

Introduction to Climate Change

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Lecture One: Climate change: is there a problem?

Some views from leaders

- Ban Ki Moon: *“Climate change is the greatest threat facing humanity. It threatens to undo 50 years of our development work and it will impact the poor in the greatest sense”*
- Barack Obama: *“We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations”*
- Tony Abbot: *“Coal is good for humanity”*
- Donald Trump: *“Global warming is an expensive hoax”*

The beginning of climate change

- Was first stated as a problem due to burning fossil fuels in 1896.
- When there are no greenhouse gasses in the atmosphere, the planet cools by losing infrared radiation to space. This would lead to an equilibrium being reached with space (-15C).
- The gases in the atmosphere can absorb heat and reflect it back to the planet
- The most important greenhouse gas in the atmosphere is water vapor. There is more water in the atmosphere than any other gas. It can absorb heat very well too.
- However, water is rained out of the atmosphere, while other gases remain in the atmosphere for a very long time.

Relationship between carbon dioxide and temperature variation

- CO₂ and temperature is closely linked over the past 8,000 years. However this has changed over the past 150 years.
- In the last 150 years, CO₂ concentration has increased by over 100ppm. Over the past 8000 years, CO₂ was never above 300ppm. It is now 420ppm. The temp + climate system is still adjusting to this increase.
- People believe that since that there hasn't been any increase in the past 20 years, that climate change doesn't exist.

- Looking at the data however, there is a long term warming trend, of about 0.1 of a degree per decade.
- Over the last 150 years, there has been variability but temp have gotten warmer.

Projected changes

- Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions

Climate change risks to Victoria

- There is a reduction in stream flow due to a reduction in rainfall.
- Reduction in water availability
- Increase bushfire – less water + hotter temps = more extreme bushfires
- Less water available for irrigated agriculture
- We have experienced all of these in the last 10 years
- Higher temps = higher sea levels due to melting glaciers

UN Framework Convention on Climate Change (UNFCCC)

- Established following the United Nations Conference on Environment and Development in Rio de Janeiro in 1992
- Objective is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”
- “Parties should protect the climate system... on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change”
- Refined by 192 countries, and came into force in March 1994

Danger

- Dangerous: *Damage on people, agriculture, ecosystems. How big and far is the rate of change?* People argue that climate change is happening, but not at a dangerous rate. Or when do we start worrying about climate change, despite it being dangerous. This will not be decided by science, but by the set of values society has.
- We are already seeing dangerous effects: bleaching of the reefs, bush fires, etc.

UNFCCC COP21 in Paris

- Countries met to approve a binding agreement on targets for emission reduction, for future review and verification, and support for developing countries.
- Major outcomes:
 - Agreement reached, goal to limit warming to well below 2C, aspirational target to limit warming to less than 1.5C
 - Targets not yet strong enough to limit warming below 2C
 - Increase Green Climate Fund for developing countries
- However, dangerous effects are occurring at 1C

Budget approach

- Cumulative emissions allowed for 25% risk of exceeding 2C
- Equal per capita emission allowance
- Global budget of 1000Gt CO₂ until 2050

- For Aust emissions of 20 t CO₂ per person from fossil fuels, budget is used in 7 years
- Australians emit more per capita than any other country, this is due to the cheap price of fossil fuels and electricity.
- To combat this, we need:
 - Greater use of low-carbon and no-carbon energy
 - Improved carbon sinks
 - Reduced deforestation and improved forest management and planting of new forests
 - Bio-energy with carbon capture and storage
 - Lifestyle and behavioural changes – our behaviour and lifestyle contributes to this problem

Recent Australian climate policies

- Carbon price and ETS legislation was repealed in 2014 and emissions are growing
- The Renewable Energy Target has been weakened, after multiple reviews
- The Government is pursuing its Direct Action policy, with the Emissions Reduction Fund purchasing emission reduction commitments from industry, with a Safeguard Mechanism
- Climate Change Authority recommended emission reduction target of 40% to 60% below 2000 levels by 2030
- Govt target: reductions of 5% below 2000 levels by 2020; 26% to 28% below 2005 levels by 2030 (22% below 2000)
- PM Turnbull, 1 Jun 2017: “We are committed to the Paris Agreement, and we’re on track to meet our targets” – however this is not true.
- Since the removal of Australia’s emission trading system, Australia’s emissions have grown by 1% every year