

Climate Threat to the Planet: Implications for Intergenerational Equity and Justice



**Dr Jim Hansen
November 14, 2008
Partnership for Change, Climate
Change Conference
Cork, Ireland**

Jake - 11 months



Sophie explains 2 Watts of forcing to brother Connor



Sophie Explains GH Warming



Connor gets it: 2 Watts



United Nations Framework Convention on Climate Change

Aim is to stabilize greenhouse gas emissions...

“...at a level that would prevent dangerous anthropogenic interference with the climate system.”



Metrics for “Dangerous” Change

Extermination of Animal & Plant Species

1. Extinction of Polar and Alpine Species
2. Unsustainable Migration Rates

Ice Sheet Disintegration: Global Sea Level

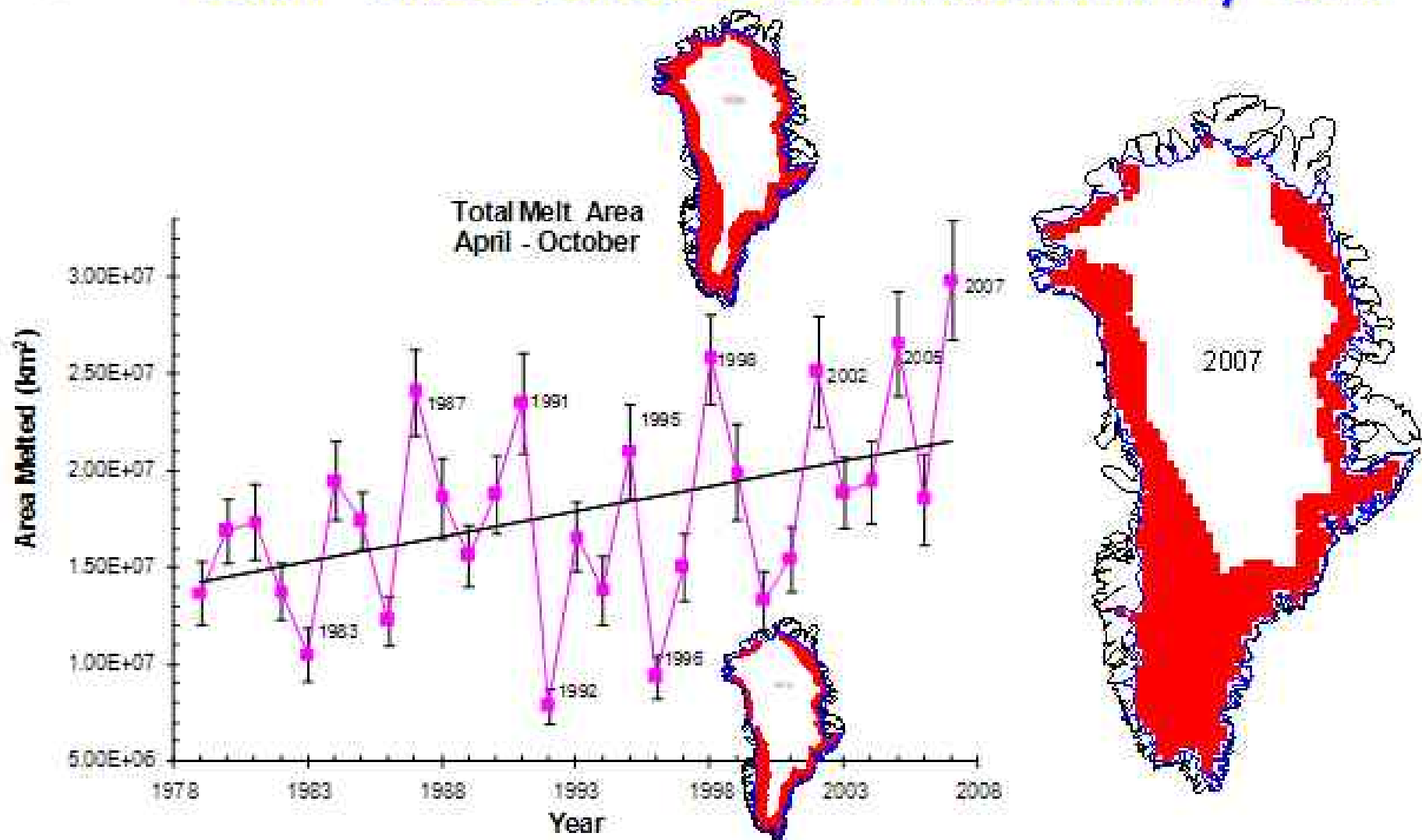
1. Long-Term Change from Paleoclimate Data
2. Ice Sheet Response Time

Regional Climate Disruptions

1. Increase of Extreme Events
2. Shifting Zones/Freshwater Shortages



Greenland Total Melt Area - 2007 value exceeds last maximum by 10%





Jakobshavn Ice Stream in Greenland

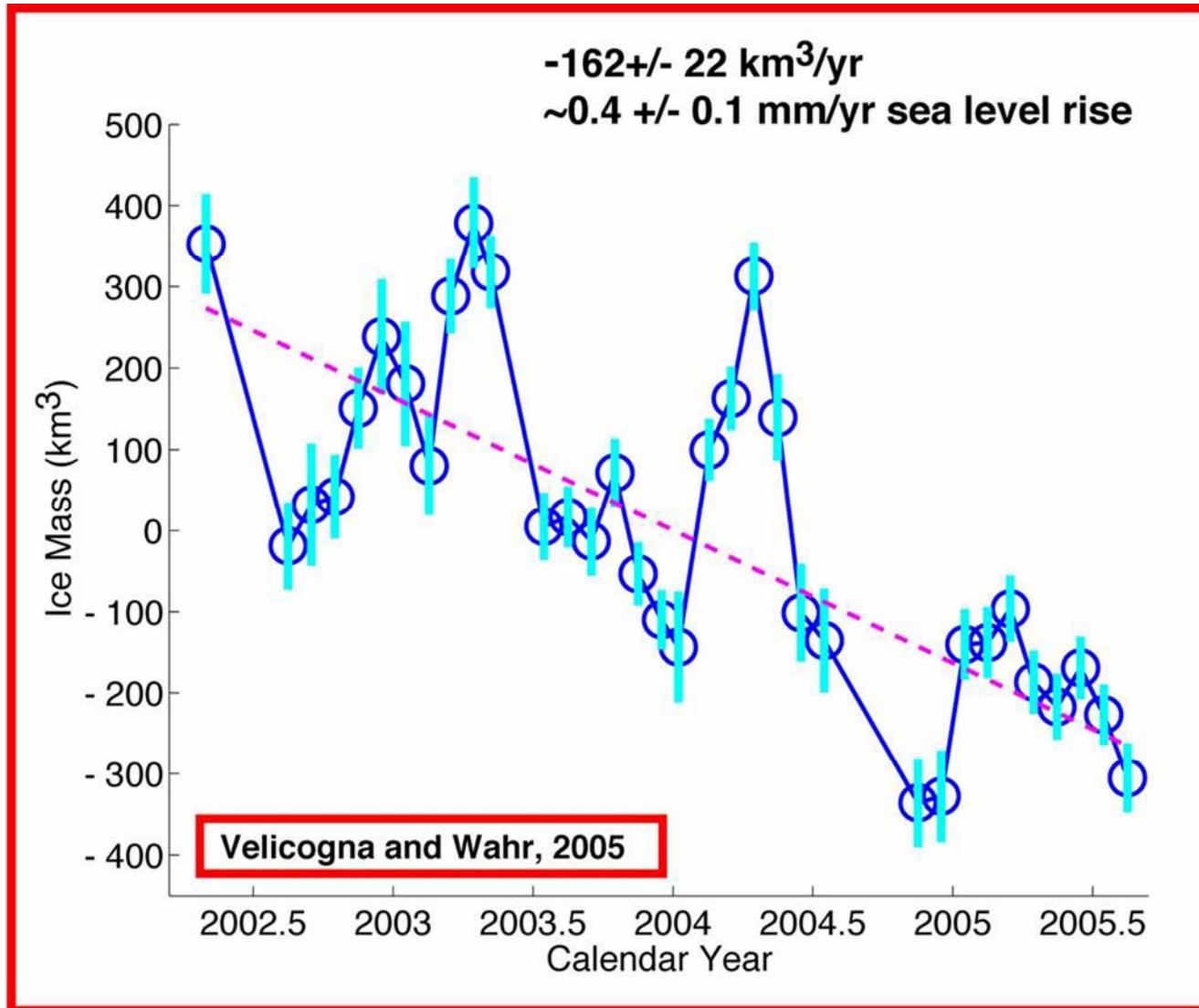
Discharge from major Greenland ice streams is accelerating markedly.



*Source: Prof. Konrad Steffen,
Univ. of Colorado*



Greenland Mass Loss – From Gravity Satellite





Sea Level Criterion*

1. Prior Interglacial Periods

→ $\text{CO}_2 < \sim 300 \text{ ppm}$

2. Cenozoic Era

→ $\text{CO}_2 < \sim 300 \text{ ppm}$

3. Ice Sheet Observations

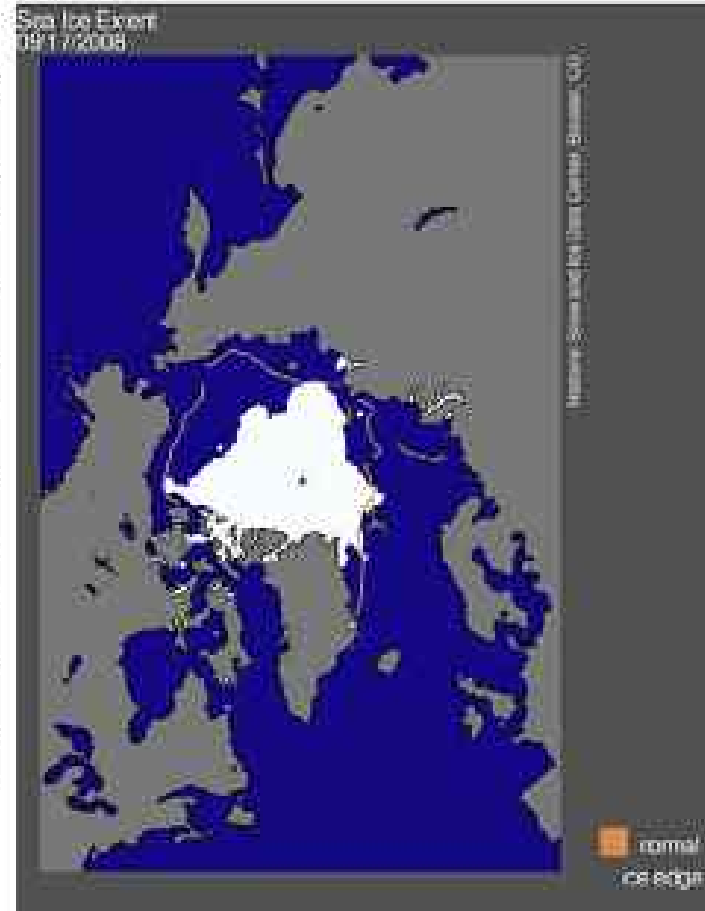
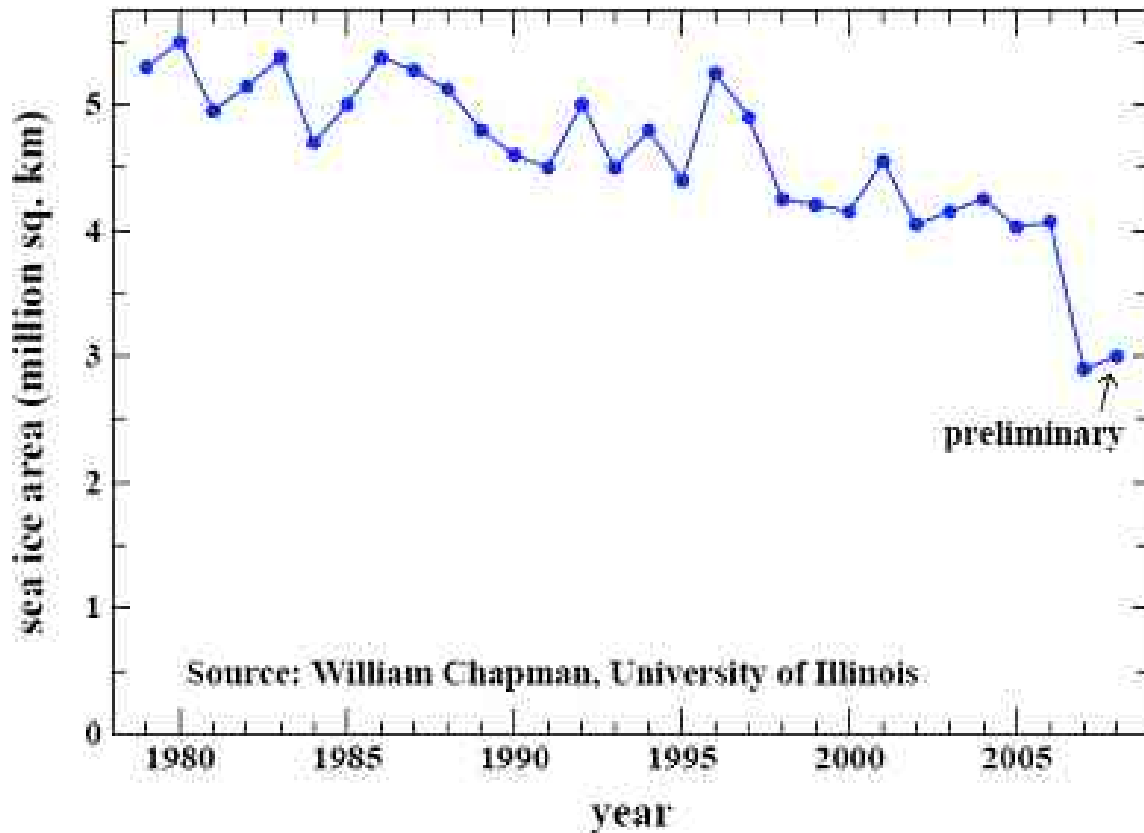
→ $\text{CO}_2 < 385 \text{ ppm}$

* Assuming near-balance among non- CO_2 forcings



Arctic sea ice area at summer minimum.

Sea ice area at summer minimum





Arctic Sea Ice Criterion*

1. Restore Planetary Energy Balance

→ CO₂: 385 ppm → 325-355 ppm

2. Restore Sea Ice: Aim for -0.5 W/m²

CO₂: 385 ppm → 300-325 ppm

Range based on uncertainty in present planetary energy imbalance (between 0.5 and 1 W/m²)

* Assuming near-balance among non-CO₂ forcings



Pier on Lake Mead



**Subtropics expected to expand with global warming.
Observations show 4 degrees of latitude expansion.**



Rongbuk Glacier



Rongbuk glacier in 1968 (top) and 2007. The largest glacier on Mount Everest's northern slopes feeds Rongbuk River.



Stresses on Coral Reefs



Coral Reef off Fiji (Photo: Kevin Roland)



Assessment of Target CO₂

Phenomenon

Target CO₂ (ppm)

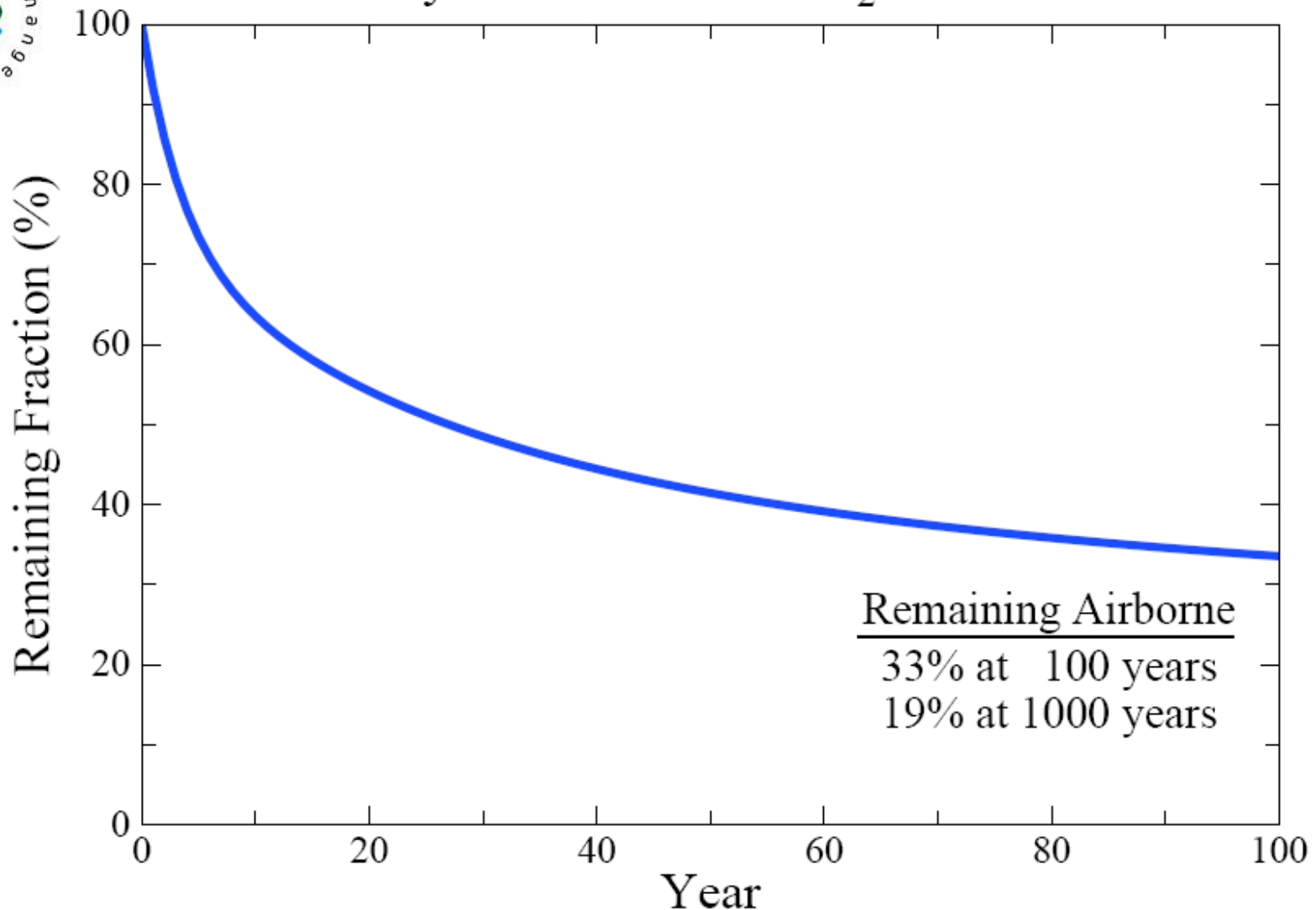
- | | |
|------------------------------|---------|
| 1. Arctic Sea Ice | 300-325 |
| 2. Ice Sheets/Sea Level | 300-350 |
| 3. Shifting Climatic Zones | 300-350 |
| 4. Alpine Water Supplies | 300-350 |
| 5. Avoid Ocean Acidification | 300-350 |

→ Initial Target CO₂ = 350* ppm

*assumes CH₄, O₃, Black Soot decrease



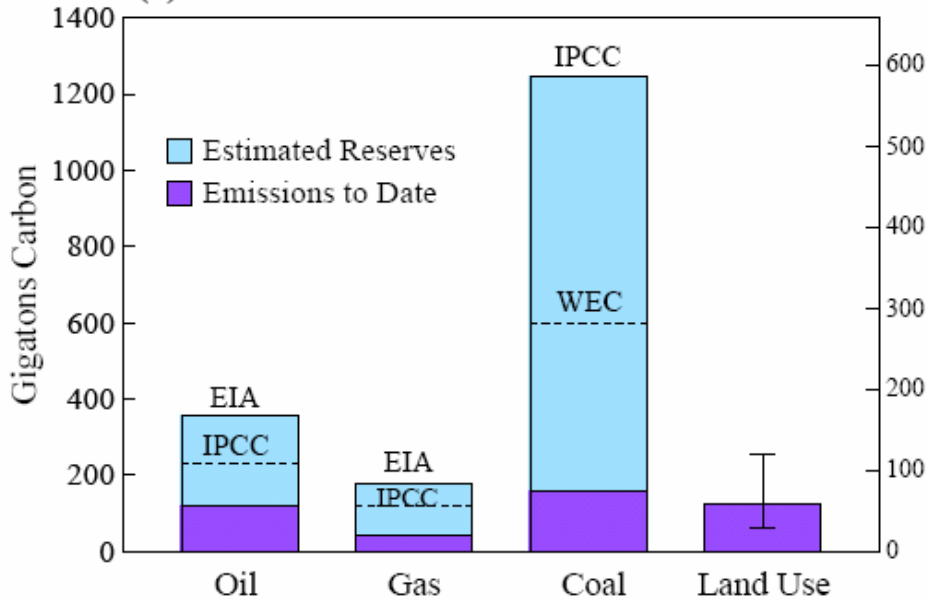
Decay of Fossil Fuel CO₂ Emission



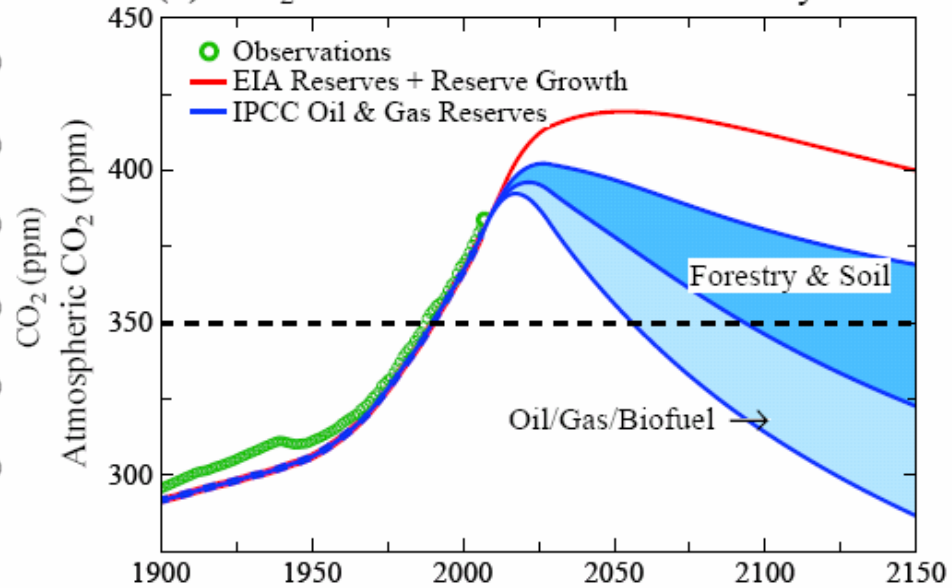
The fraction of CO₂ remaining in the air, after emission by fossil fuel burning, declines rapidly at first, but 1/3 remains in the air after a century and 1/5 after a millennium (*Atmos. Chem. Phys.* **7**, 2287-2312, 2007).



(a) Fossil Fuel and Net Land Use Emissions



(b) CO₂ Amount with Coal Phaseout by 2030



Coal phase-out by 2030 → peak CO₂ ~400-425 ppm, depending on oil/gas
Faster return below 350 ppm requires additional actions



Initial Target CO₂: 350 ppm

Technically Feasible

(but not if business-as-usual continues)

Quick Coal Phase-Out Critical

(long lifetime of atmospheric CO₂)

(must halt construction of any new coal plants that do not capture & store CO₂)



Basic Conflict

Fossil Fuel Special Interests

VS

Young People & Nature (Animals)

Fossil Interests: God-given fact that all fossil fuels will be burned **(no free will)**

Young People: Hey! Not so fast!
Nice planet you are leaving us!



What are the Odds?

Fossil Interests: have influence in capitals world-wide

Young People: need to organize, enlist others (parents, e.g.), impact elections

Animals: not much help (don't vote, don't talk)



Intergenerational Conflict

Intergenerational inequity and injustice is the result, affecting the young and unborn.

'Did not know' defense of prior generations no longer viable.

Ethical and legal liability questions raised by actions that deceived the public.

Continued failure of political process (not even available to young and unborn) may cause increasing public protests.



Climate Change Protest at Kingsnorth Power Station



Greenpeace activists on the painted chimney
October 8 2008. Photograph: Will Rose/Greenpeace



Kingsnorth Six: Not Guilty



Huw Williams, Kevin Drake, Ben Stewart, Tim Hewke, Emily Hall and Will Rose
outside Maidstone Crown Court.

Photograph: Jiri Rezac/Greenpeace



Web Site

www.columbia.edu/~jeh1

includes

**Target Atmospheric CO₂: Where Should
Humanity Aim?**

**Global Warming Twenty Years Later:
Tipping Points Near**

In Defence of Kingsnorth Six