Lecture

• Climate Believers
• Temperature Increases and Potential Risks
• The Kaya Equation
Announcements

• Homework 4 posted: Due Monday 4/29.
• Homework 4 reading on website.
Climate Change Believers/Deniers

There are 6 distinct audiences in the United States.

Source: Yale Program on Climate Change Communication
Alarmed

• The alarmed are fully convinced of the reality and seriousness of climate change and are already taking action to address it.
Concerned

- The concerned are also convinced that climate change is happening and that it is a serious problem, but have not yet engaged the issue personally.
Cautious

• The **cautious** are not sure if climate change is happening or if it is human caused.
Disengaged

• The disengaged don’t know anything about it.
Doubtful

• The *doubtful* either don’t think climate change it is happening or think it is natural and not a threat. Not taking action either way.
Dismissive

• The dismissive are convinced climate change is not happening and that is a hoax.

• Oppose climate action and are actively involved as opponents of efforts to reduce greenhouse gas emissions.
Where do you fall?

a) Alarmed
b) Concerned
c) Cautious
d) Doubtful
e) Dismissive
About 67% of the US population is inclined to believe that climate change is real.
2018

- Alarmed: 29%
- Concerned: 30%
- Cautious: 17%
- Disengaged: 5%
- Doubtful: 9%
- Dismissive: 9%

December 2018
n=1,114

Highest Belief in Global Warming
Most Concerned
Most Motivated

Lowest Belief in Global Warming
Least Concerned
Least Motivated
In the past 14 years 10% of the population has transitioned from Group 2 to Group 1.
Carbon Stabilization Revisited

The bad news 😞:
• Business as usual (BAU) likely lead to disastrous consequences.

The good news 😊:
• Stabilizing at roughly double current carbon levels seems possible.
• This will leave us until 2040ish to begin reducing emissions.
• And until 2100 to bring carbon emissions down to half of current levels.
• Most likely temperature change: $3^\circ C$ ($5.4^\circ F$)

Atmospheric Stabilization Emissions Paths

- Business As Usual
- 750 ppm ceiling
- 550 ppm ceiling = 2 x Pre-Industrial CO
- 350 ppm ceiling
Stern’s “Temperature Increases and Potential Risks”

- Food
- Water
- Ecosystems
- Extreme Weather Events
- Runaway G.Effect
Stern’s “Temperature Increases and Potential Risks”
The Kaya Identity

The Kaya Identity: States that the total $CO_2$ emission levels can be expressed as the product of four factors:

1. Population
2. GDP per Capita
3. Energy Intensity
4. Carbon Intensity
The Kaya Identity

\[ F = P \times \frac{G}{P} \times \frac{E}{G} \times \frac{F}{E} \]

- \( F \) – Emissions
- \( P \) – Population
- \( G \) – Per Capita Gross Domestic Product (GDP per capita)
- \( E \) – Energy
The Kaya Identity

\[ F = P \times \frac{G}{P} \times \frac{E}{G} \times \frac{F}{E} \]

Goal is to return yearly G.H.G. emissions to about 1/2 of today's levels.

Need to reduce G.H.G. emissions per energy used \((F/E)\) by about a factor of 5.
ICLICKER QUESTION

According to Stern’s “Temperature Increases and Potential Risks” graphic, which of the following will be affected by changes in temperature increases?

a) Food
b) Water
c) Extreme Weather Events
d) all of the above
e) b and c
The Kaya Identity relates human factors to:

- total $CO_2$ emission levels
- the amount of fossil fuels burned
- energy efficiency
- increase in population
- global economic growth
In-Class Activity Links
