

Carbon Footprints & Sustainable Solutions

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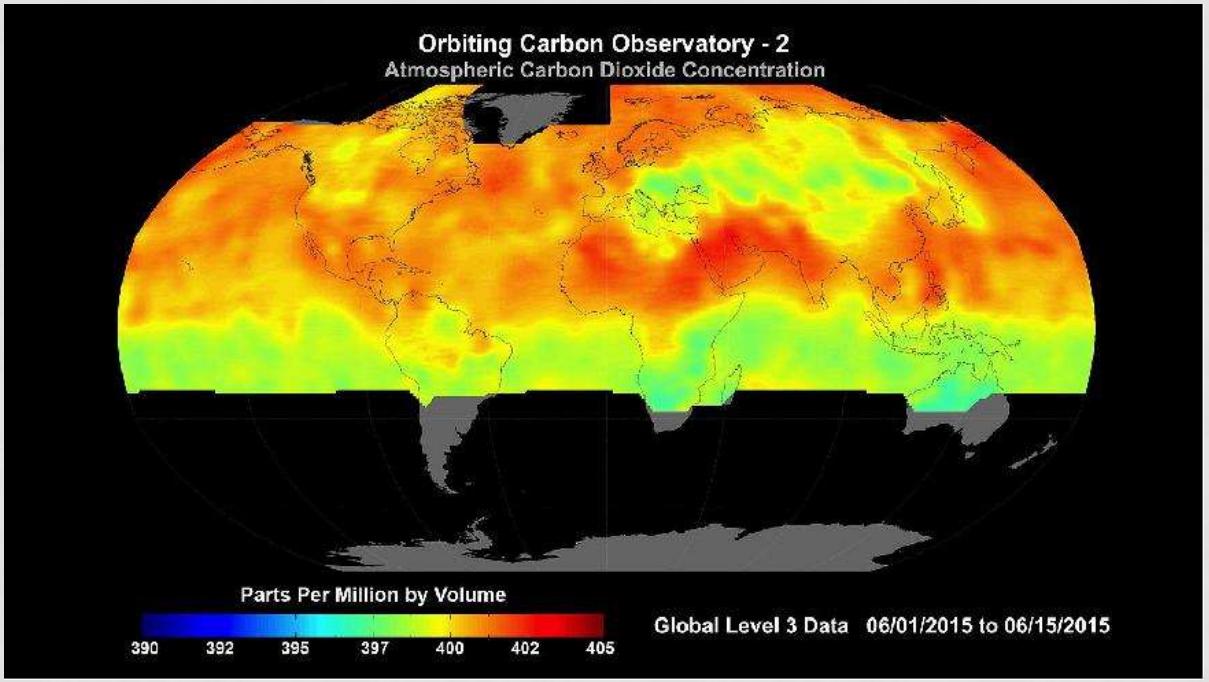
"If we could see CO_2 then maybe we'd have more incentive to do something about it."

-Neil deGrasse Tyson, COSMOS

NASA: ORBITING CARBON OBSERVATORY

LAUNCHED JULY 2014

- "Watching the Earth breathe from space…"
- Measure carbon dioxide in the Earth's atmosphere every day
- Characterize CO_2 **sources and sinks** on regional scales



"Our goal is to get really good data so we can make informed decisions about how to manage carbon and carbon emissions in the future."

-Annmarie Eldering, OCO-3 mission scientist at NASA's Jet Propulsion Laboratory

SESSION AGENDA

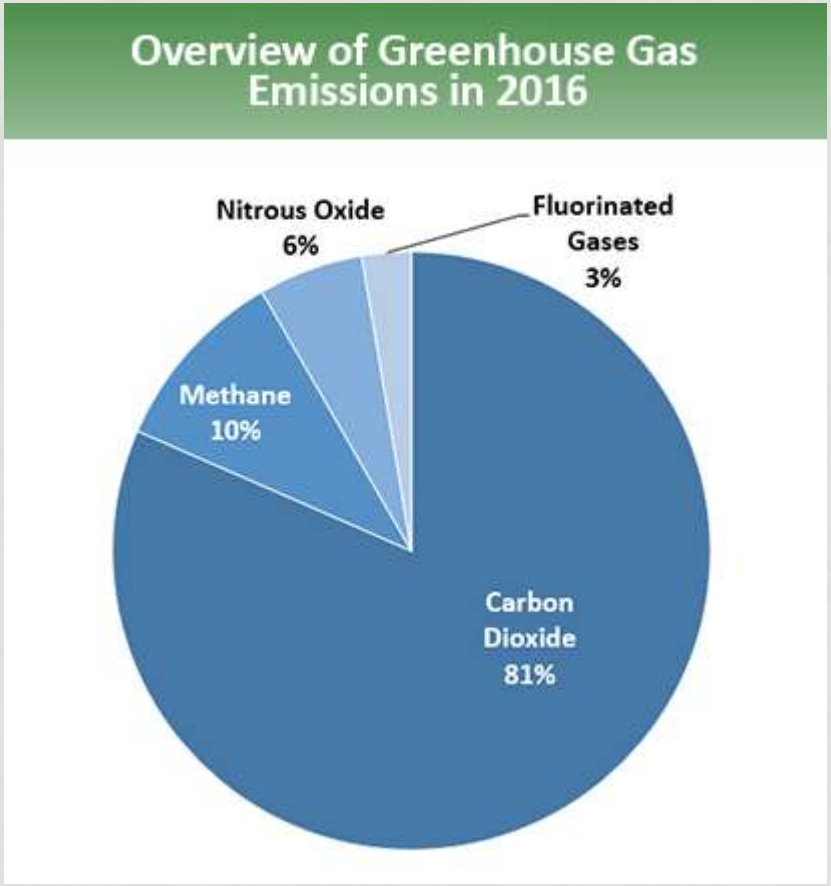
- Activity 1
  Connecting Electrical Consumption to Coal & CO_2
- Activity 2
  What is your carbon footprint?
- Activity 3
  Secondary Carbon Footprints | Hidden energy
- Evaluation

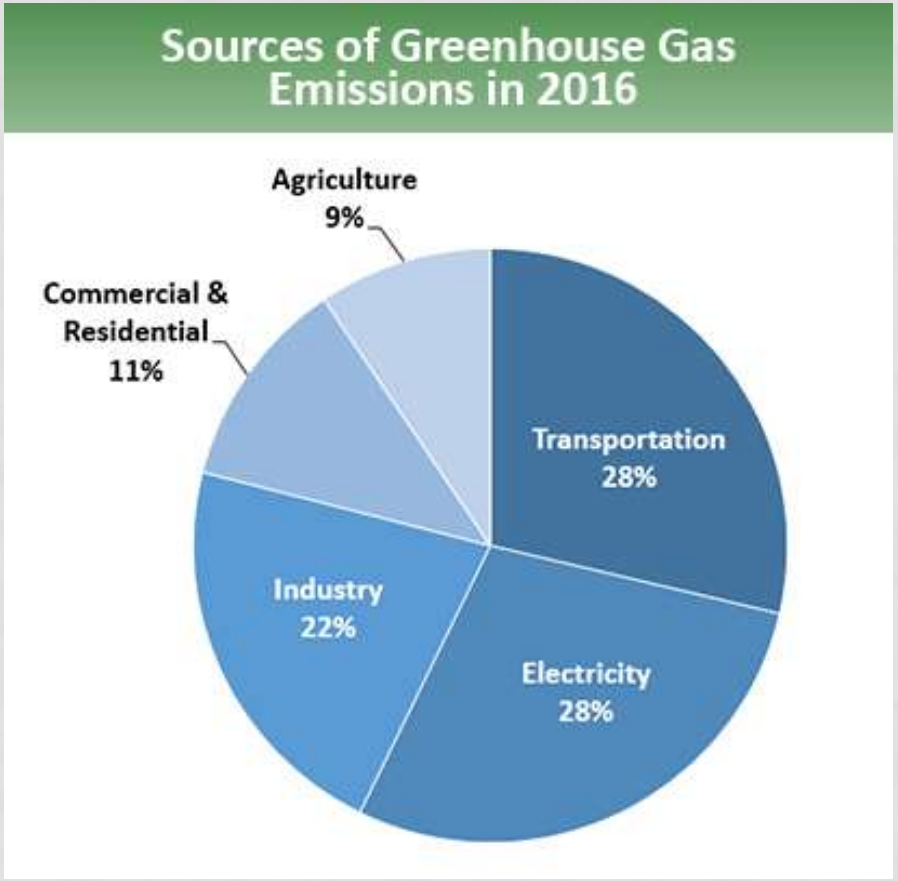
https://ie.unc.edu/cpes/resources/

ACTIVITY 1: CONNECTING ELECTRICAL CONSUMPTION TO COAL AND CO_2

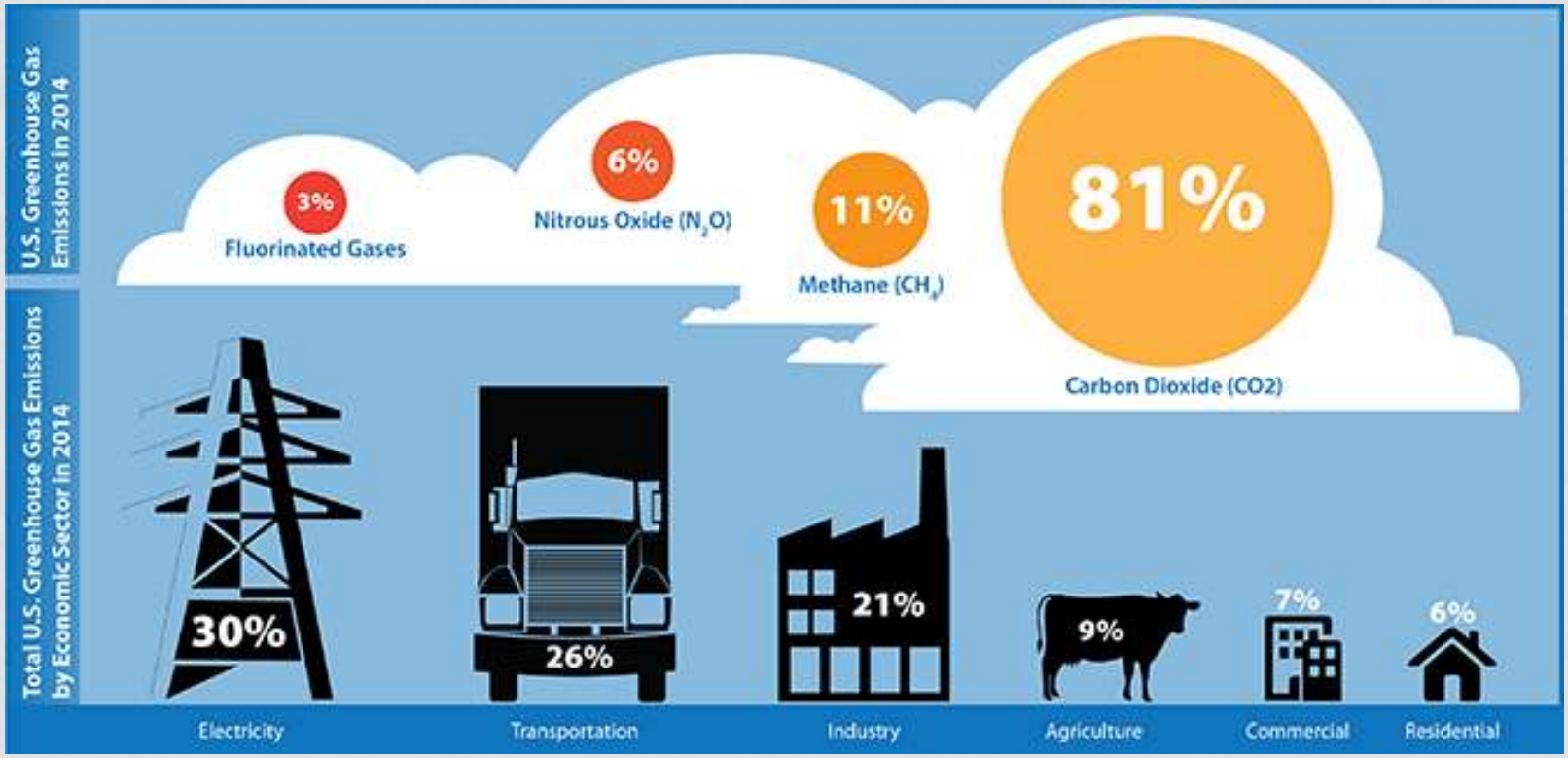
KILL A WATT DEVICE

U.S. Inventory of Greenhouse Gases and Sources of Emissions, 1990-2016



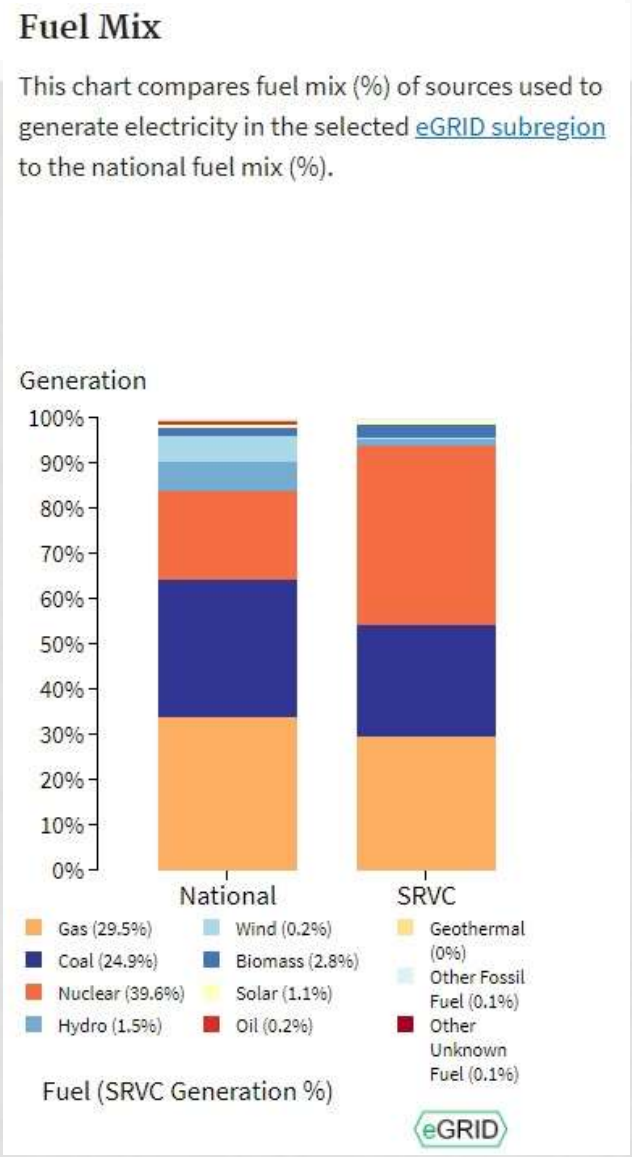


https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks



https://www3.epa.gov/climatechange/ghgemissions/inventoryexplorer/

HOW CLEAN IS THE ELECTRICITY YOU USE?

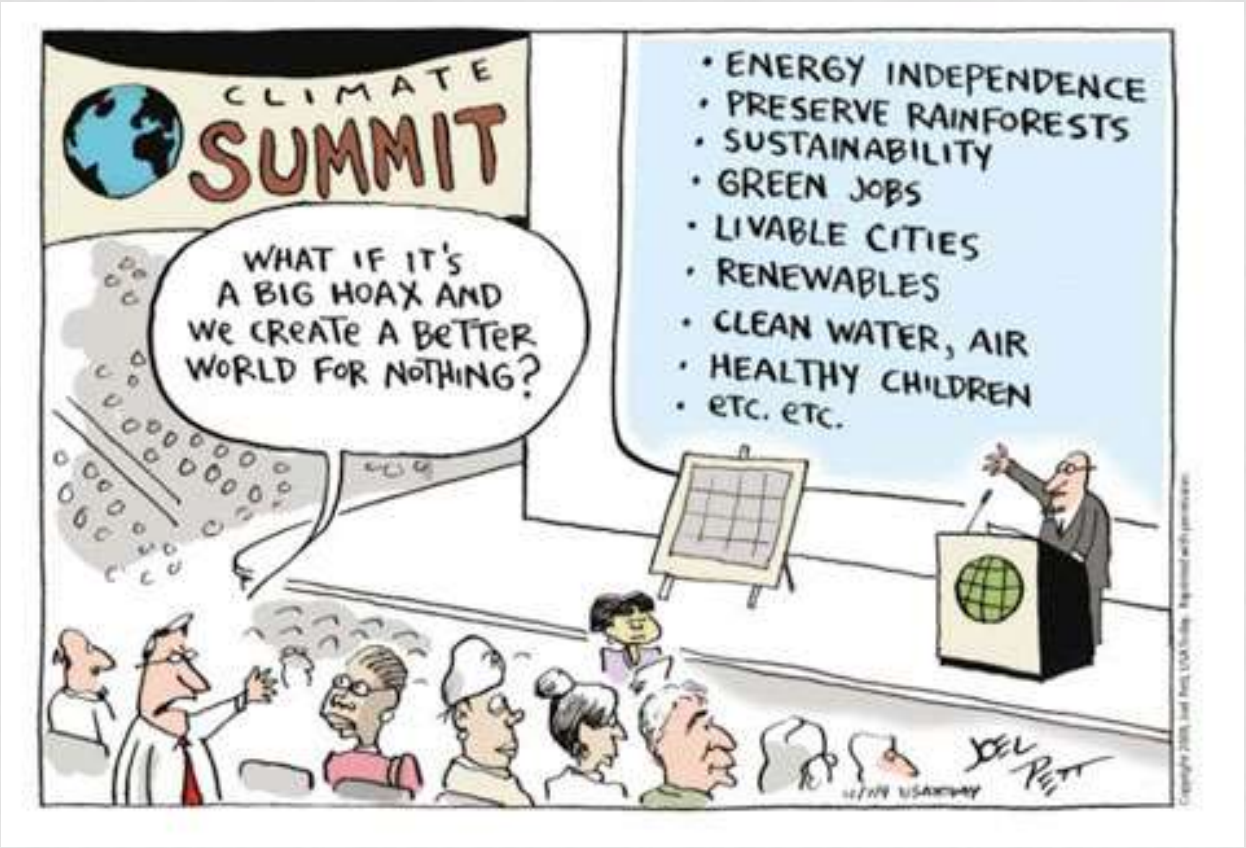


In 2014 NC ranked 14th nationally in terms of its contribution of carbon dioxide emissions from the electricity sector. *US Energy Information Agency*

CARBON REDUCTION SOLUTIONS

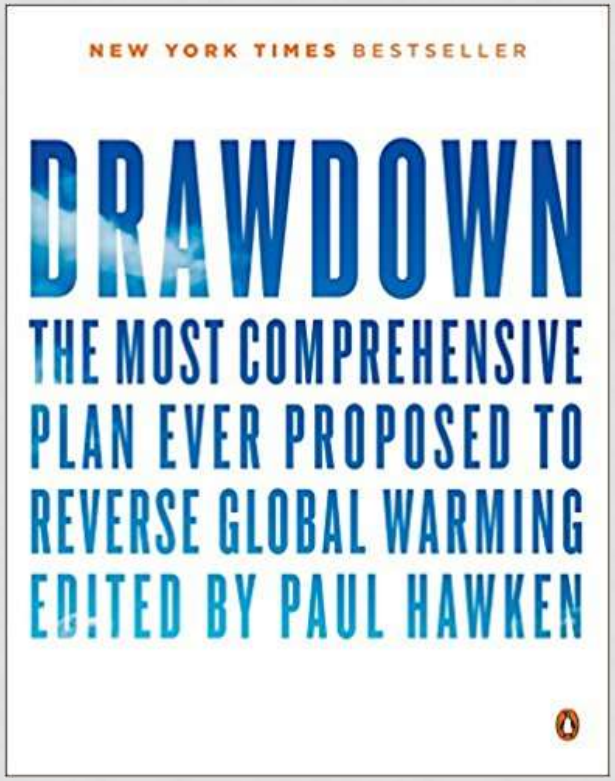
Reducing CO_2 emissions benefits:

- The Environment
- The Economy
- Society



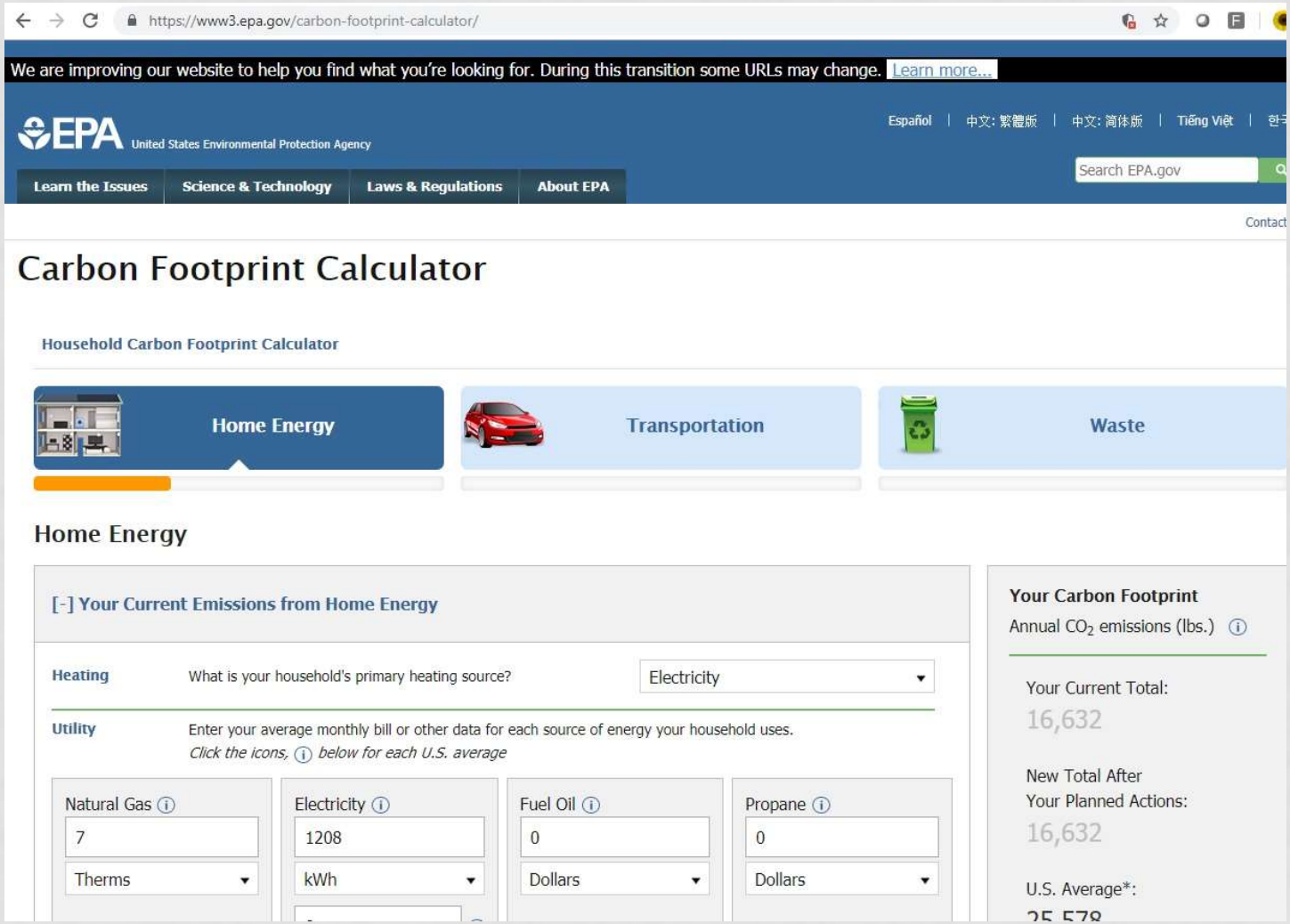
CARBON REDUCTION SOLUTIONS

Individual behaviors and consumer choices impact an individual's carbon footprint.



Energy Conservation
Solid Waste Reduction
Transportation Choices
Civic Engagement

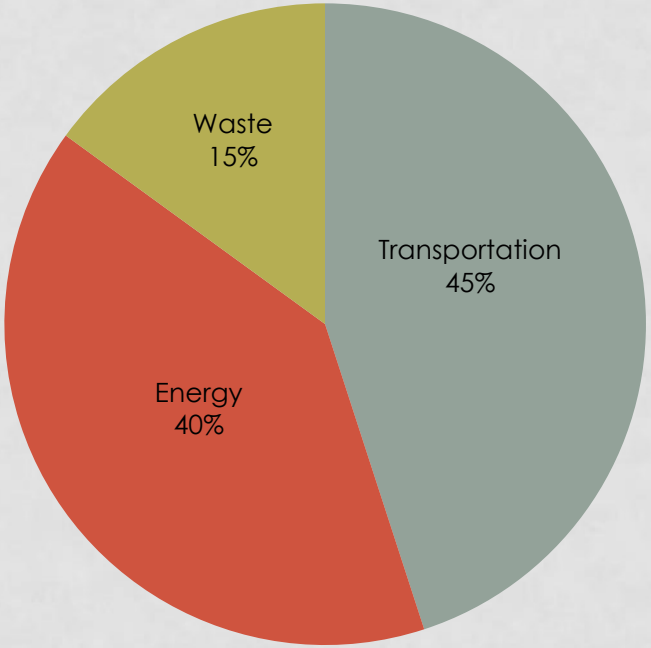
ACTIVITY 2: CALCULATING YOUR CARBON FOOTPRINT



ACTIVITY 2: CALCULATING YOUR CARBON FOOTPRINT

- **THINK-PAIR-SHARE:** Find a neighbor who has a different size footprint and discuss the reason(s) for the difference.
- What aspect(s) of your lifestyle were not taken into account by the EPA carbon calculator?
- How would your carbon footprint be altered if the online calculator took this into account? Would it be bigger or smaller?
- What can you do to reduce your carbon footprint?

WHAT IS YOUR "CARBON FOOTPRINT?"



Pie Chart

- On the back of your worksheet draw a pie chart that shows what proportion of your household's CO_2 emissions comes from transportation, energy, and waste.

ACTIVITY 3: SECONDARY CARBON FOOTPRINTS | HIDDEN ENERGY

- Consider the following as you observe this product:
  - Raw materials
  - Manufacturing
  - Packaging, transport, and storage
  - Marketing
  - Use/Lifespan
  - Disposal

HIDDEN ENERGY

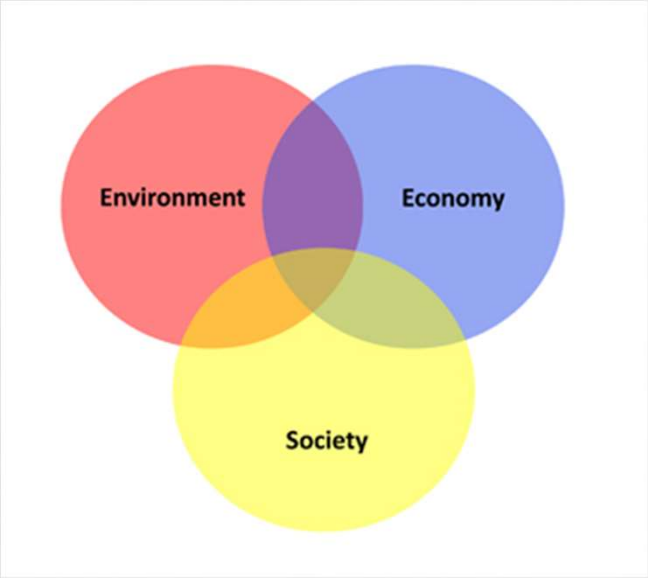
- Finally, indicate the steps on your diagram that use energy and result in CO_2 emissions.

SINGLE-SERVE ORANGE JUICE

SUSTAINABILITY ANALYSIS | EXTENSION #1

For your item consider the following:

- **Environmental Impact**
  - Carbon footprint
  - Water footprint
  - Air and water pollution
  - Biodiversity
- **Societal (Human) Impact**
  - Workers
  - Consumers
- **Economic Impact**



SUSTAINABILITY SCALE

SUSTAINABILITY SCALE

SUSTAINABILITY ANALYSIS | EXTENSION #2

View your object **from the perspective of the manufacturer**:

- How could the carbon footprint of your object be reduced?
- How could the object be produced and/or designed with sustainability in mind?
- What other positive benefits might result from these changes?
- What negative consequences might arise from these changes?

MANUFACTURERS: REDUCED PACKAGING

MANUFACTURERS: PRODUCT REDESIGN

- Saves 890,000 lbs/yr in paper fiber
- Reduces greenhouse gases by 11%
- Eliminates 500 trucks on the road each year.
- Increases shelf pack-out by 20%, allowing retailers to sell the same amount of product in less space.

"Compacting noodles proves profitable" http://www.packworld.com/package-24567

MANUFACTURERS: UPCYCLING

Terra Cycle uses packaging waste to make new products such as shower curtains, umbrellas, pencil cases, totes, lunchboxes and backpacks -- a process known as **upcycling**.

SUSTAINABILITY ANALYSIS | EXTENSION #3

View your object **from the perspective of the consumer:**

- Is this an item that you need or want?
- What actions could you take as a consumer to reduce the carbon footprint of this object?
- How could the object be utilized/consumed more sustainably?
- When presented with choices in brands when purchasing this type of item, what factors will influence which item (brand) you select?

CONSUMERS: REDUCE, REUSE, RECYCLE

CONSUMERS: CONSIDER ALTERNATIVES

CONSUMERS: CARBON LABELING

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