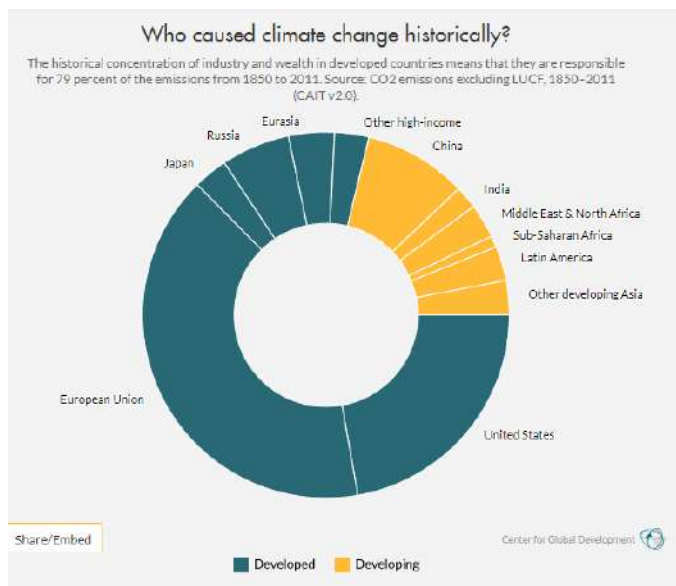


Name \_\_\_\_\_

## DEVELOPING AND DEVELOPED COUNTRIES TAKE ON CLIMATE CHANGE

DO NOW:

1. What are some characteristics of a DEVELOPING country?
2. What are some characteristics of a DEVELOPED country?
3. How do you think the DEVELOPED nations became developed and wealthy?



Historically, the responsibility for climate change, though, rested with the rich countries that emitted greenhouse gases unimpeded from the Industrial Revolution on — and become rich by doing so. Now, some of the most quickly developing countries have become major emitter themselves just as all countries are compelled by the common good to reduce greenhouse gas emissions. A major challenge of reaching a global deal on climate change was to find a way for poor countries to continue developing under the planetary carbon limits that rich countries have already pushed too far. That will involve scaling up finance to deploy clean technologies, to adapt to the effects of climate change, and to compensate countries

that provide the global public good of reducing emissions, especially by reducing tropical deforestation.

**TODAY'S BIG QUESTION:**

*SHOULD DEVELOPING NATIONS BE ABLE TO USE FOSSIL FUELS?*

Station 1:

1. Where are the most deaths because of climate change?
2. What does the word 'insufficient' mean? What countries are critically insufficient in addressing climate change? Do these nations have a high number of deaths or a low number of deaths?
3. What countries emit the most CO<sub>2</sub>? Are these countries going to be affected by climate change the most?

Station 2:

1. What are some environmental impacts of burning fossil fuels?
2. How do we get our fossil fuels out of the Earth? How does this process affect our environment?
3. If more countries burn more fossil fuels, what is going to happen to our climate?
4. Draw a feedback loop for question number 3:

Station 3:

1. What percentage of the world's energy is fueled from fossil fuels?
2. Why are fossil fuels so popular?
3. Why are fossil fuels attractive? If you were a growing nation, would you want to use them?
4. Do developed countries or developing countries use the most fossil fuels? How do you think developed nations become 'developed'?

Station 4: *Watch first the video from 00:00-01:45*

1. What does the video suggest that developing countries do?

2. Why aren't all of the developed nations switching to renewable energy right away?

*Watch the second video*

3. Developing countries may be upset with developed countries because they had a right to.....
  - a. Is it fair for developed nations to tell other countries what to do?

Station 5:

1. What energy sources are the cheapest to use AT FIRST?
2. What energy sources are the cheapest in the long-term?
3. Would you rather have money now? Or wait 50 years to have a lot of money? Do you want to be poor until you are 65 years old?
4. With your idea from #3, so should countries invest in renewable now when they can have more money NOW?

Station 6:

1. Should the poorer nations be allowed to use fossil fuels? How would this benefit them?
2. Obama says WE need to use renewable energy - who do you think he is referring to by we?
3. In the second quote, Obama says this generation needs to do something about climate change since we already feel the effects. With that in mind, should this generation allow countries to continue to burn fossil fuels?

NOW MAKE A DECISION - ***Should developing nations be able to use fossil fuels?***

Write a detailed, one paragraph **CER** below. Use at least 2 pieces of evidence from today's lesson.

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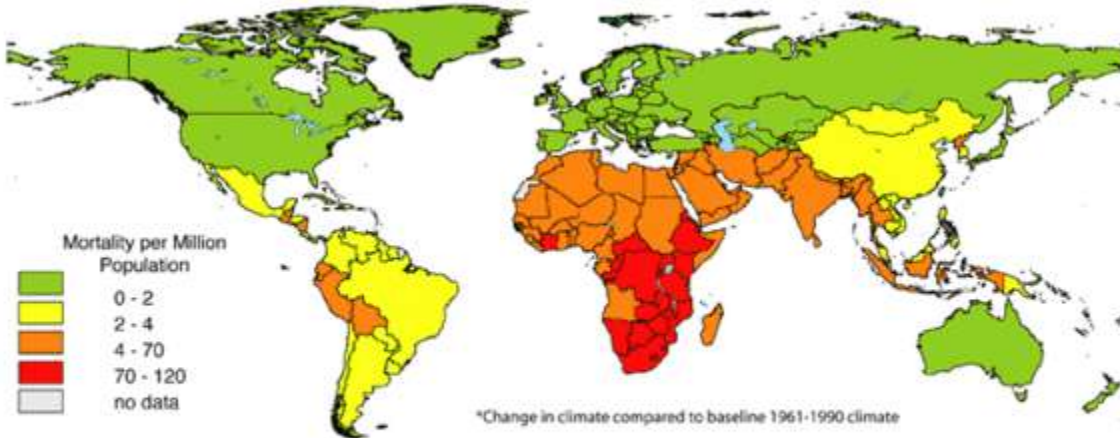
**Closer:**

1. Now think about what nations are most affected by climate change? If we allow them to burn fossil fuels, what do you expect to happen to their countries in the future?
2. Draw a feedback loop for question #2
3. There are consequences to both decisions. List a consequence of the claim / decision you made. How would you address this problem?

**STATIONS RESOURCES**

## STATION 1.

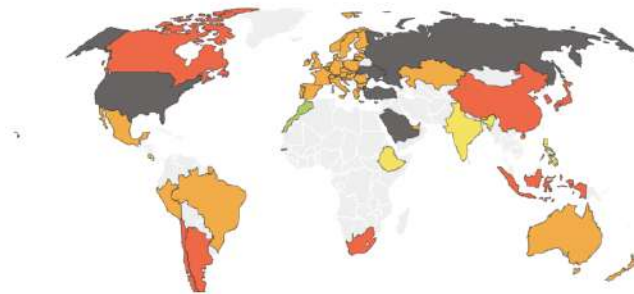
**Estimated Deaths Attributed to Climate Change in the Year 2000, by Subregion\***



Data Source:  
McMichael JJ, Campbell-Lendrum D, Kovats RS, et al. Global Climate Change. In Comparative Quantification of Health Risks: Global and Regional Burden of Disease due to Selected Major Risk Factors. M. Ezzati, Lopez, AD, Rodgers A, Murray CJL. Geneva, World Health Organization, 2004

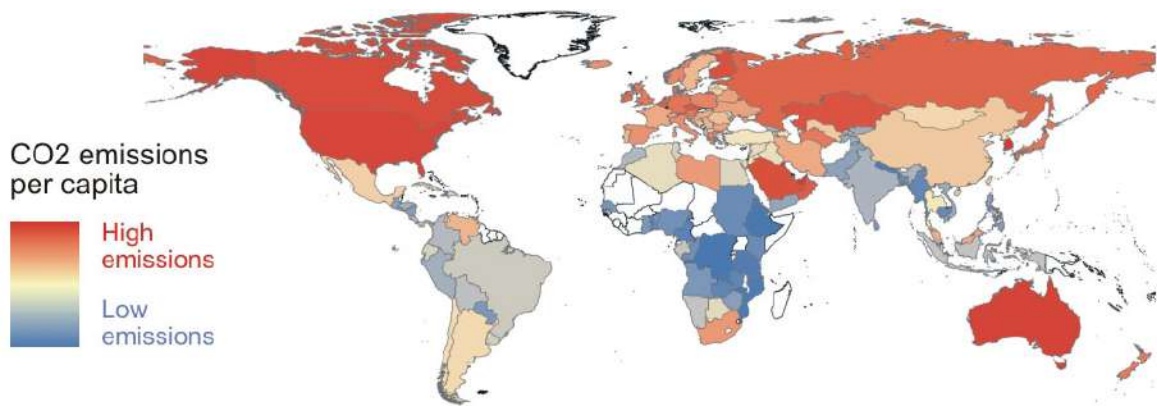


Maps produced by the Center for Sustainability and the Global Environment (SAGE)

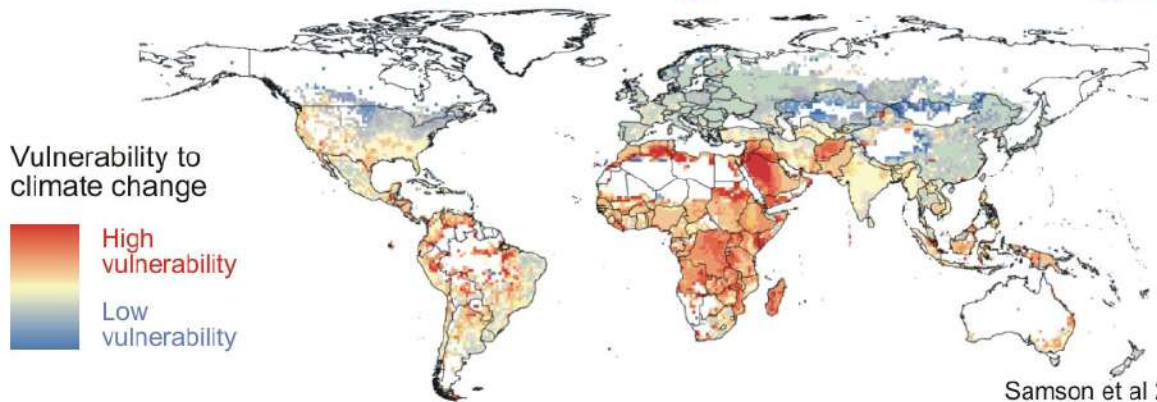


LAST UPDATE: April 2018



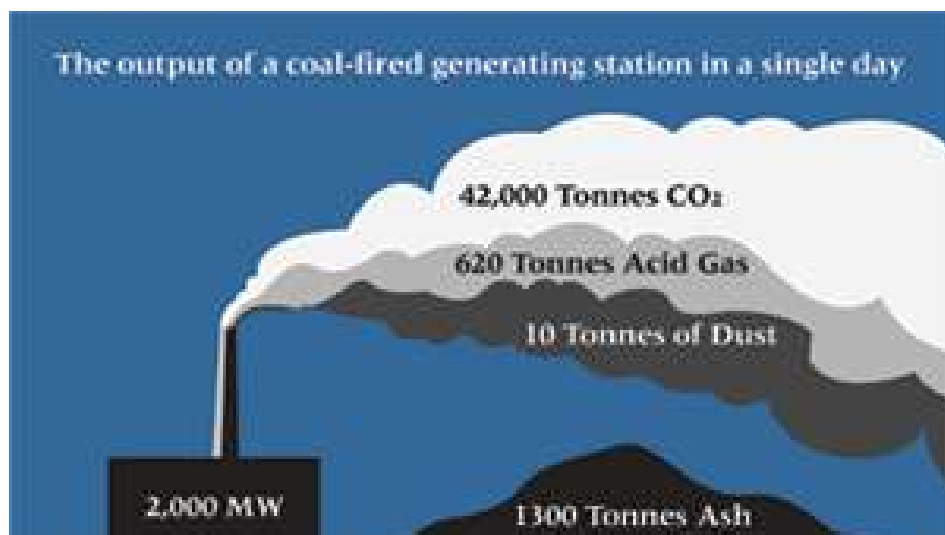
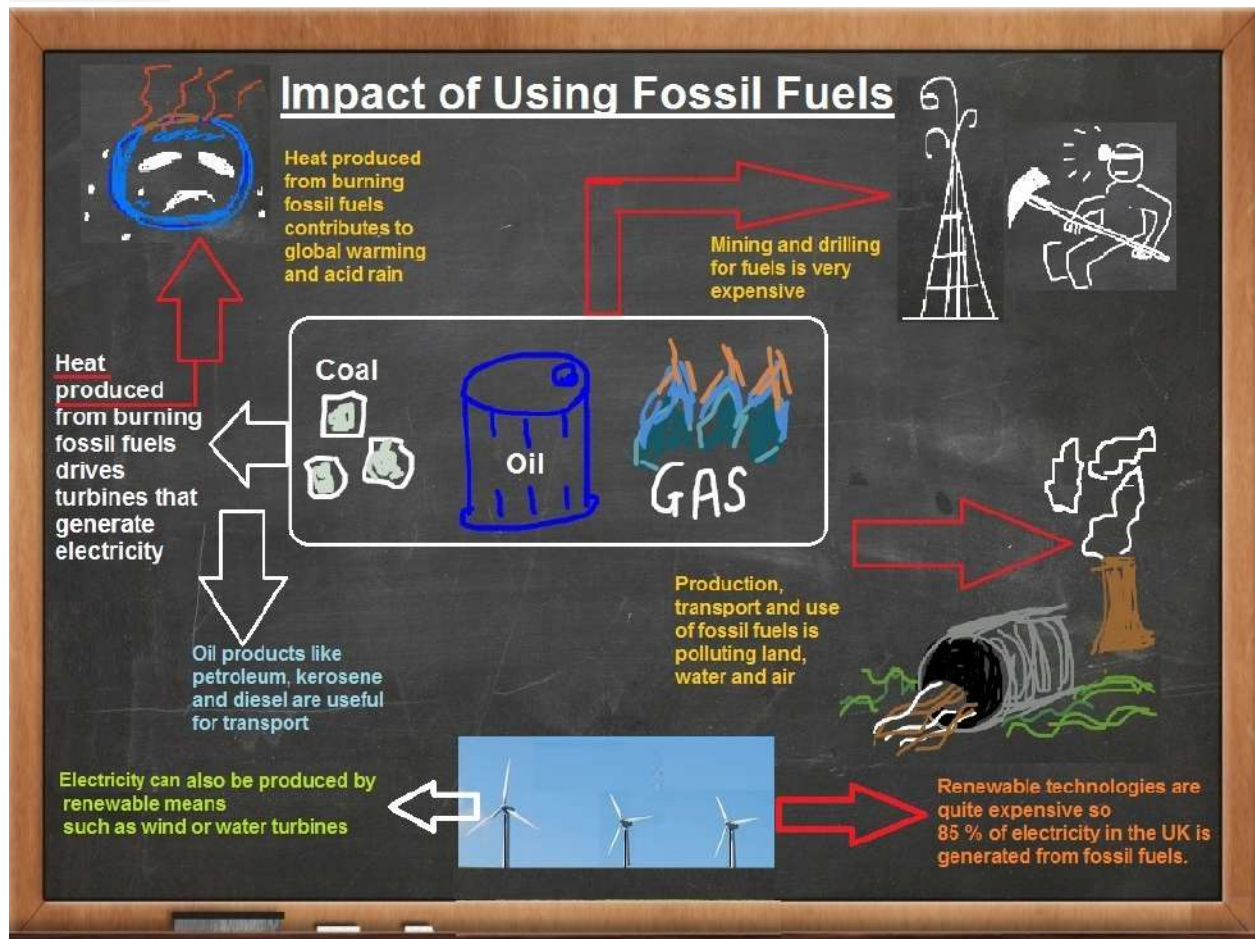


Those who contribute the least greenhouse gases  
**will be most impacted by climate change**



Samson et al 2011

## STATION 2





# Environmental impacts

- burning fossil fuels releases  $CO_2$  which adds to global warming
- Releases gases that contribute to the formation of acid rain
- Gathering wood for fuel can cause deforestation and destroys habitats
- Mining for coal causes air and water pollution. Open cast mining removes large areas of land which destroys more habitats
- Transporting oil either by pipeline or tanker can lead to leaks, Oils spills kills birds and fish and damages the marine ecosystem



### STATION 3

## FOSSIL FUELS AS AN ENERGY SOURCE

Presently, fossil fuels account for about 88% of the commercial energy sources used (not counting energy supplied directly by the sun and traditional biomass sources not traded in commerce). This situation hasn't changed much over the last 50 years (Table 1) and could persist for 50 more. Considering the environmental problems associated with the increasing use of fossil fuels, why are they so popular?

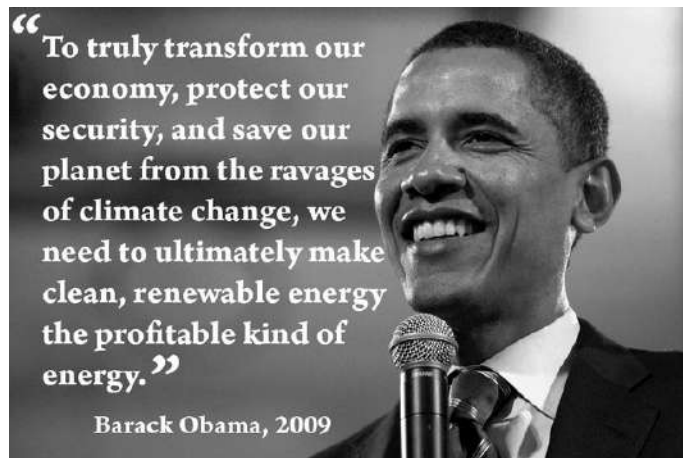
Fossil fuels are relatively marvelous energy sources. The variety of fossil fuels plus the technology mankind has developed to produce and convert them to useful purposes is a marvelous combination. As a result, fossil fuels are available everywhere, and some are easy to transport. Technical advances have led not only to discoveries and production from the most inhospitable (tough to live) places but also to more complete resource recovery. Although fossil fuels are depletable, the estimated resources are still very large. The undiscovered resources of oil and gas are judgmental estimates of those resources thought to be geologically possible and technically recoverable within a reasonable price range. For coal, ultimately recoverable geological resources is an estimate based on the assumption that 50% Of the total coal resources-in-place can be recovered using current mining techniques as well as advanced techniques yet to be developed.

Fossil fuels are attractive not only because they are available and relatively inexpensive but also because we have learned to use them so effectively. The relatively simple technology of controlled combustion provides energy for both small- and large-scale applications. Almost exclusively, liquids refined from petroleum power the world's transportation systems (greater than 97% in the United States) because these fuels have such a high energy density, because they are so portable, and because of the development of the internal combustion engine and the modern jet engine.

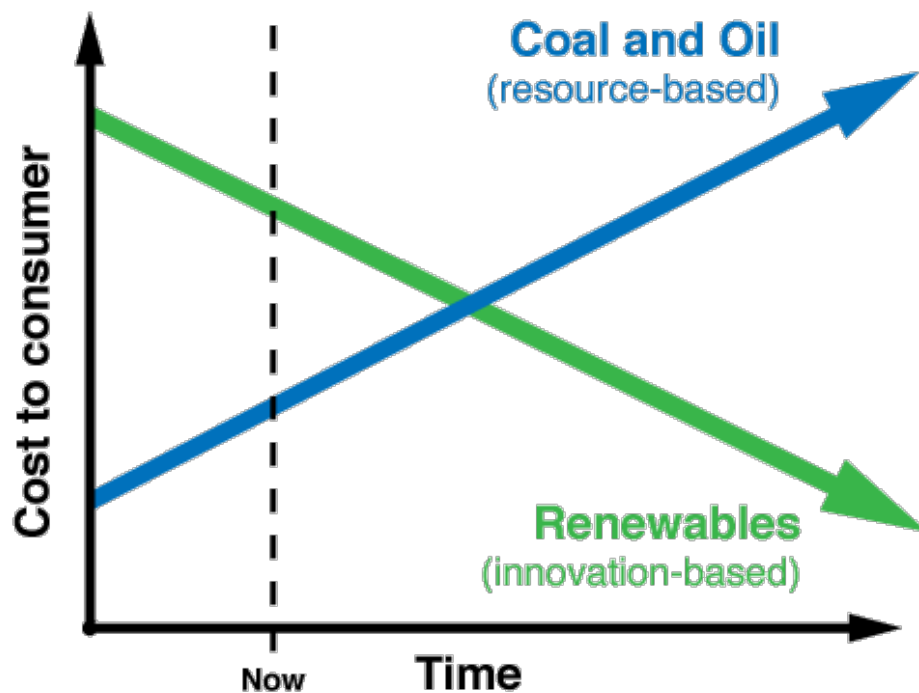
The top 3 producers of fossil fuels – China, America and Russia – are also the top 3 consumers of fossil fuels. Unsurprisingly, they are almost all developed economies: Japan, Germany, South Korea, Brazil, United Kingdom and Italy.

## STATION 6

*“But even as we push to get serious about confronting climate change, we should not try to solve the problem on the backs of the poor. For one thing, poor countries represent a small part of the carbon-emissions problem. And they desperately need cheap sources of energy now to fuel the economic growth that lifts families out of poverty. They can’t afford today’s expensive clean energy solutions, and we can’t expect them wait for the technology to get cheaper.”*



## STATION 5



Fuel Type	Advantages	Disadvantages
<b>Coal</b>	Inexpensive fuel Abundant supply near existing resources Low cost resource Reliable, semi-flexible operation	Produces highest level of emissions, including carbon dioxide Relatively water intensive
<b>Nuclear</b>	Produces no emissions Low-cost resource Reliable, fixed operation	High up-front capital cost Produces radioactive waste, for which long-term storage and disposal is not resolved Uses reclaimed water
<b>Natural Gas</b>	Cleaner burning than coal, including half of the carbon emissions Abundant supply in New Mexico (local production as well as access to interstate pipelines) Reliable, fully-flexible operation Flexible design options from base load to peaking plant types	Still produces emissions, including carbon Volatile in price Can achieve low water intensities at a price
<b>Wind</b>	No emissions or water use NM ranks 10th in the nation for wind energy production potential (Source: AWEA) No fuel cost	Intermittent in nature High up-front capital costs for equipment and transmission Requires fossil-fueled backup Wind power is often not available when customers use the most electricity.
<b>Solar</b>	No emissions or water use NM ranks second in the nation for solar energy production potential No fuel cost While solar energy production peak does not precisely match the peak daily hours for energy consumption, generation is during daylight hours, when usage is high	Intermittent in nature Prices have been declining, but still have high up-front capital costs for equipment Requires large land area; 8-10 acres/MW for PV Requires fossil-fueled backup Other solar technologies such as solar thermal hold promise, but have not demonstrated cost-competitiveness with solar PV for electric utility needs
<b>Geothermal</b>	No air emissions High capacity factor generation	High up-front capital costs Water intensive Favorable sites may not be available in all areas of the country or New Mexico
<b>Solar Thermal</b>	No Emissions Less operational variation than wind or solar PV No fuel cost	Intermittent in nature Water intensive High up-front capital costs

## VIDEOS - STATION 4

<https://www.youtube.com/watch?v=vveoL2vqqZY>

<https://www.youtube.com/watch?v=OoJ9esEvnL4>