Guiding Question: Why do we need to find alternative sources of Energy?

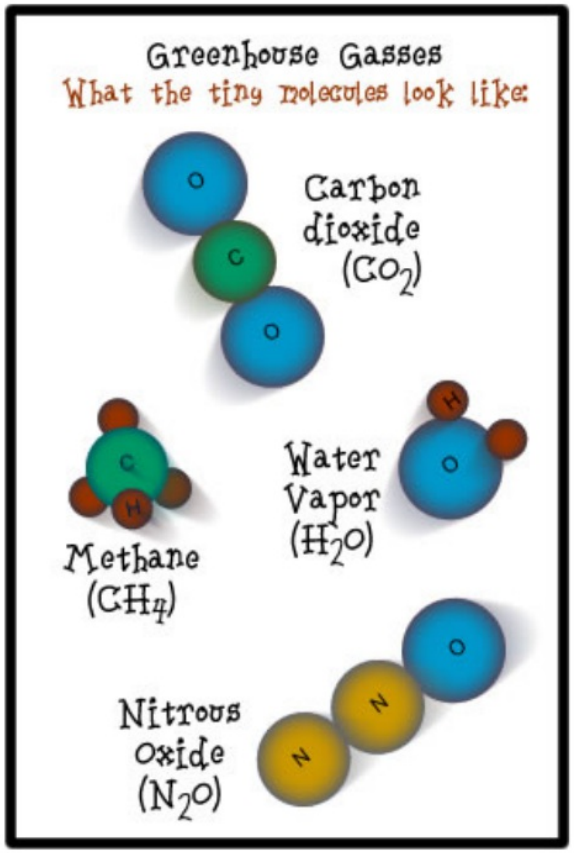
Learning Goal: Explain why alternatives to fossil fuels for a source of energy is needed and list they types of energy being used throughout the world.

Agenda
1) Warm-up
2) Intro to climate change C-notes
3) Pros and Con's to Energy Sources
4) Exit Ticket

Words of the day
Greenhouse Gases
Greenhouse Effect

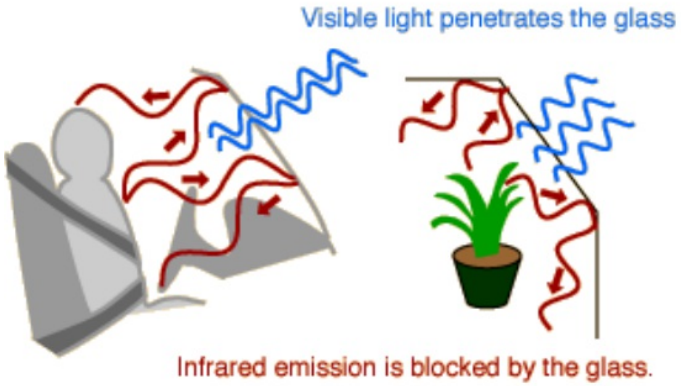
Greenhouse Gases

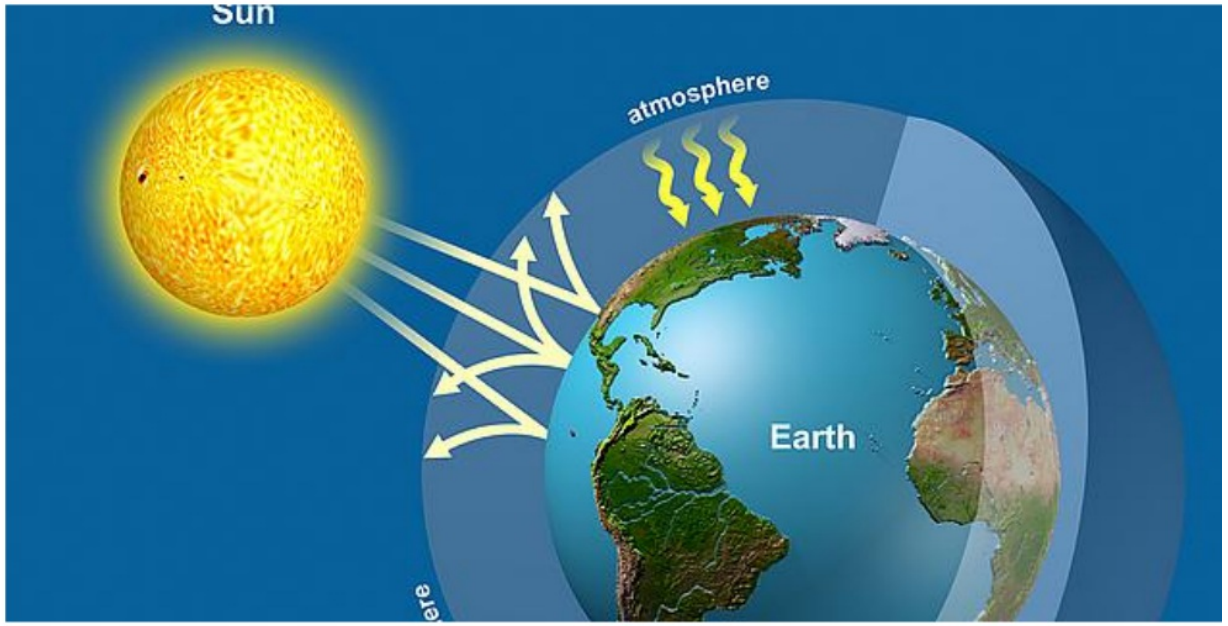
Carbon dioxide, water vapor, methane, and nitrous oxide gases in the atmosphere that trap earth's heat.



Greenhouse Effect

The heating of a planet (Like earth) due to the trapping of heat by the greenhouse gases in the atmosphere





Greenhouse Effect C-Notes

Greenhouse effect

Causes of Climate Change

Sources of Greenhouse gasses

Summary

Energy Source Pros and Cons

Cons -	Source	Pros +


STOP

Greenhouse Effect C-Notes

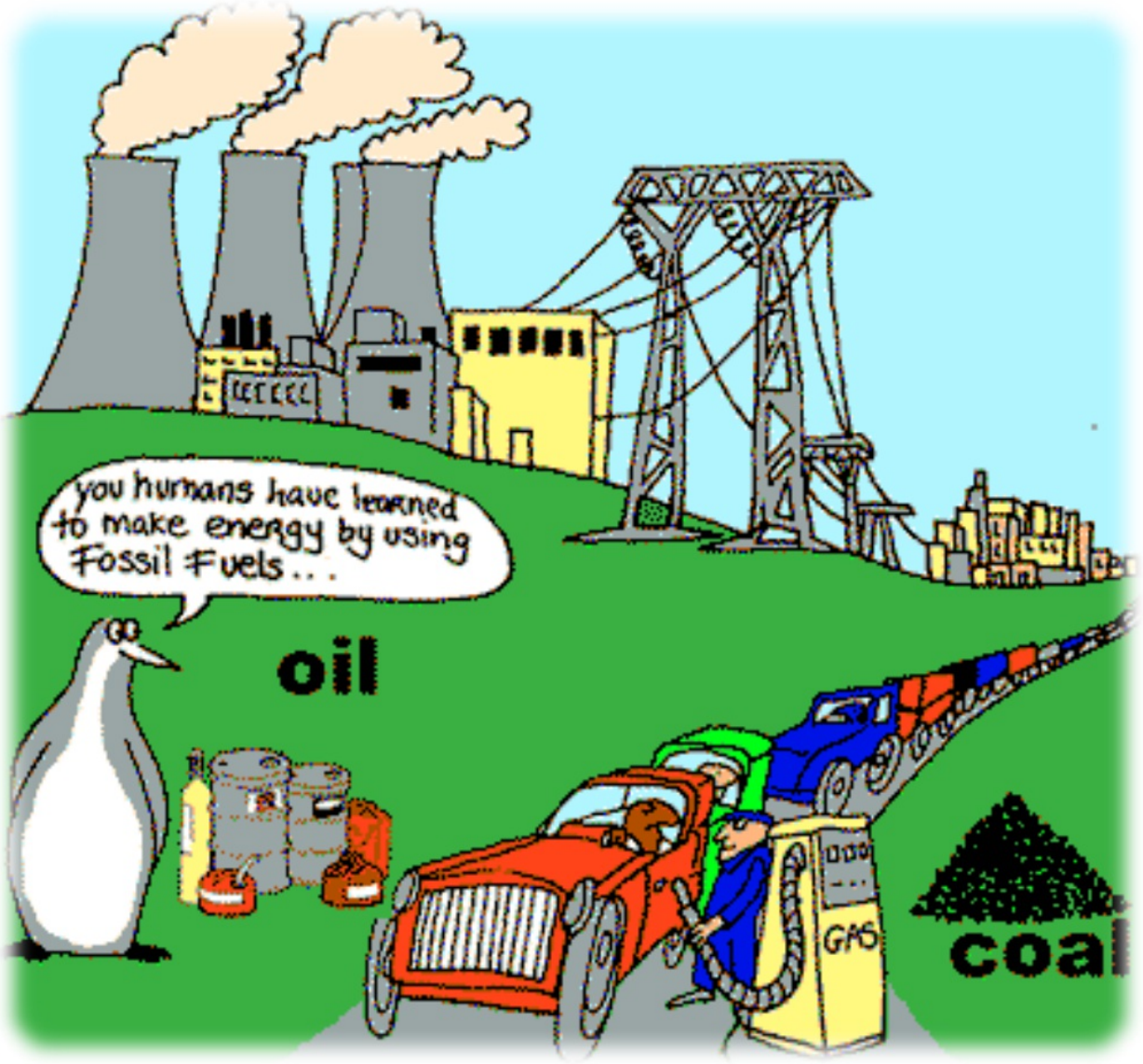
Greenhouse effect

Causes of Climate Change

Sources of Greenhouse gasses

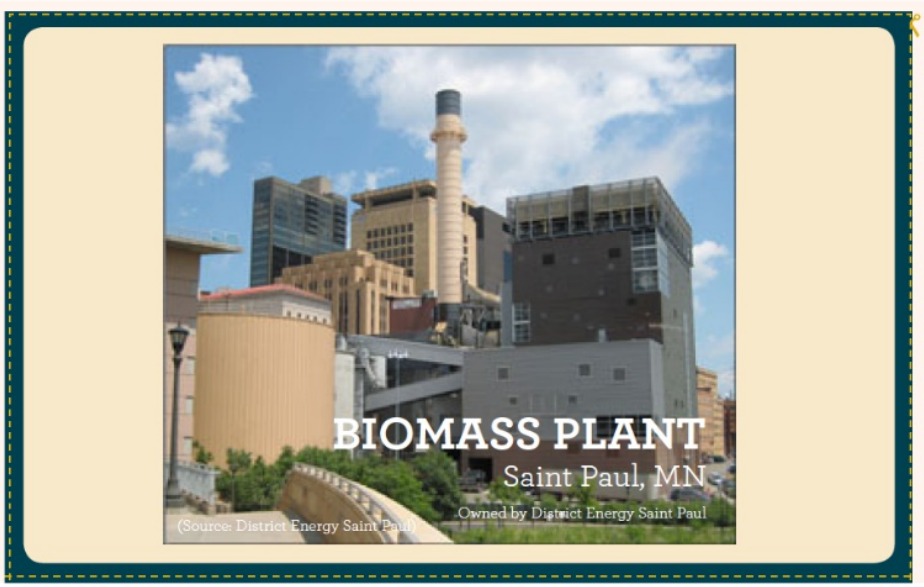
Summary

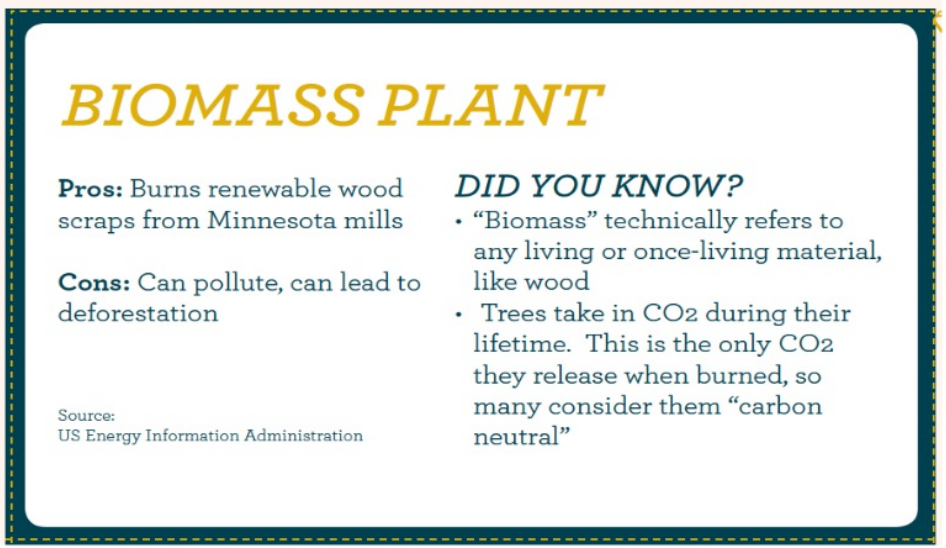
Sources of Greenhouse gases: Fossil Fuels



Each Table is going to get a set of cards that show how energy is generated in Minnesota.

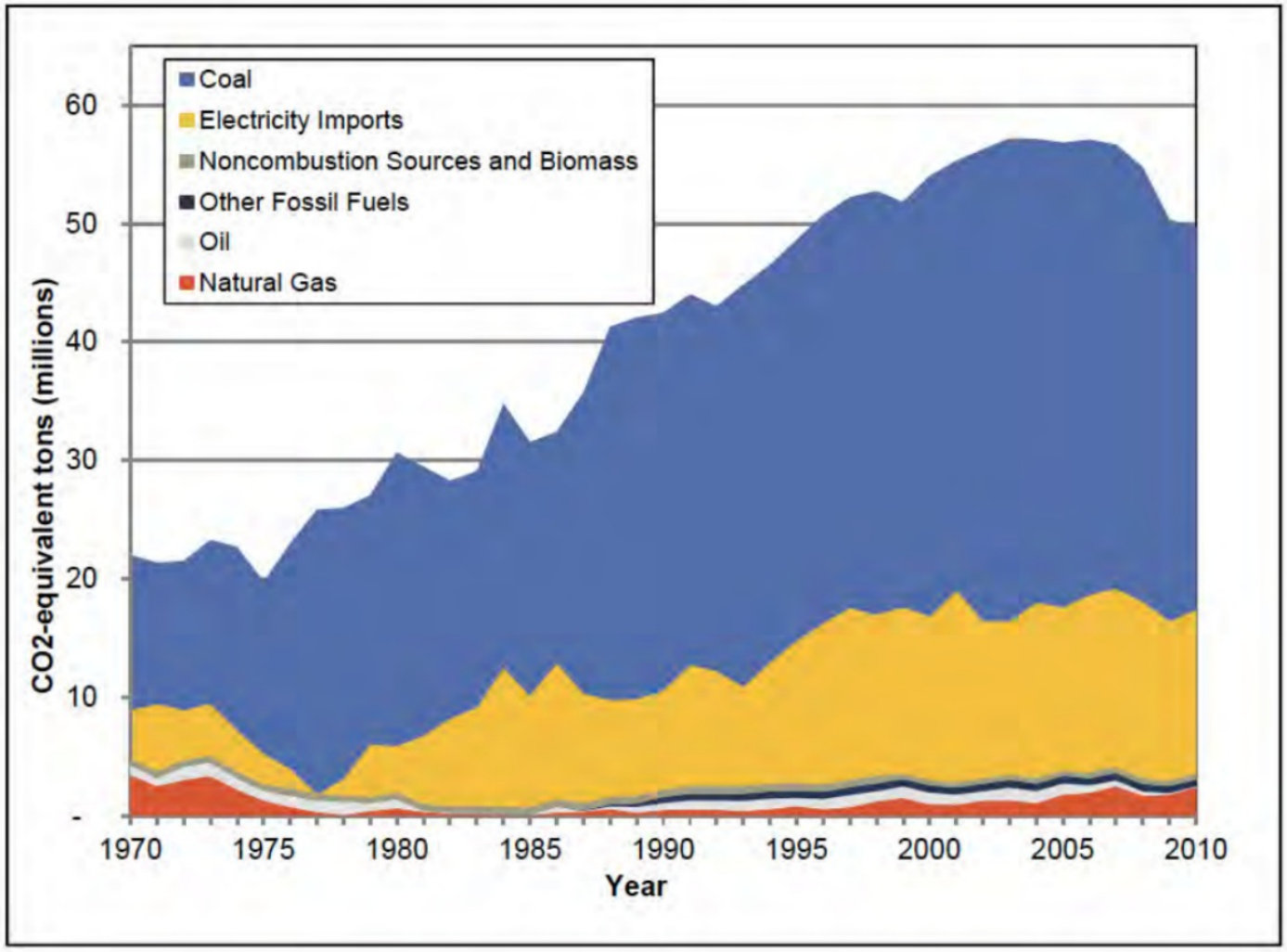
Put the cards in order from BEST to Worst for releasing Carbon Dioxide into the atmosphere. Use "Minnesota Greenhouse gas emmision by source" graph to evaluate fossil fuels.





Minnesota Greenhouse Gas Emissions by Source

Figure 3: GHG Emissions from Electric Generation



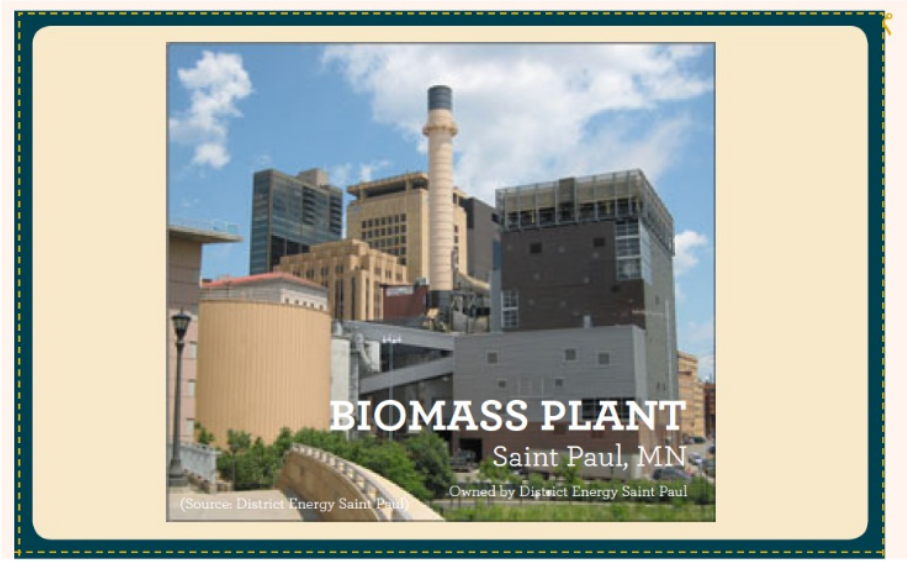
Source: Climate Change: Greenhouse Gas Emissions in Minnesota
http://www.pca.state.mn.us/index.php/topics/climate-change/climate-change-in-minnesota/greenhouse-gas-emissions-in-minnesota.html

Energy Source Pros and Cons

Cons -	Source	Pros +
	List the sources in your order on your notebook page.	
	Put a STAR next to the one that you think is best for reducing greenhouse gases.	

Some renewable resources cost more then others, Now put the cards in order from Most expensive to Least expensive.

Use Economic of Energy to help You evaluate



BIOMASS PLANT

Pros: Burns renewable wood scraps from Minnesota mills

Cons: Can pollute, can lead to deforestation

Source:
US Energy Information Administration

DID YOU KNOW?

- "Biomass" technically refers to any living or once-living material, like wood
- Trees take in CO_2 during their lifetime. This is the only CO_2 they release when burned, so many consider them "carbon neutral"

More Info to help you Sort order from most expensive to least expensive.

Economics of Energy

COMPARING THE COST: NEW ELECTRICITY SOURCES

What's the price of new power? Comparing the levelized costs of new electricity resources on a per megawatt-hour basis shows that effciency comes out on top.

$20-$50
energy efficiency

$57-71
natural gas (advanced combined cycle: a more efficient process)

$82-155
wind energy

$86-$111
conventional coal

$87-118
natural gas (advanced combustion turbine: a less efficient process)

$100-$133
biomass

Energy Source Pros and Cons

Cons -	Source	Pros +

Put a * next to the one that you think is best for Cost.

Energy Source Pros and Cons

Cons -	Source	Pros +

Complete the Pro Cons Columns using the cards

Considering BOTH cost and the need to reduce greenhouse gasses which type of energy should Minnesota invest in? Pick your top 2 choices.

Enter your choices on the form linked on the Conceptual Science website.