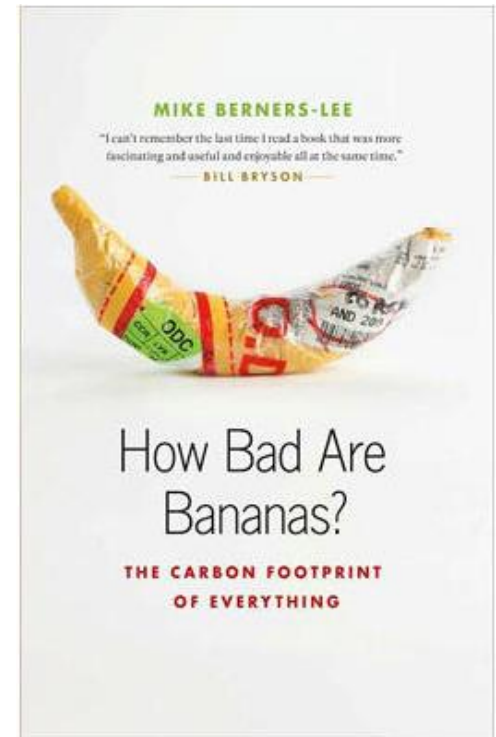


Perspective

“A friend recently asked me how he should best dry his hands to reduce his carbon footprint, ...

The same person flies across the Atlantic literally dozens of times a year. A sense of scale is required here, ...

I want to help you get a feel for roughly how much carbon is at stake when you make simple choices – where you travel, how you get there, whether to buy something, whether to leave the TV on standby, and so on.”



1. Light bulbs
2. Hot water
3. Food
4. Clothing



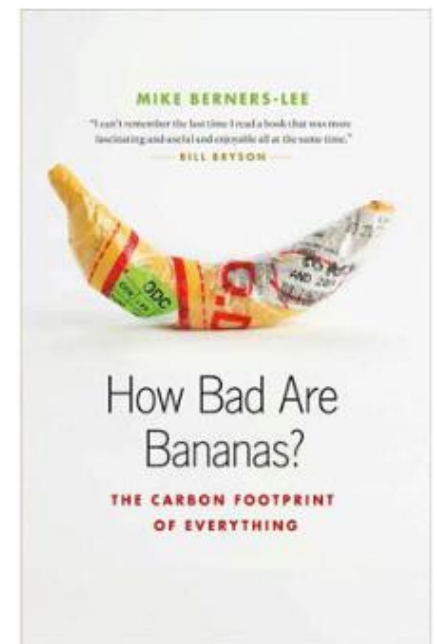
1. Light bulbs







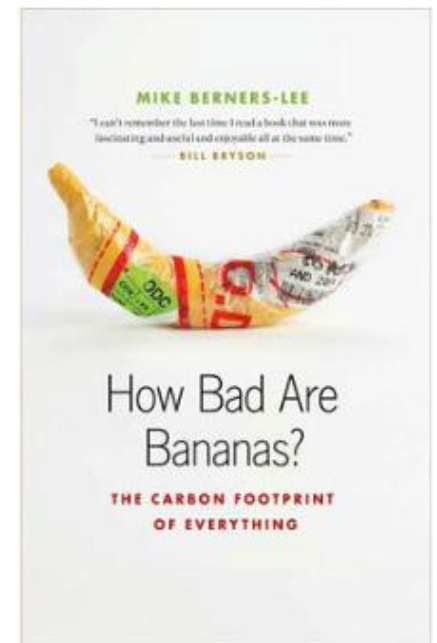
Like any form of electricity wastage, leaving the lights on is one of the cheapest ways of trashing the planet,



Leaving the lights on

90 kg (198 lbs.) CO₂e a low-energy bulb for 1 year

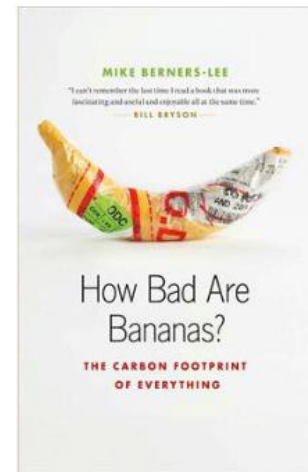
500 kg (1,100 lbs.) CO₂e a 100-watt incandescent bulb for 1 year



2. Hot water



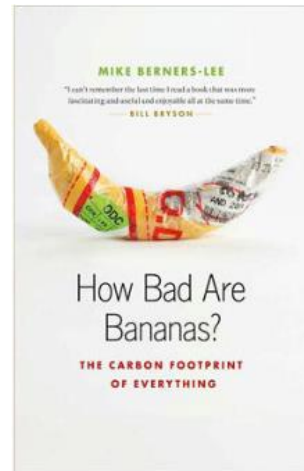
A cup of tap water
0.06 g CO₂e one cup



A cup of tap water
0.06 g CO₂e one cup



What if we
heated the water
to a boil...?



A cup of tap water
0.06 g CO₂e one cup

The carbon footprint for a cup of boiling water is about:

- A 0.12 g CO₂e (~ 2x tap water)
- B 1.2 g CO₂e (~ 20x tap water)
- C 12 g CO₂e (~ 200x tap water)
- D 120 g CO₂e (~ 2,000x tap water)

A cup of tap water
0.06 g CO₂e one cup

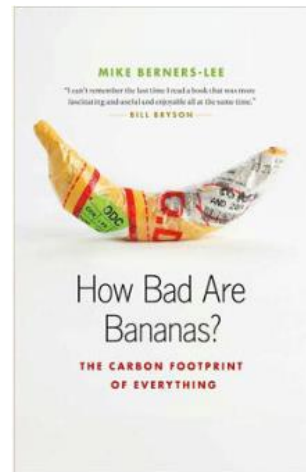
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- D 120 g CO₂e (~ 2,000x tap water)

Boiling a quart of water

50 g CO₂e gas stove-top
kettle, fairly low heat



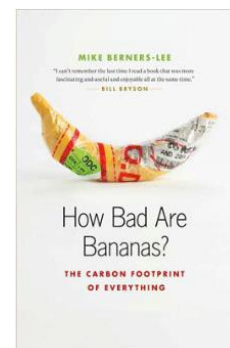
Boiling a quart of water

50 g CO₂e gas stove-top

kettle, fairly low heat

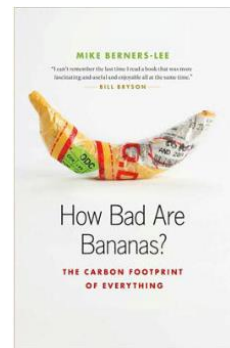
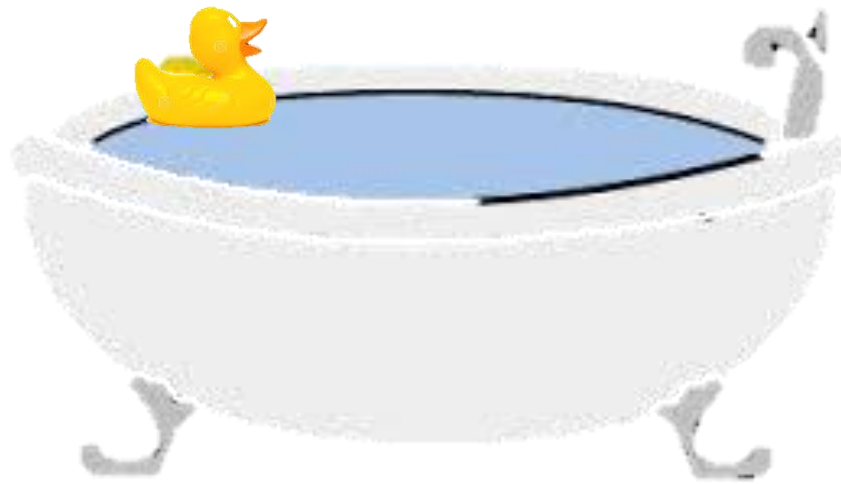
70 g CO₂e electric kettle

115 g CO₂e saucepan on the
gas without a lid and flames up the
side



Hot water in a bathtub (or shower)

In winter you can reclaim about half the heat simply by leaving the plug in until it goes cold. This works provided that you actually want the heat in your bathroom and don't object to the idea of old bathwater hanging around.



3. Food!



Choose the *lower* carbon meal choice.



Chicken Tikka Masala



Lamb Curry

Choose the *lower* carbon meal choice.



4 ounces of chicken thigh +
1 oz masala paste +
2 oz heavy cream

Chicken Tikka Masala



Lamb Curry

Choose the *lower* carbon meal choice.



**4 ounces of chicken thigh +
1 oz masala paste +
2 oz heavy cream**

Chicken Tikka Masala



**4 oz lamb +
4 oz yogurt +
1 oz curry paste**

Lamb Curry

Choose the *lower* carbon meal choice.

CORRECT!

Lamb is one of the highest carbon foods around, due to the fact that like cows, sheep are ruminants and ruminants emit methane, a powerful greenhouse gas.

NEXT

Chicken Tikka Masala

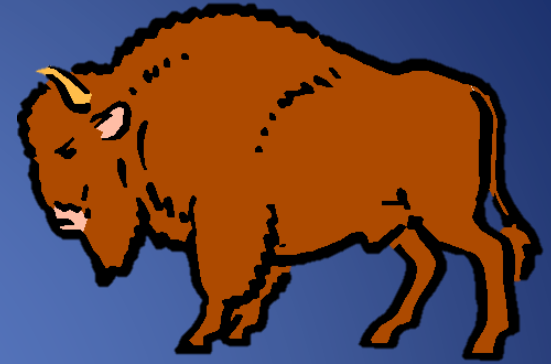


Lamb Curry

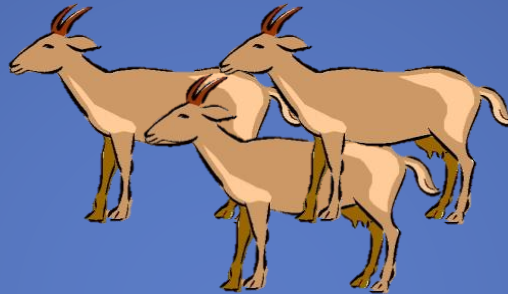
Ruminant animals



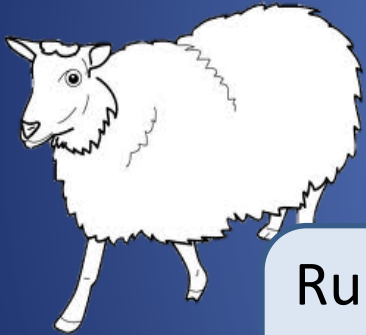
cattle



buffalo



goats



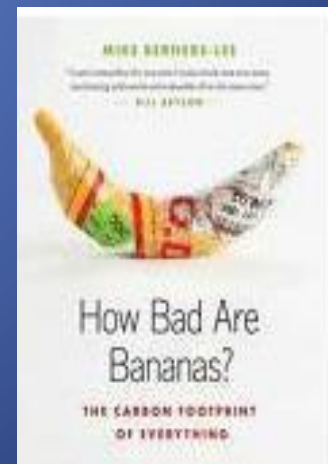
sheep

Ruminant animals have the highest CH₄ emissions per unit of body mass of all animal types.

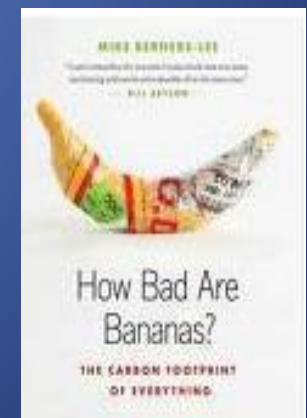


camel

“Food from animals turns out to be more carbon intensive (remember, this is my shorthand for greenhouse gas intensive) than food from plants, simply because animals are inefficient devices for producing food. They eat plants and then spend their lives wasting most of the energy from them on things such as walking around and keeping warm.”



“Beef and lamb are doubly high in carbon because they are belching ruminants. Chicken is a bit better because, to put it bluntly, they don’t live as long, so they don’t get so much opportunity to waste the energy in their feed. Dairy has all the same problems of ruminant meat production, so there is little point in switching from beef to cheese.”



Choose the *lower* carbon meal choice.



1/2 Milk Chocolate Bar



3 small Chocolate Chip Cookies

Choose the *lower* carbon meal choice.



1 oz chocolate +
1 oz sugar +
1 oz milk

1/2 Milk Chocolate Bar



3 small Chocolate Chip Cookies

Choose the *lower* carbon meal choice.



1 oz chocolate +
1 oz sugar +
1 oz milk

1/2 Milk Chocolate Bar



.25 oz butter + .63 oz sugar +
.75 oz flour + .13 oz egg +
.38 oz chocolate

3 small Chocolate Chip Cookies

Choose the *lower* carbon meal choice.



1/2 Milk Chocolate Bar

CORRECT!

Chocolate Chip Cookies are a slightly lower carbon choice than a Milk Chocolate Bar. Chocolate itself is a highly processed product and milk chocolate contains more dairy, which is a higher carbon item.

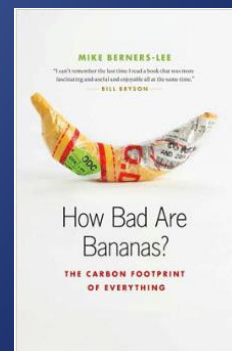
NEXT

3 small Chocolate Chip Cookies



A mug of tea or coffee

23 g CO₂e black tea or
coffee, boiling only what you need



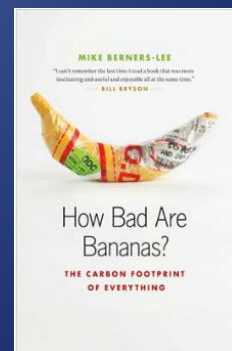


A mug of tea or coffee

23 g CO₂e black tea or
coffee, boiling only what you need

55 g CO₂e with milk, boiling
only what you need

74 g CO₂e average, with
milk, boiling double the water you
need





A mug of tea or coffee

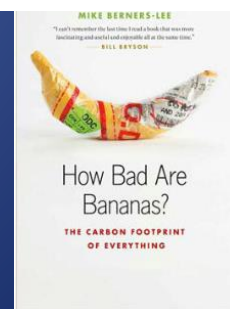
23 g CO₂e black tea or coffee, boiling only what you need

55 g CO₂e with milk, boiling only what you need

74 g CO₂e average, with milk, boiling double the water you need

236 g CO₂e a large cappuccino

343 g CO₂e a large latte





A mug of tea or coffee

23 g CO₂e black tea or coffee, boiling only what you need

55 g CO₂e with milk

The shock here is the milk. If you take tea or coffee with milk, and you boil only the water you need, then the milk accounts for two-thirds of the total footprint (see Milk). The

236 g CO₂e a large cappuccino

343 g CO₂e a large latte

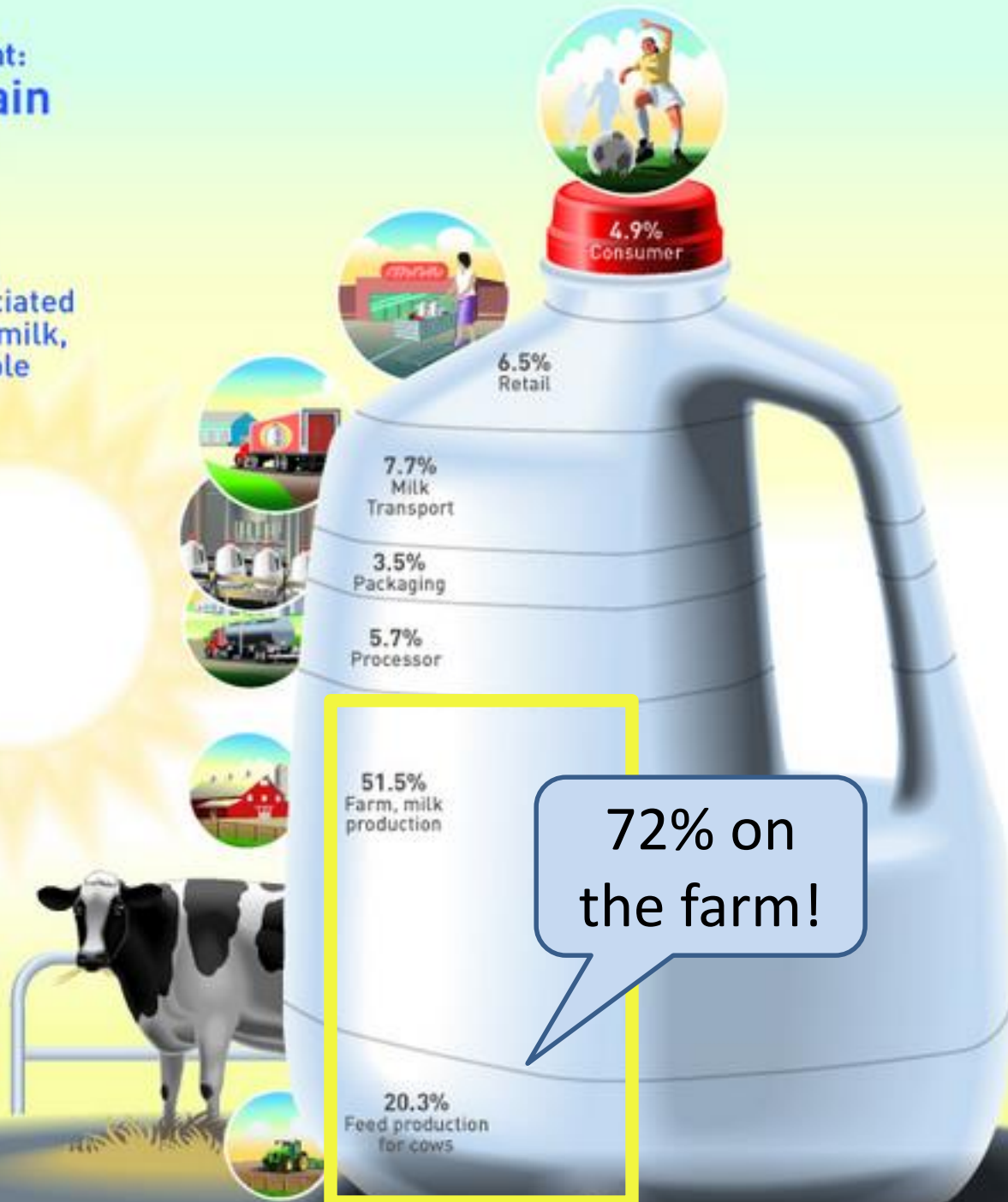


MIKE BERNERS-LEE
"Each banana in the world is wrapped in newspaper, making and recycling equivalent of a 20-ton truck."
- BILL GAYTON

How Bad Are Bananas?
THE CARBON FOOTPRINT OF EVERYTHING

U.S. Fluid Milk Carbon Footprint: Supply Chain Emissions

Percentage of
greenhouse gas
emissions associated
with a gallon of milk,
from farm to table



72% on
the farm!

ed
k,



7.7%
Milk
Transport

3.5%
Packaging

5.7%
Processor

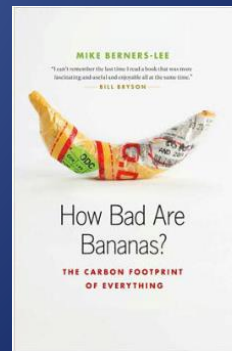
51.5%
Farm, milk
production

6.5%
Retail

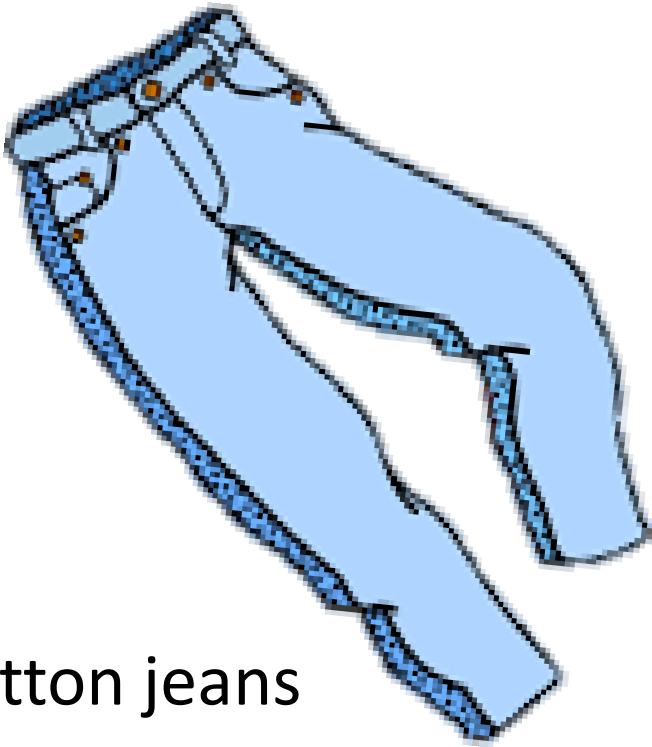
4.9%
Consumer

The point:

"Wherever you get your milk; however, it remains - like all food from cattle - a high-carbon way to get your calories."



4. Clothing



Cotton jeans

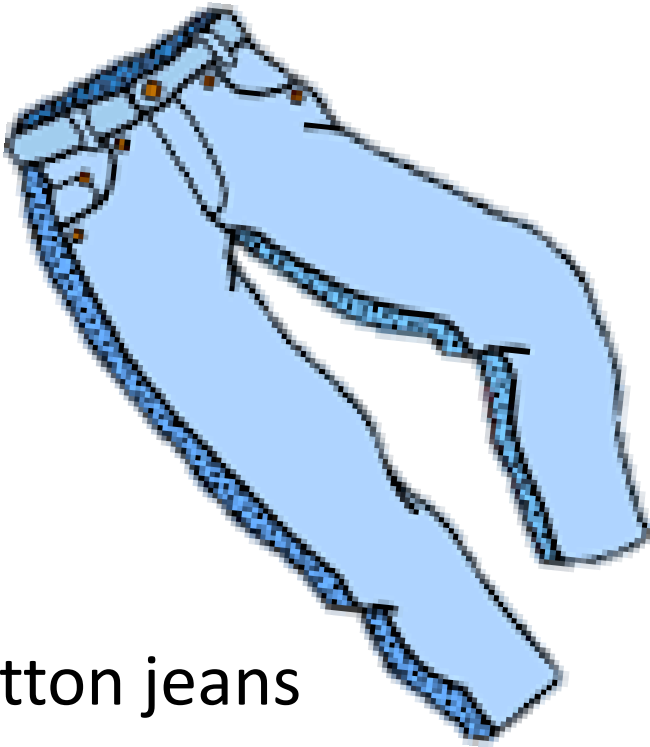


Nylon trail pants

Grow the
fiber

4. Clothing

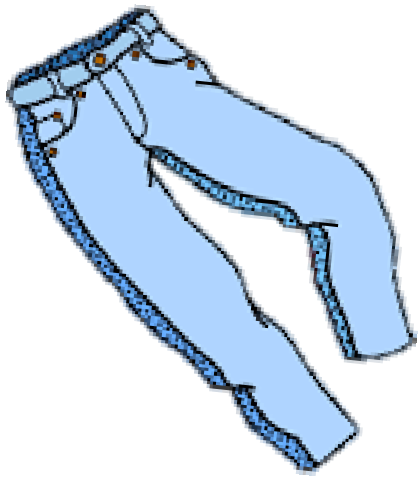
Produce
the fiber



Cotton jeans

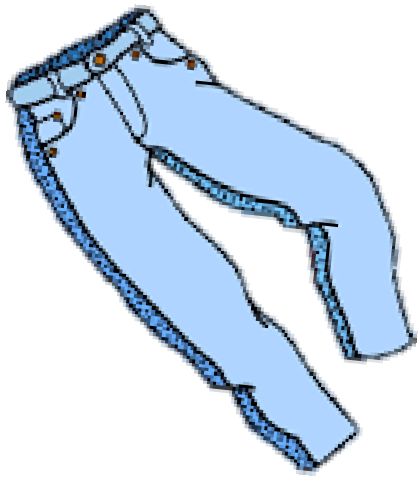


Nylon trail pants




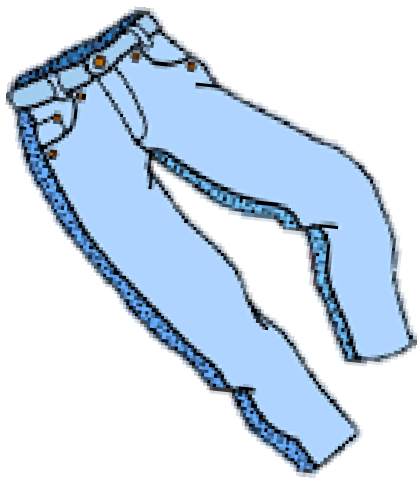
Which one has a higher carbon footprint:

- A** Cotton jeans
- B** Nylon trail pants



Which one has a higher carbon footprint:

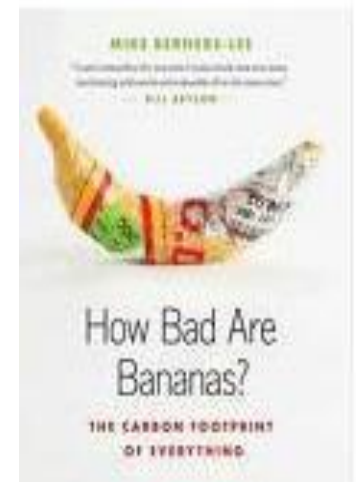
- A** Cotton jeans
- B** Nylon trail pants
- 
- A yellow arrow with a black outline points from the left towards the text for option B.

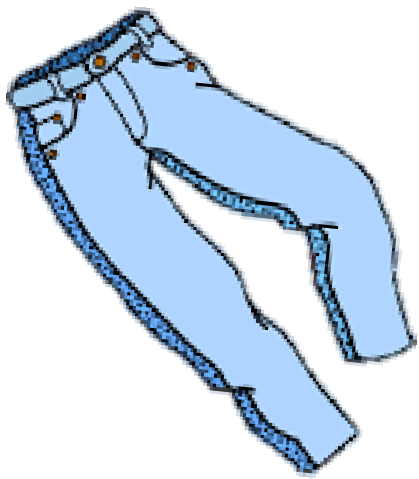


A pair of pants

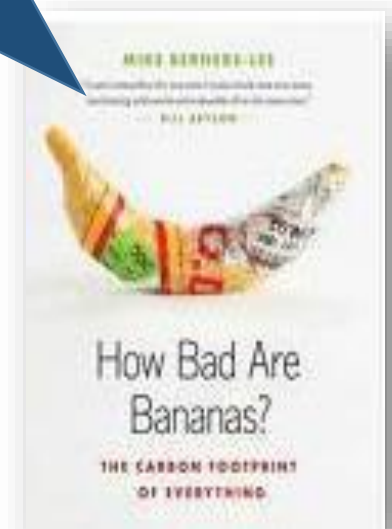
3 kg (6.6 lbs.) CO₂e my favorite old nylon traveling pants

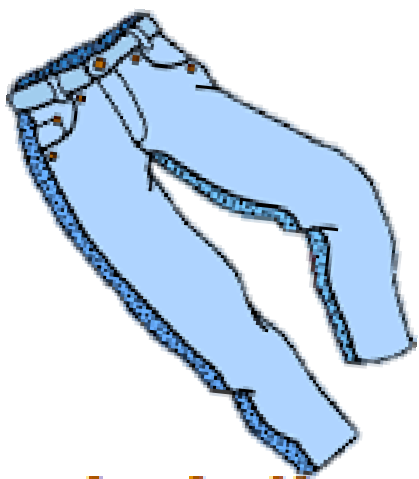
6 kg (13 lbs.) CO₂e my cotton jeans





The footprint of washing and drying the pants is likely to be several times that of producing them in the first place.





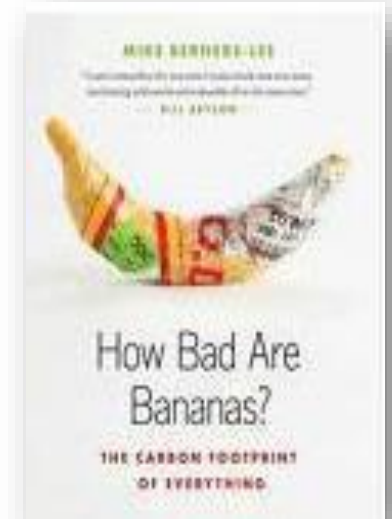
A load of laundry

0.6 kg CO₂e washed at 30°C (86°F), dried on the line

0.7 kg CO₂e washed at 40°C (104°F), dried on the line

2.4 kg CO₂e washed at 40°C (104°F), tumble-dried in a vented drier

3.3 kg CO₂e washed at 60°C (140°F), dried in a combined washer-drier



Cotton clothing, worn into the ground. Washed and tumble dried

Quick-drying built-to-last clothing. Worn into the ground. No tumble drying

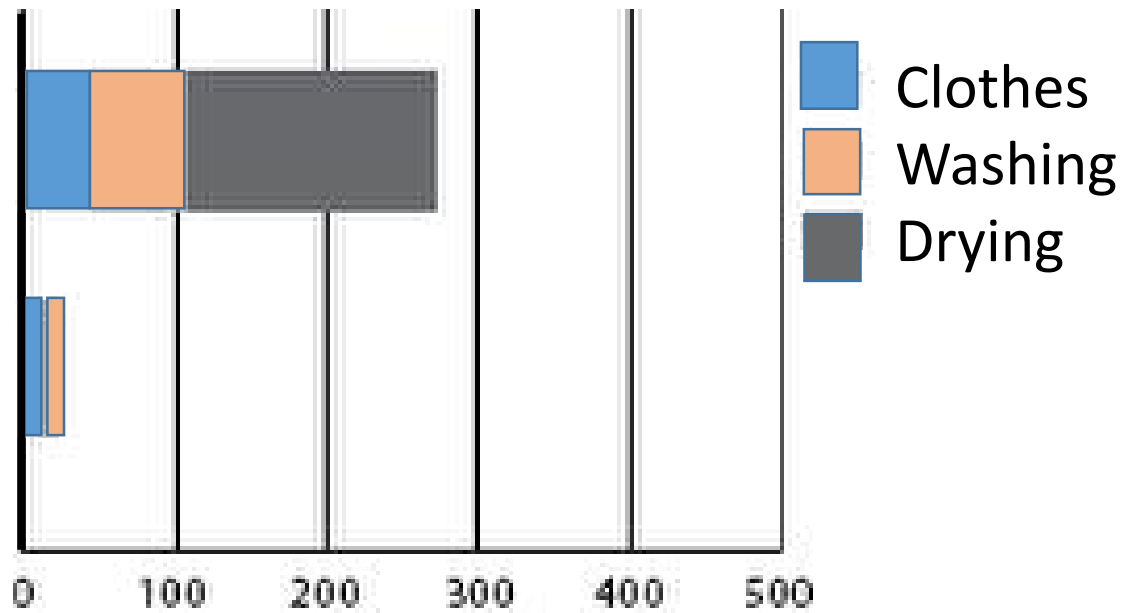
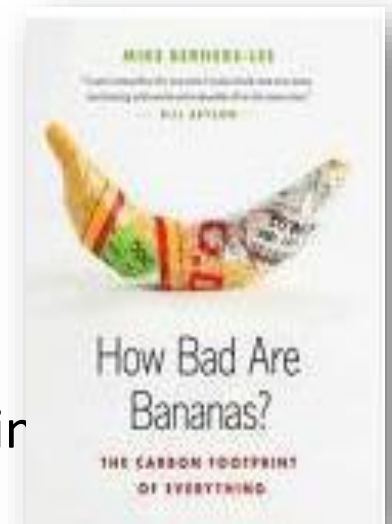


Figure 5.5 The annual carbon footprint of buying and washing clothes.







Thank you!

Bruce and Cathy

