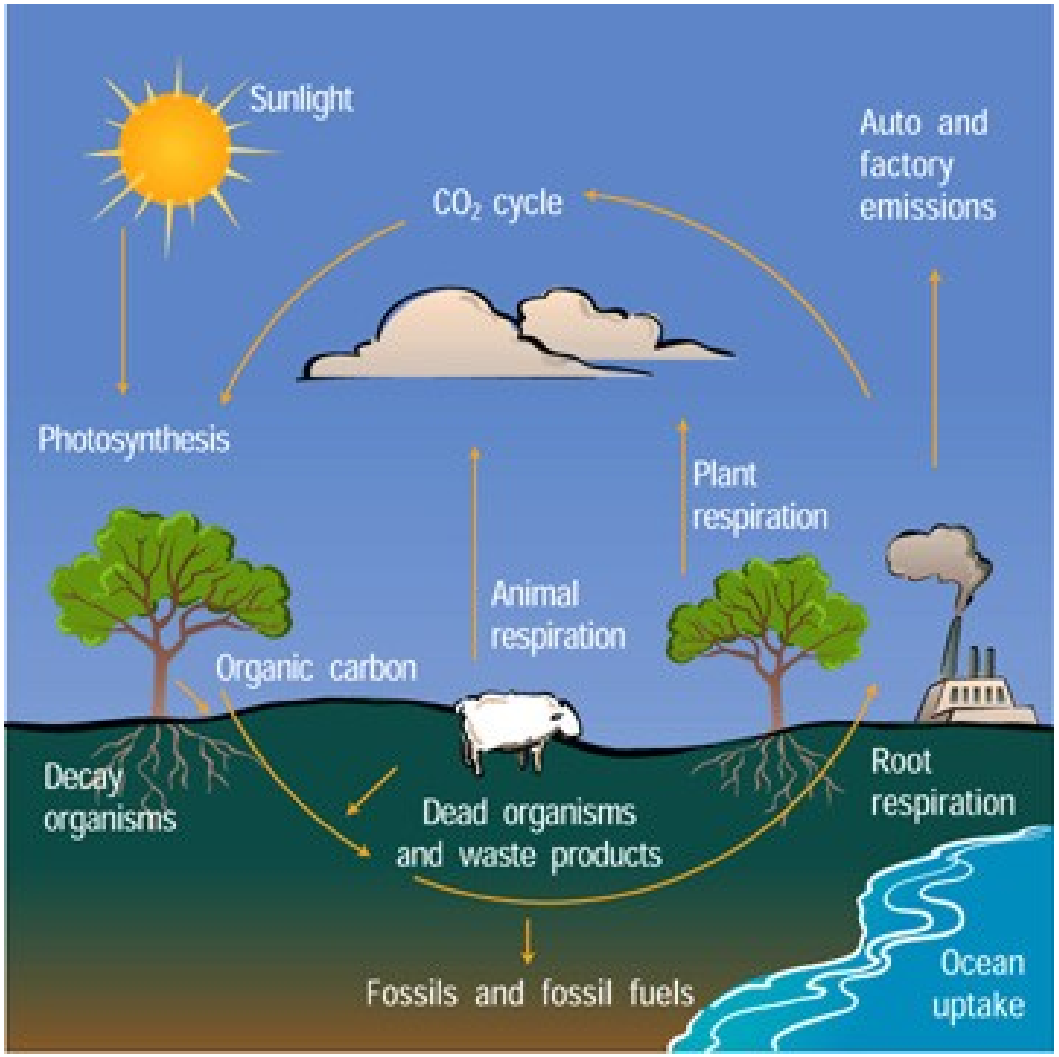
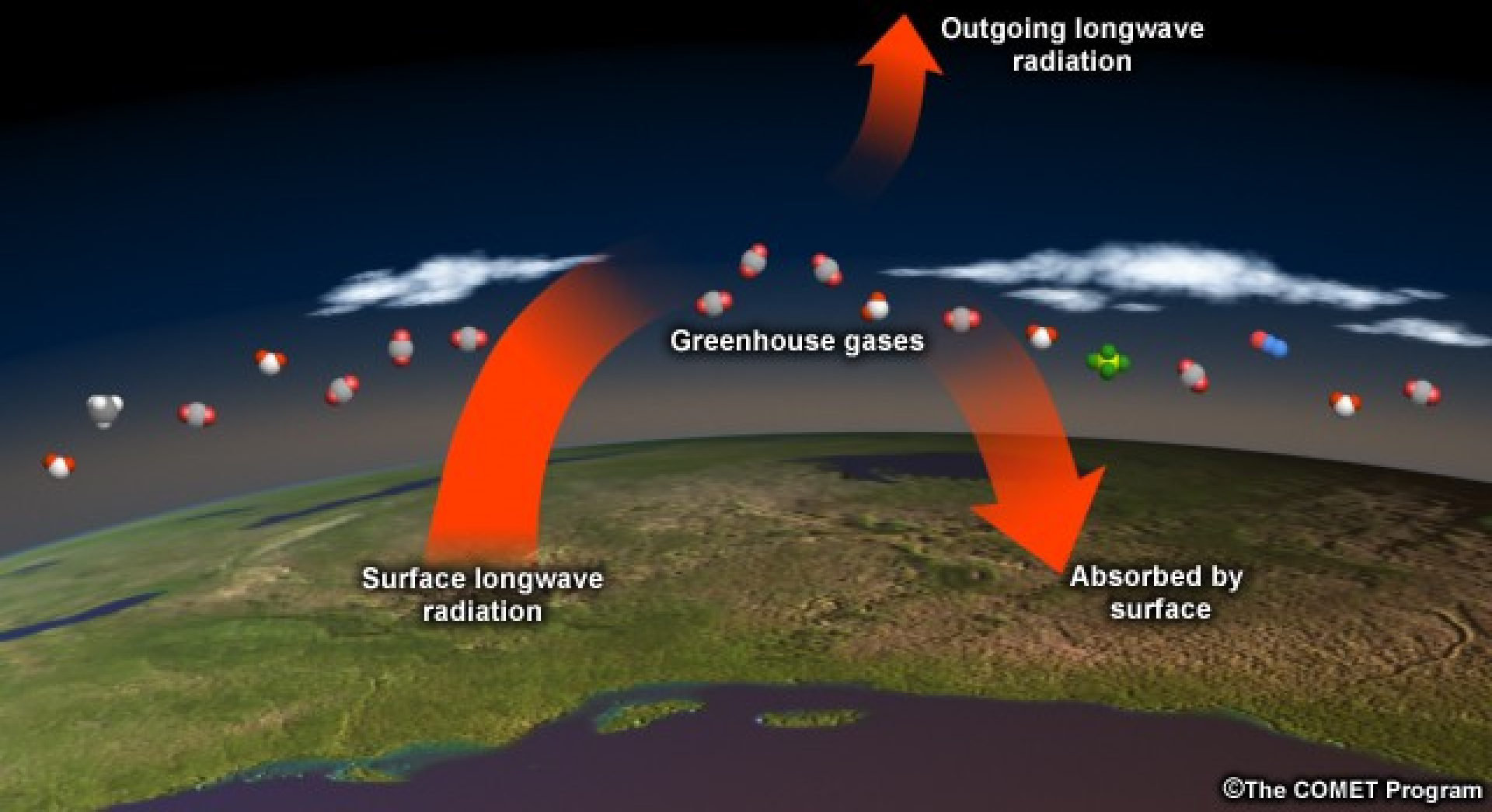
The Science and Economics of Climate Change

Based on presentations by John Houghton of IPCC, Earthguage, the Met. Office and the Stern Review

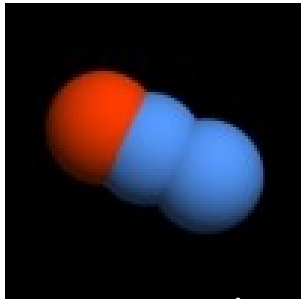
The Carbon Cycle



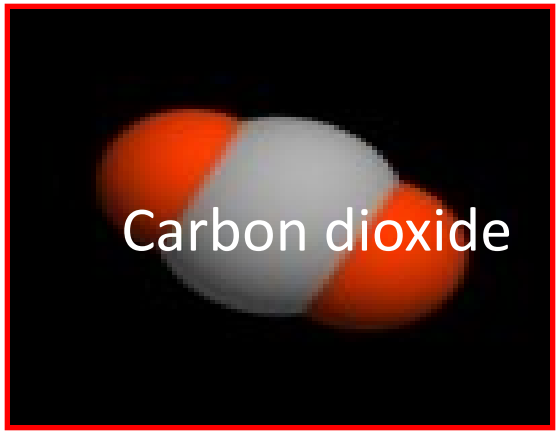
Increasing greenhouse gases trap more heat

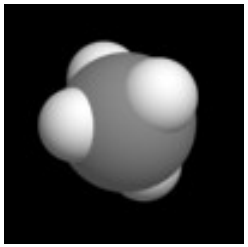


Greenhouse gases

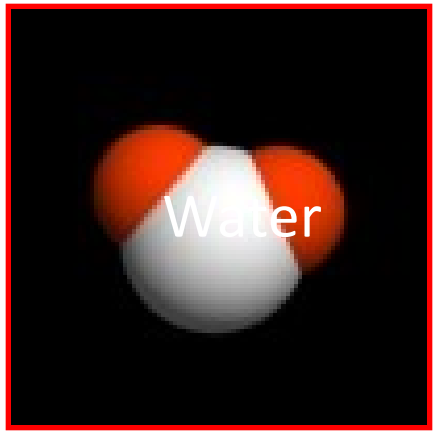


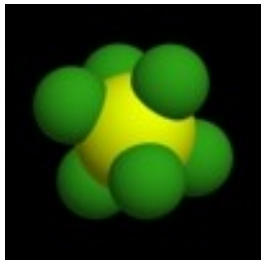
Nitrous oxides





Methane

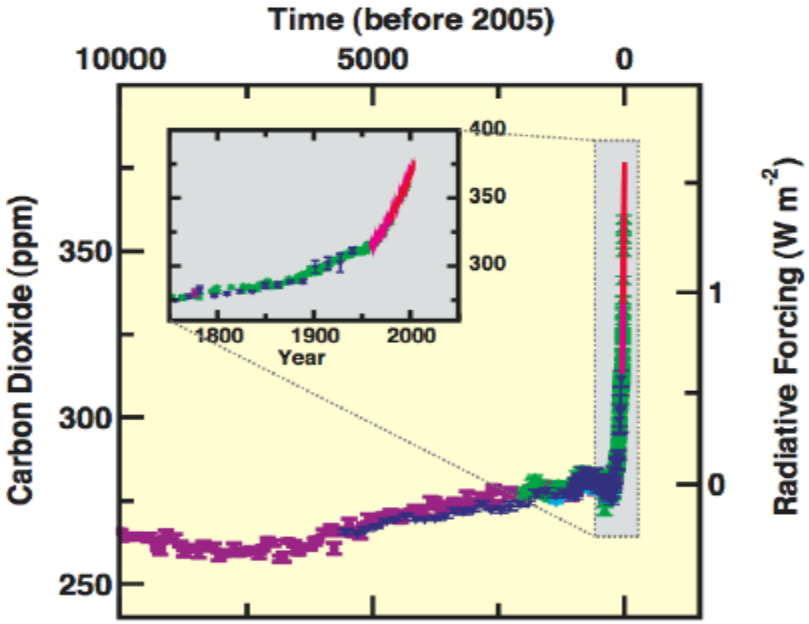




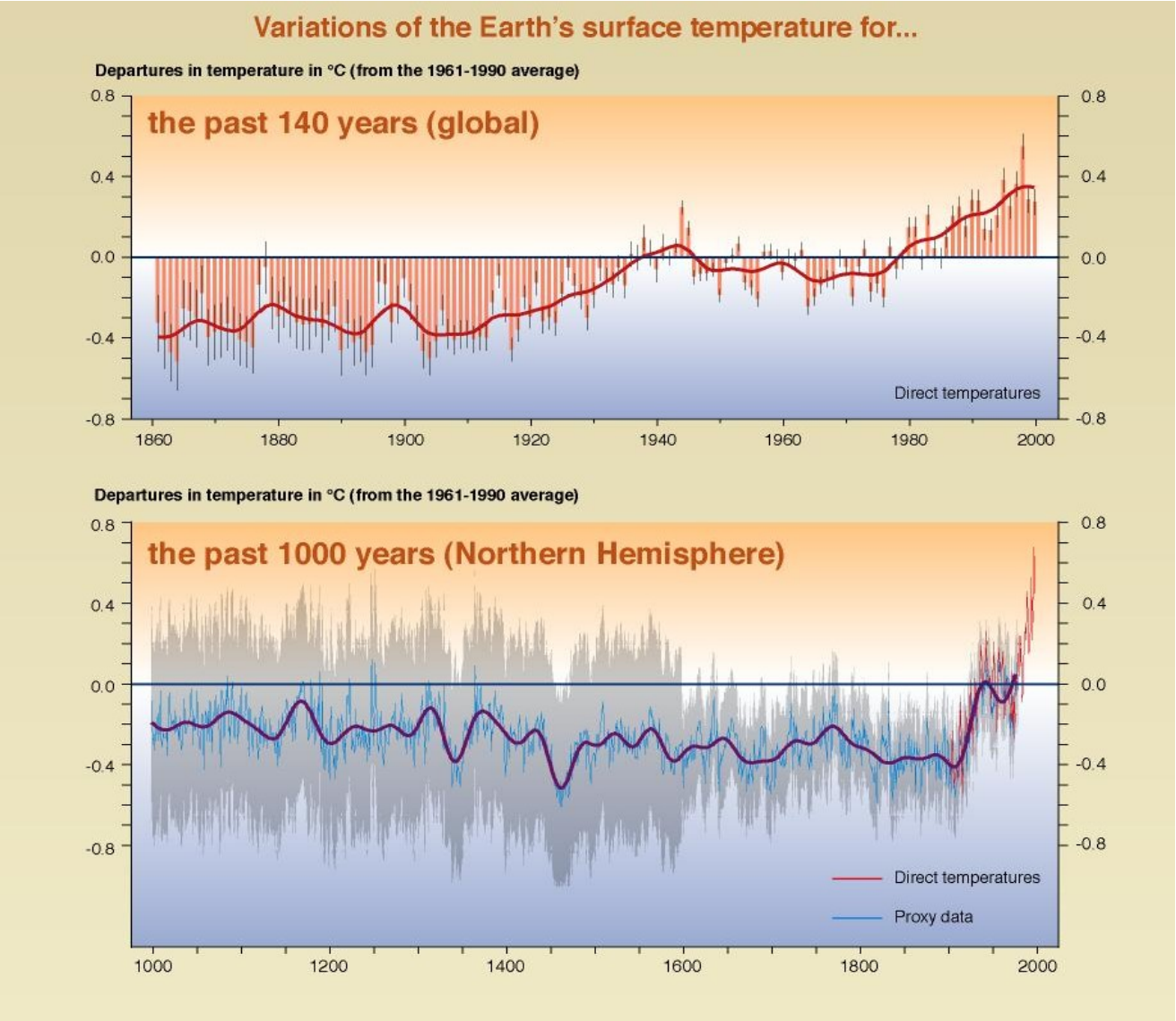
Sulphur hexaflouride

Unprecedented human drivers of climate change

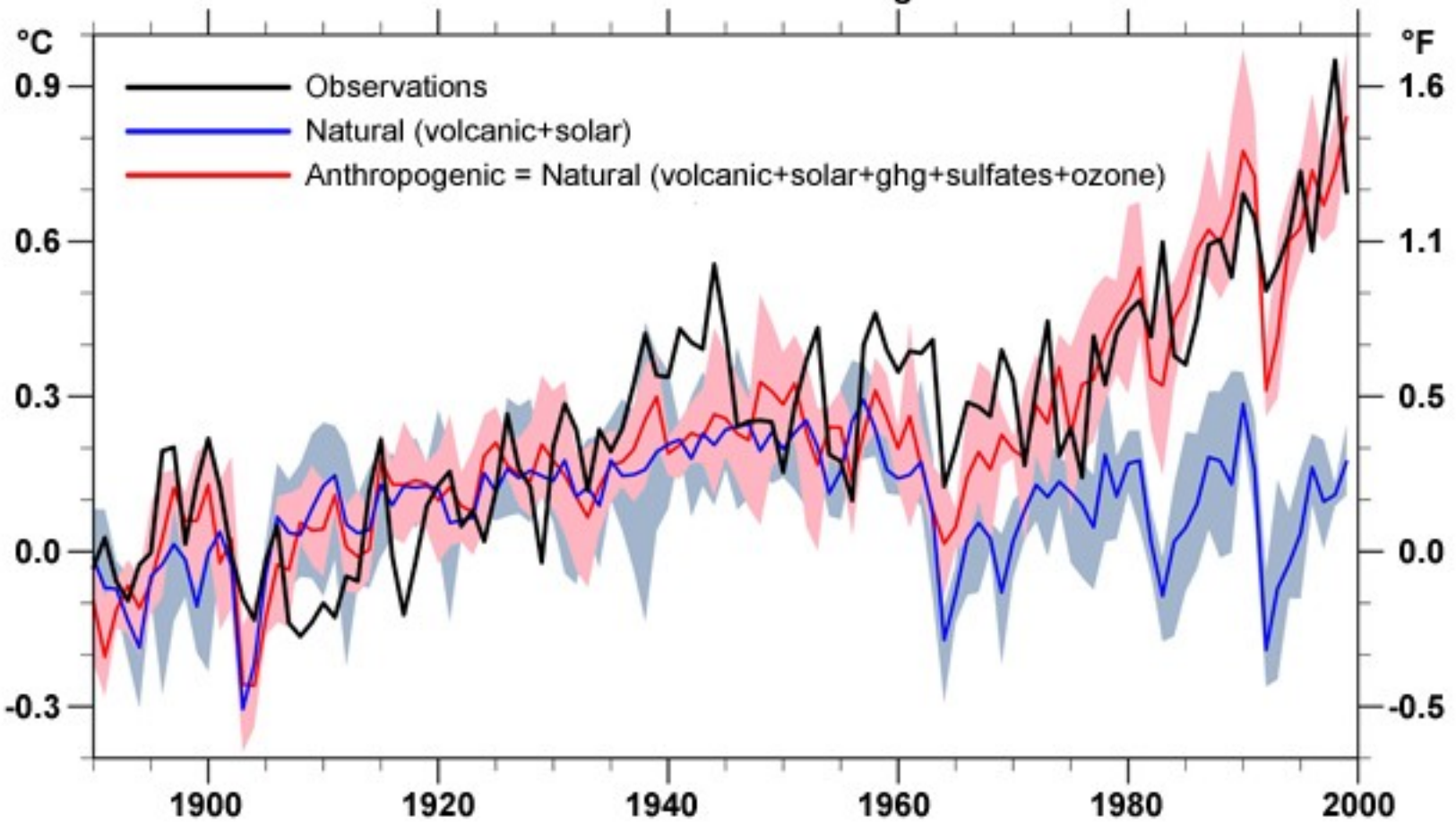
- Carbon dioxide: a critical greenhouse gas
- Dramatic increase in industrial era, ‘forcing’ climate change
- Higher concentration than for more than 600,000 years



Global mean surface temperatures have increased

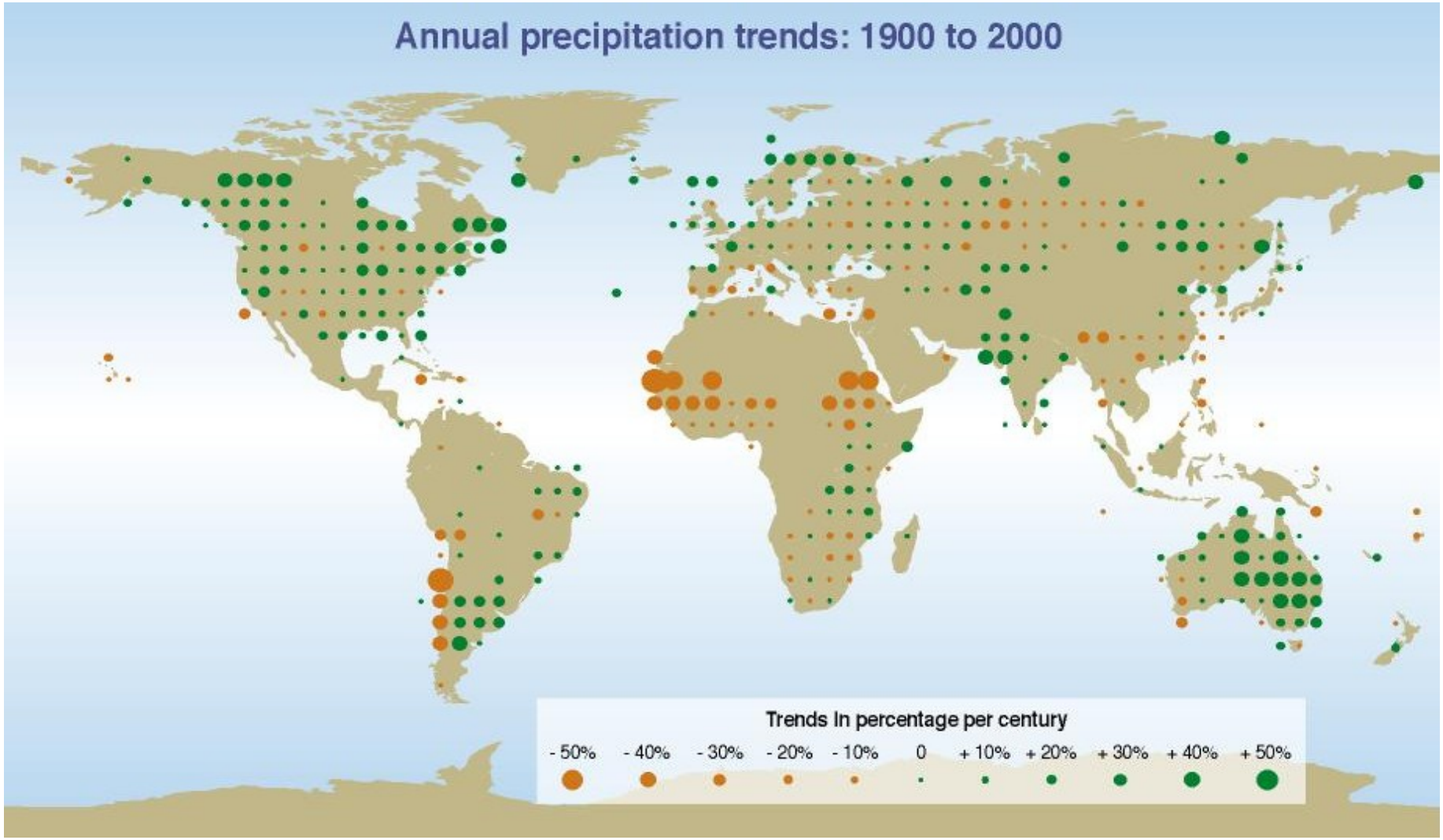


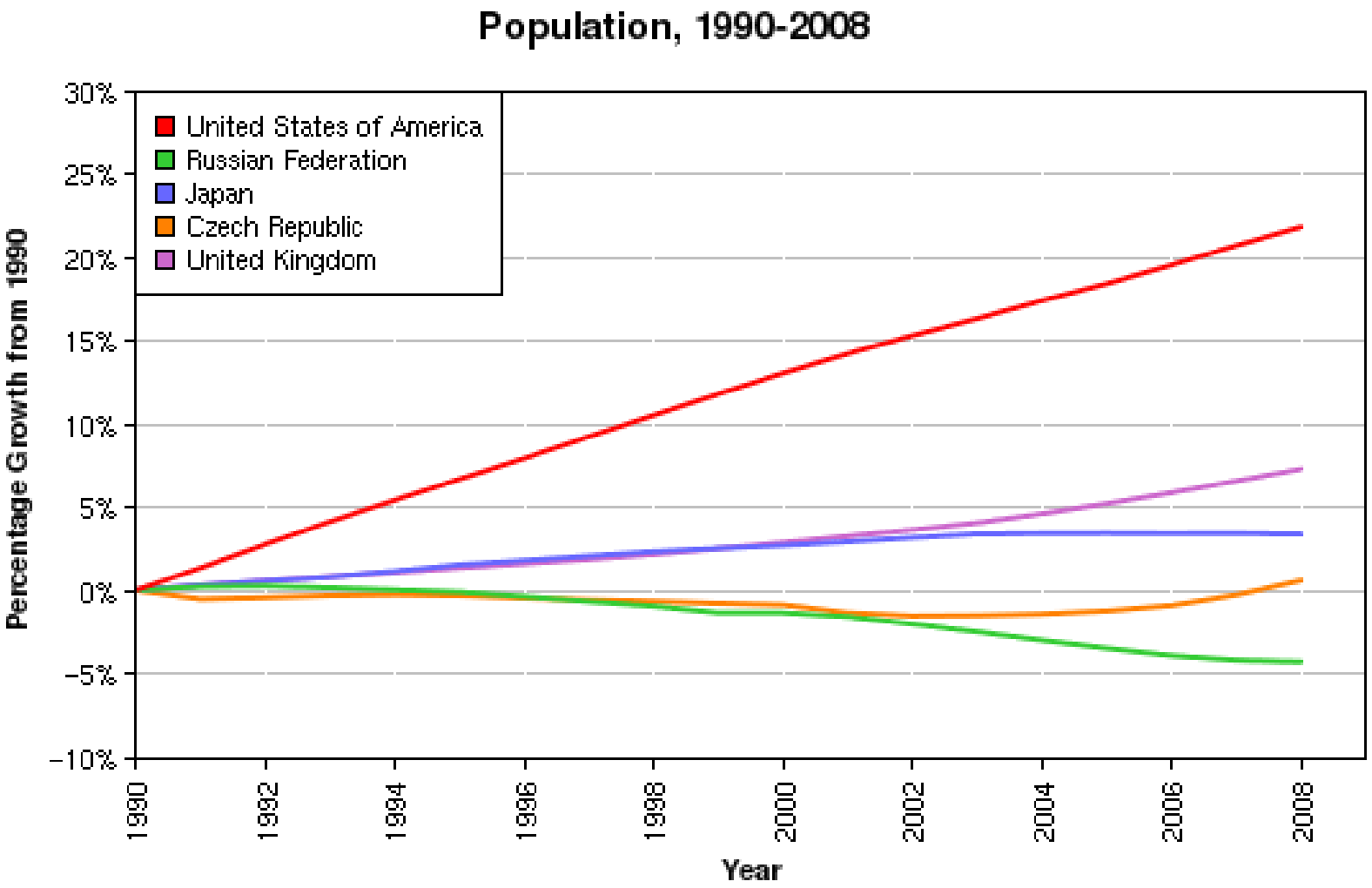
Climate Model Runs With/Without Greenhouse Gases



NCAR

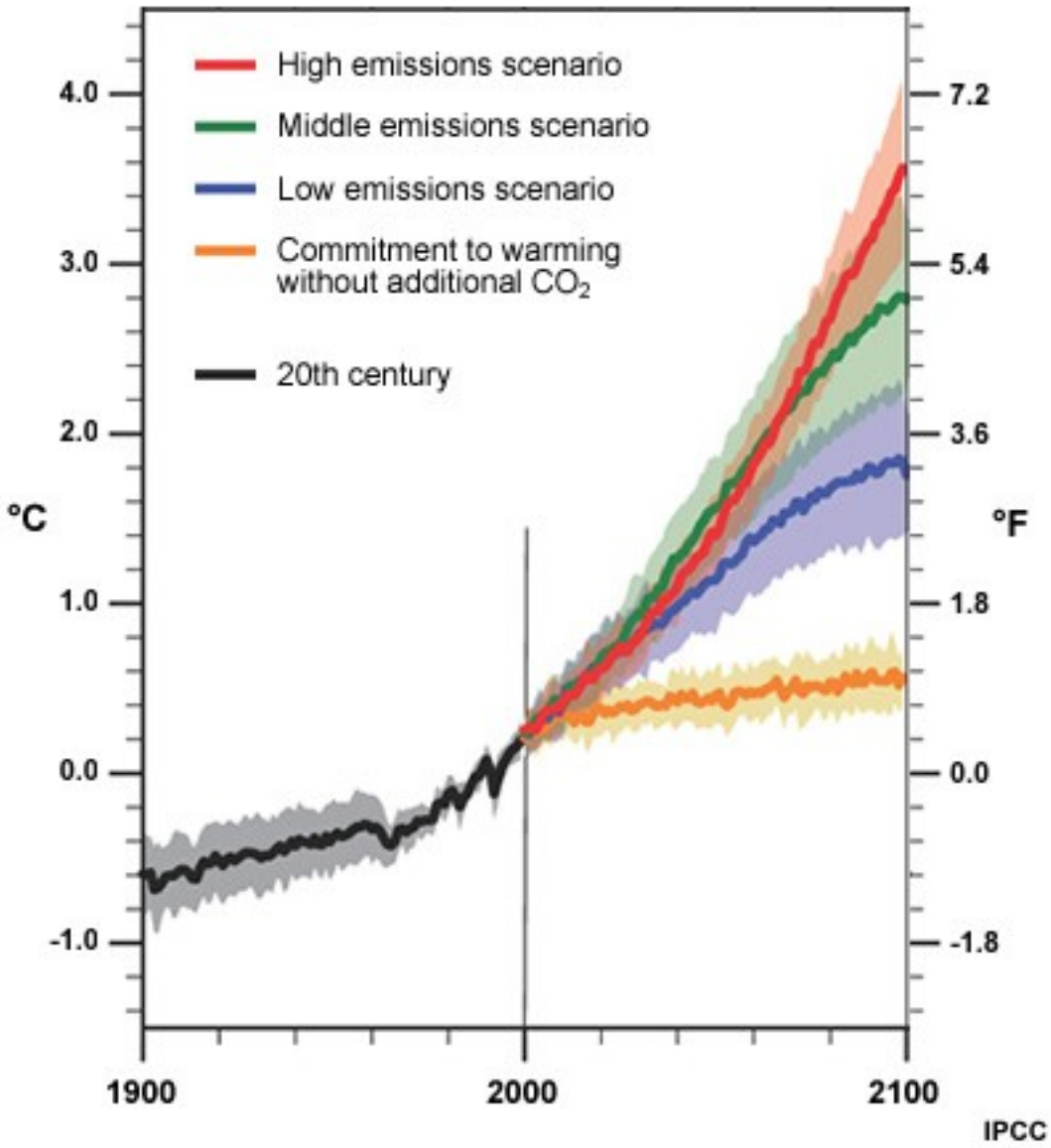
Precipitation patterns have changed

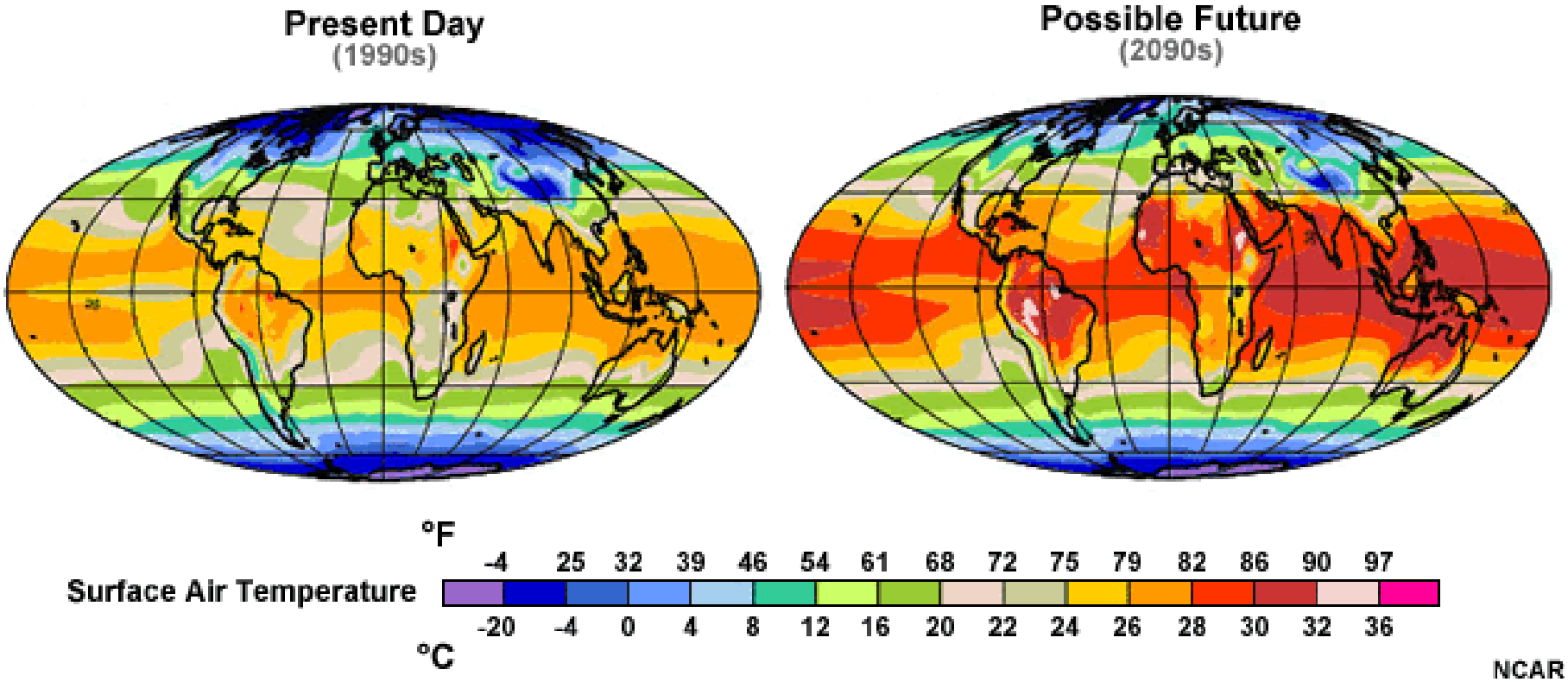




- Data from World Resources Institute

Temperature Increases for Various Emission Scenarios

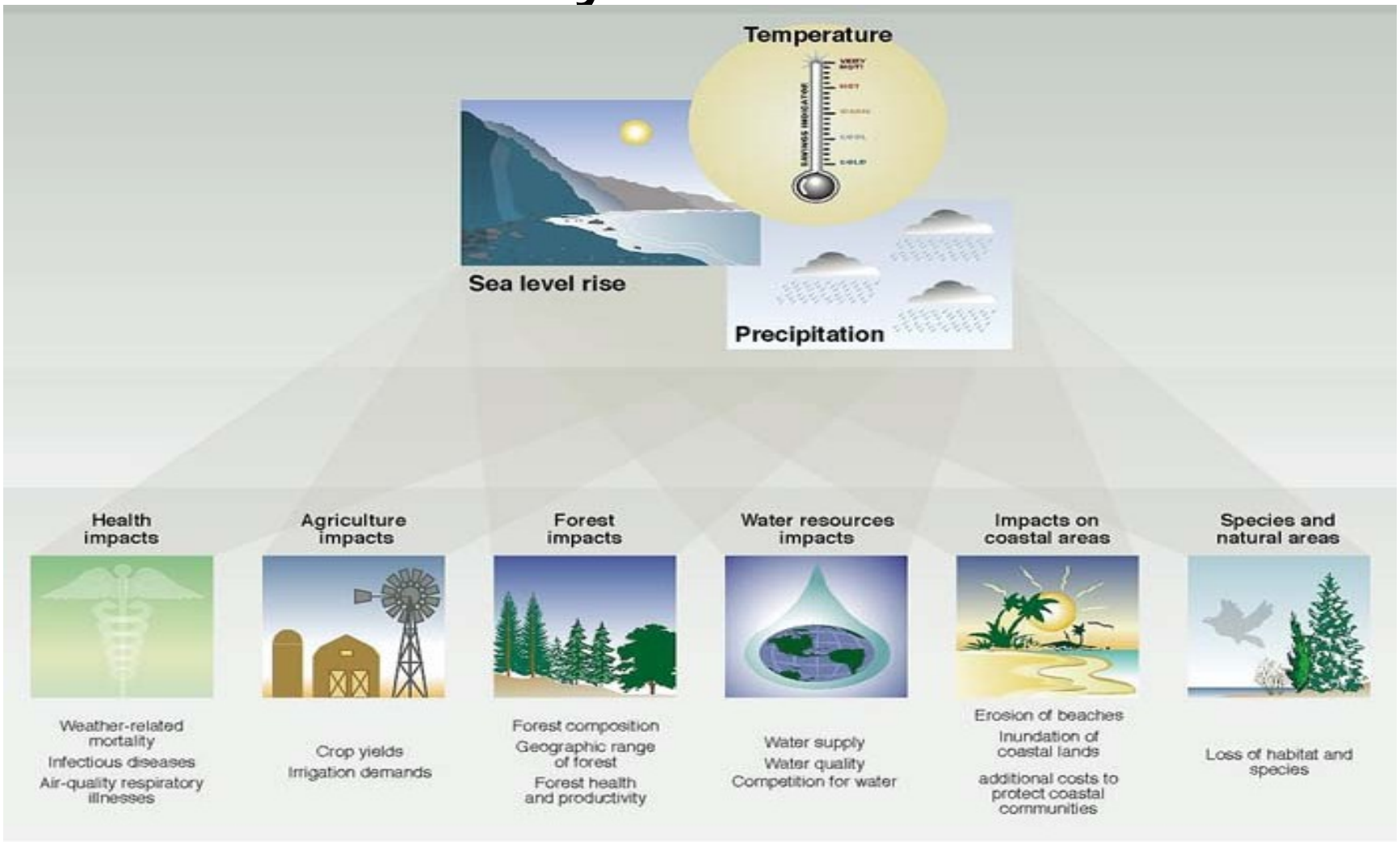



Present Day
(1990s)
Possible Future
(2090s)
°F
-4 25 32 39 46 54 61 68 72 75 79 82 86 90 97
Surface Air Temperature
-20 -4 0 4 8 12 16 20 22 24 26 28 30 32 36
°C
NCAR

Consequences of sea-level rise

A rise of 5 metres would result in significant land loss

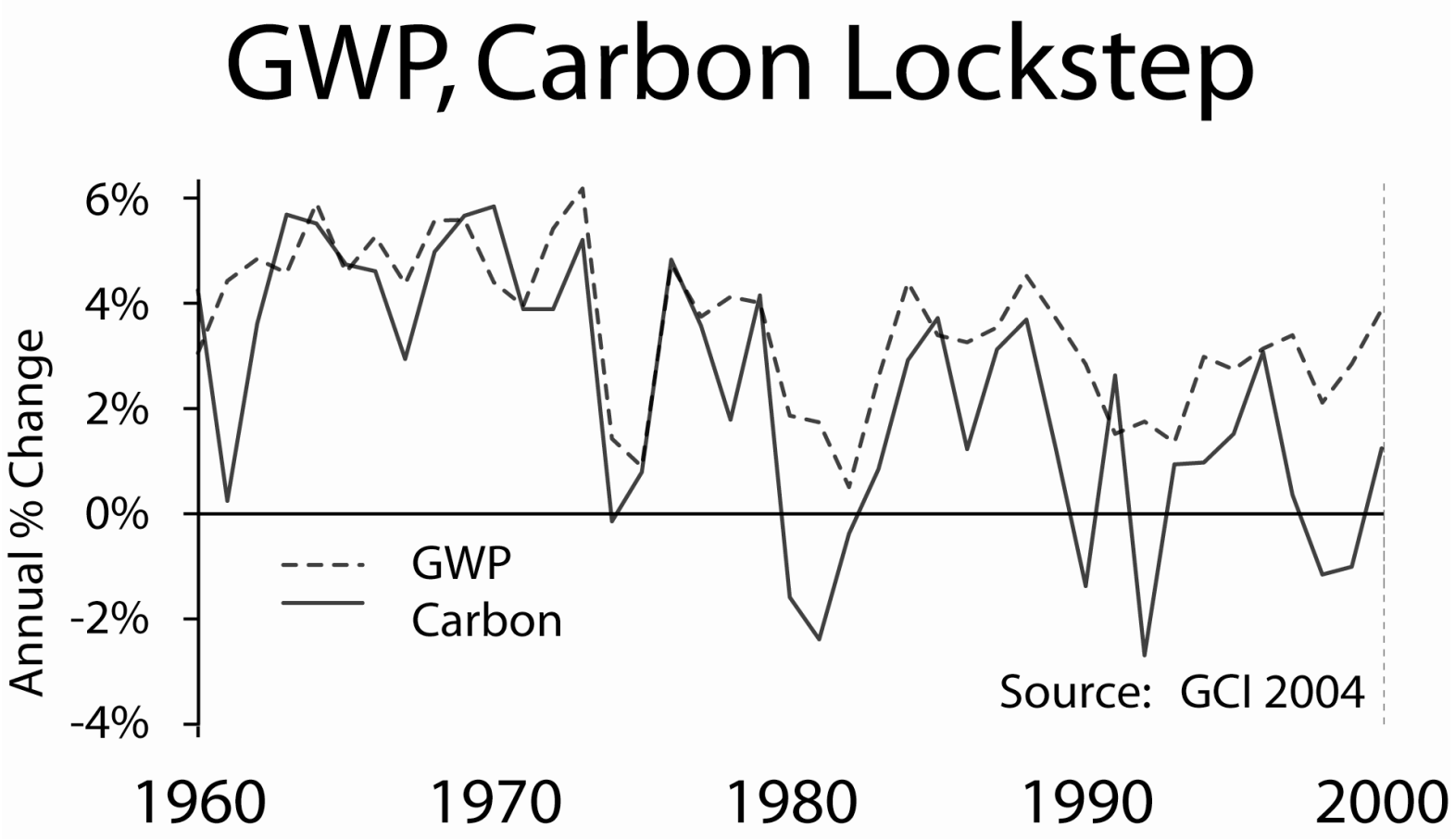
Impacts on biological and social systems



Time for thought . . .

- How much of this is about your personal behaviour and how much about how the economy is structured?
- How much is your responsibility and how much is the government's? Or is it the responsibility of business?
- What do you think? What does your neighbour think?

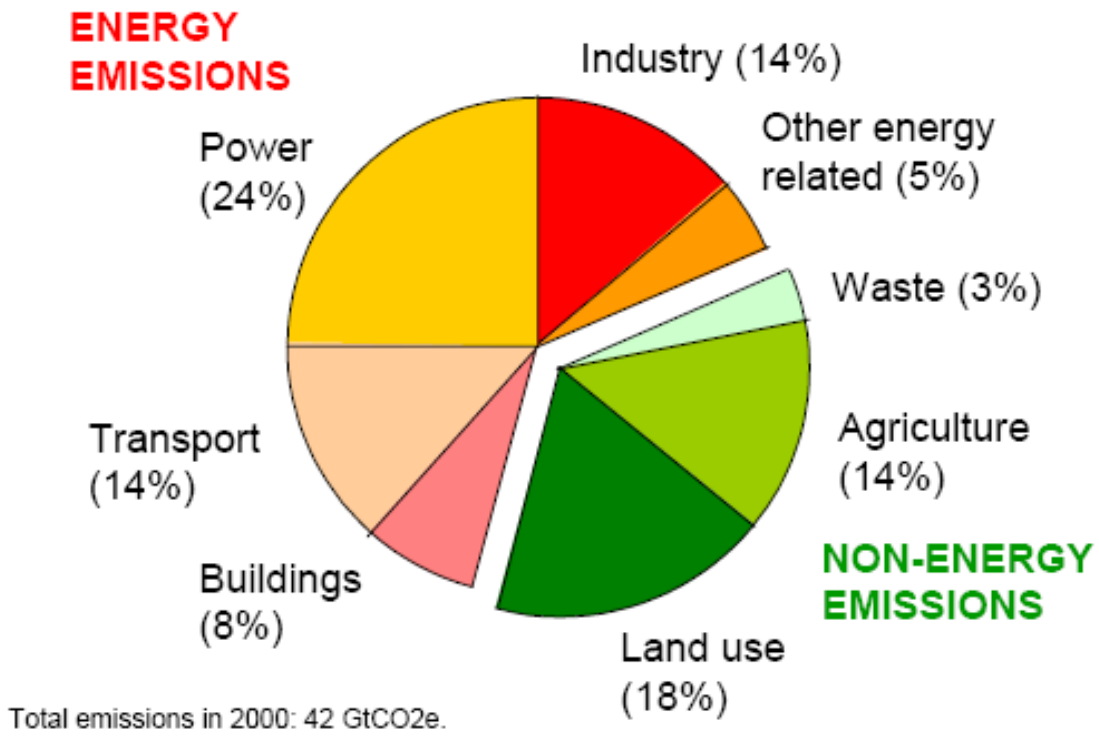
What does this have to do with business?



Stern Review

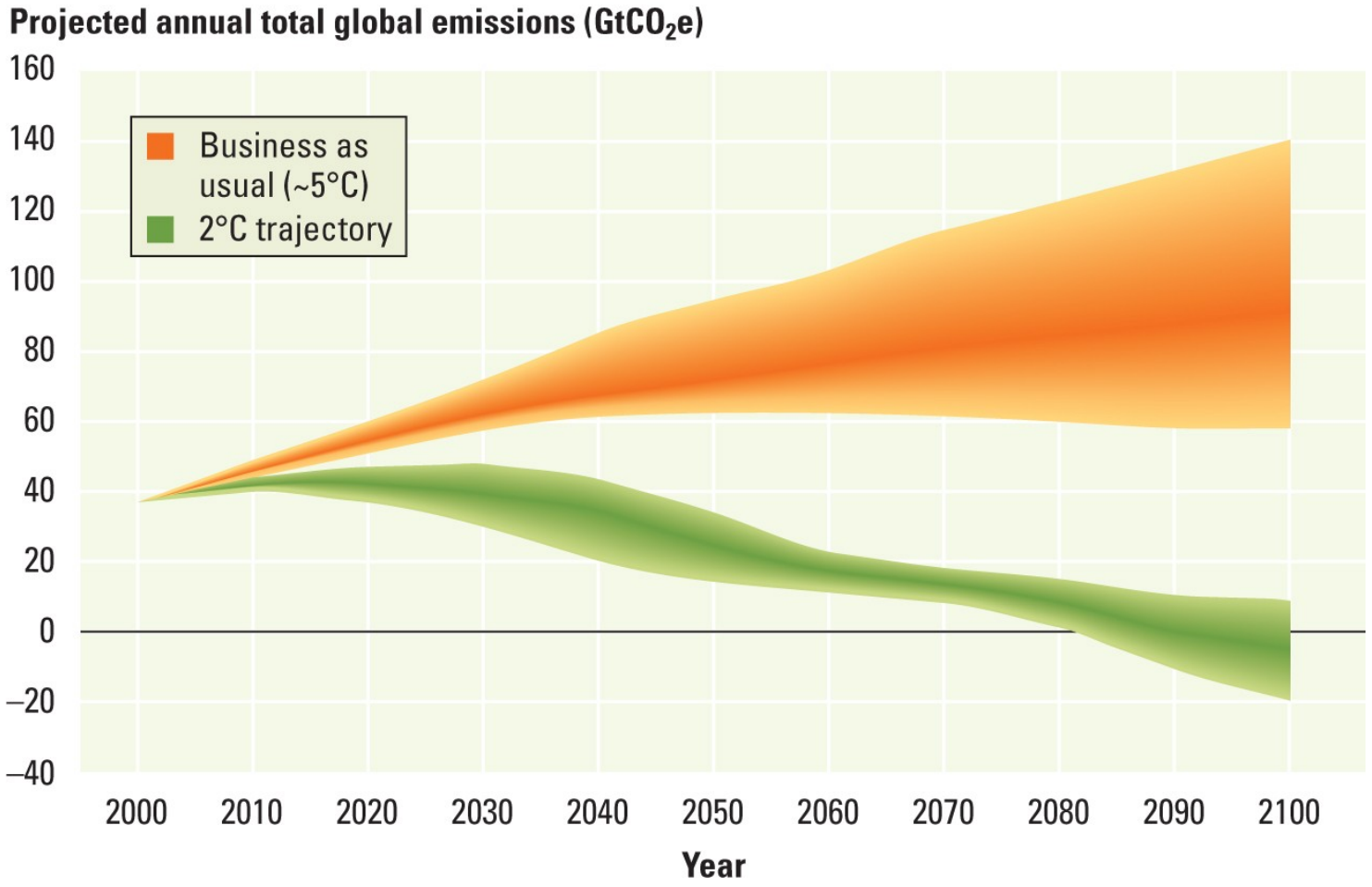
- The Stern Review was the first significant consideration by an economist of the environmental consequences of climate change
- Sir Nicholas Stern admitted he had only known about climate change for two years!

Greenhouse gas emissions in 2000 by source



Business as usual is not an option

Figure 5 What does the way forward look like? Two options among many: Business as usual or aggressive mitigation



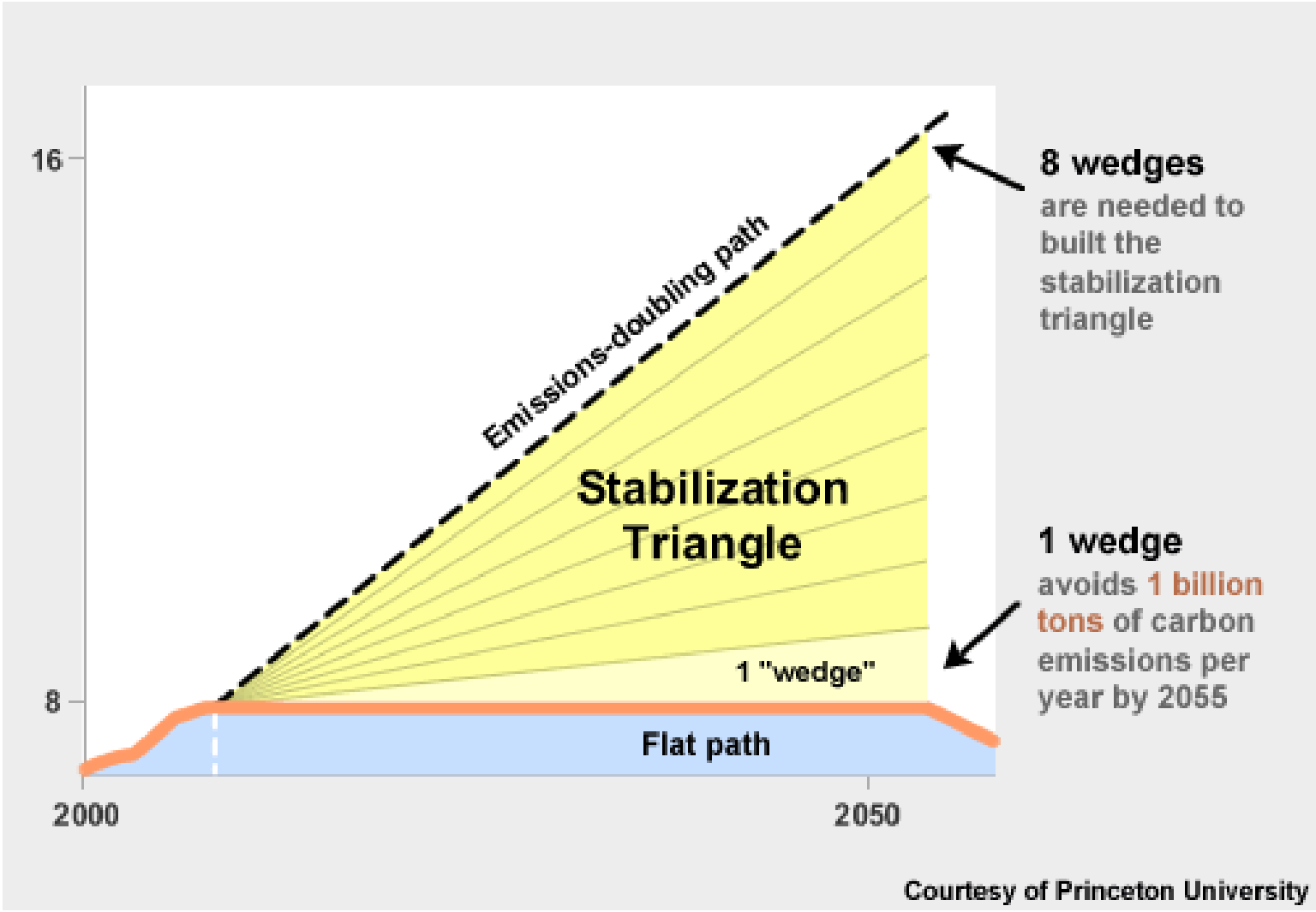
Headlines

- What we do now can have only a limited effect on the climate over the next 40 or 50 years; what we do in the next 10 or 20 years can have a profound effect on the climate in the second half of this century and in the next.
- By investing 1% of GDP now (the next 10-20 years) we will avoid losing 20% of GDP later (40-50 years)
- Markets for low-carbon energy products are likely to be worth at least $500bn per year by 2050, and perhaps much more. Individual companies and countries should position themselves to take advantage of these opportunities.

Main findings of the review

- CO2 emissions are caused by economic growth but policy to tackle climate change is not incompatible with economic growth;
- Favours the transition to a ‘low carbon economy’ which will ‘bring challenges to competitiveness but also opportunities for growth’;
- ‘Policy to reduce emissions should be based on three essential elements:
- carbon pricing, technology policy, and removal of barriers to behavioural change’;
- Argues for the pricing of carbon through trading, taxation or regulation;
- Need for government support for low-carbon and energy-efficient technologies

Socolow's wedges: pro-technology approach



Each bullet point is one 1bn. Tonne wedge

- Efficient vehicles: Double car fuel efficiency by 2055
- Reduced vehicle use: Halve the miles travelled by the world's cars by 2055
- Efficient buildings: Cut emissions by 25% in all buildings

Power generation

- Triple the world's current nuclear capacity
- Increase solar capacity 700 times
- CCS electricity: Capture and store carbon from 800 large coal power plants or 1600 large gas power plants

Change land-management systems

- Halve global deforestation and double forest planting in 50 years
- Apply carbon management strategies to all of the world's farm fields