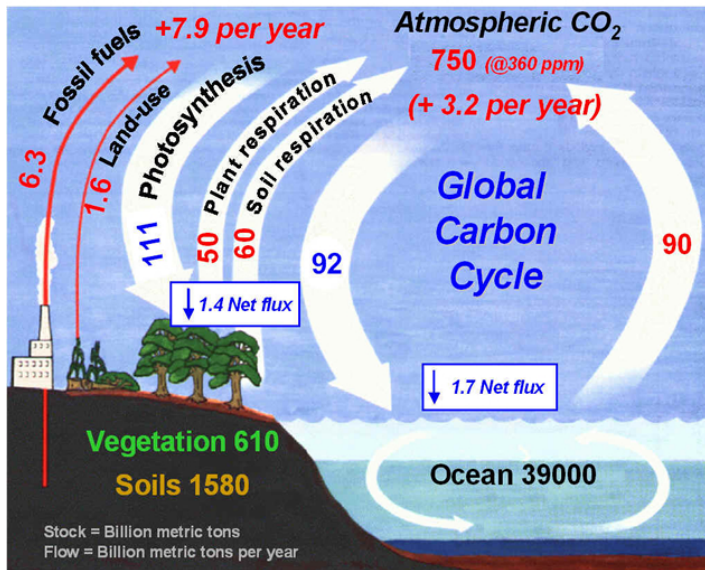


Carbon Footprint / Energy Use

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Carbon cycle



Carbon Emissions

- ▶ Carbon dioxide is one of the main gasses causing global warming
- ▶ We'll focus on burning gasoline (mainly from cars), and using electricity
 - ▶ Farming and producing goods in factories are two other ones, but are harder to calculate
- ▶ Carbon emissions measured in metric tons of CO₂e
- ▶ Human carbon emissions: about 26 billion tons of CO₂e per year
- ▶ Average for Canada: about 20 tons CO₂e per year
- ▶ Average worldwide: about 4 tons CO₂e per year
- ▶ (1 ton = 1000 kg)

Electricity

- ▶ Energy is the ability to do things, measured in watt-hours (1000 watt-hours = 1kWh)
- ▶ Devices have a power rating which gives the rate at which they use energy
- ▶ E.g. a device using 60 watts, turned on for an hour, consumes 60 watt-hours of energy.
- ▶ On your power bill, a kWh is about \$0.10. So 60 watt-hours = 0.06 kWh = 0.6 cents.
- ▶ carbon footprint of 1 kWh: 0.00069 metric tons CO₂e
 - ▶ So if you use 10000kWh of electricity per year, that's 6.9 metric tons of CO₂e per year
 - ▶ But consider peak usage and type of energy!

Common uses of electricity / burning gas

Common uses of electricity / energy

- ▶ Hot water
- ▶ Heat
- ▶ wood stove
- ▶ Fridge
- ▶ Lights
- ▶ TV
- ▶ Computer
- ▶ Laundry
- ▶ Vampire power
- ▶ Cooking
- ▶ Lawnmower
- ▶ Air conditioning

Common uses of electricity / energy

- ▶ Hot water - 10 gallons = 2kWh for an 8 min shower
- ▶ Heat - huge (6000kWh / year for my small house)
- ▶ wood stove - wood is “carbon-neutral”
- ▶ Fridge - varies (mine is about 1 kWh per day)
- ▶ Lights - LED bulbs use about 10W
- ▶ TV - 60W
- ▶ Computer - 100W + 50W for monitor. 30W for laptop, 15W for netbook.
- ▶ Laundry 0.3 kWh / load for cold water, 4.5 kWh / load for hot
- ▶ Vampire power - $10\text{W} * 24\text{h} = 0.240\text{kWh}$ per day
- ▶ Cooking - 1000W for a stovetop element
- ▶ Air conditioning - huge (3000W-5000W)

Gasoline

- ▶ Burning 1 gallon of gasoline = 0.00889 metric tons
- ▶ Car: If the mileage is 48 kilometers per gallon, then driving 10000km per year gives:

$(10000\text{km} / 48\text{km/gallon}) * 0.00889 \text{ metric tons/gallon} = 1.852$
tons CO₂e

- ▶ Lawnmower: model I found uses 0.59 gallons per hour
 - ▶ So $0.59 * 0.00889 = 0.0052451$ metric tons per hour
 - ▶ Compare with 1440W electric lawnmower:
 - ▶ $1.44 * 0.00069 \text{ metric tons per kWh} = 0.0009936$ metric tons

Transportation

- ▶ Carbon emissions to go from Fredericton to Toronto and back:
 - ▶ 0.22 metric tons by plane.
 - ▶ 0.02 to go about the same distance (2000km) by train.
 - ▶ 0.34 metric tons by car.