Highlights of IPCC Fourth Assessment Report (AR4)

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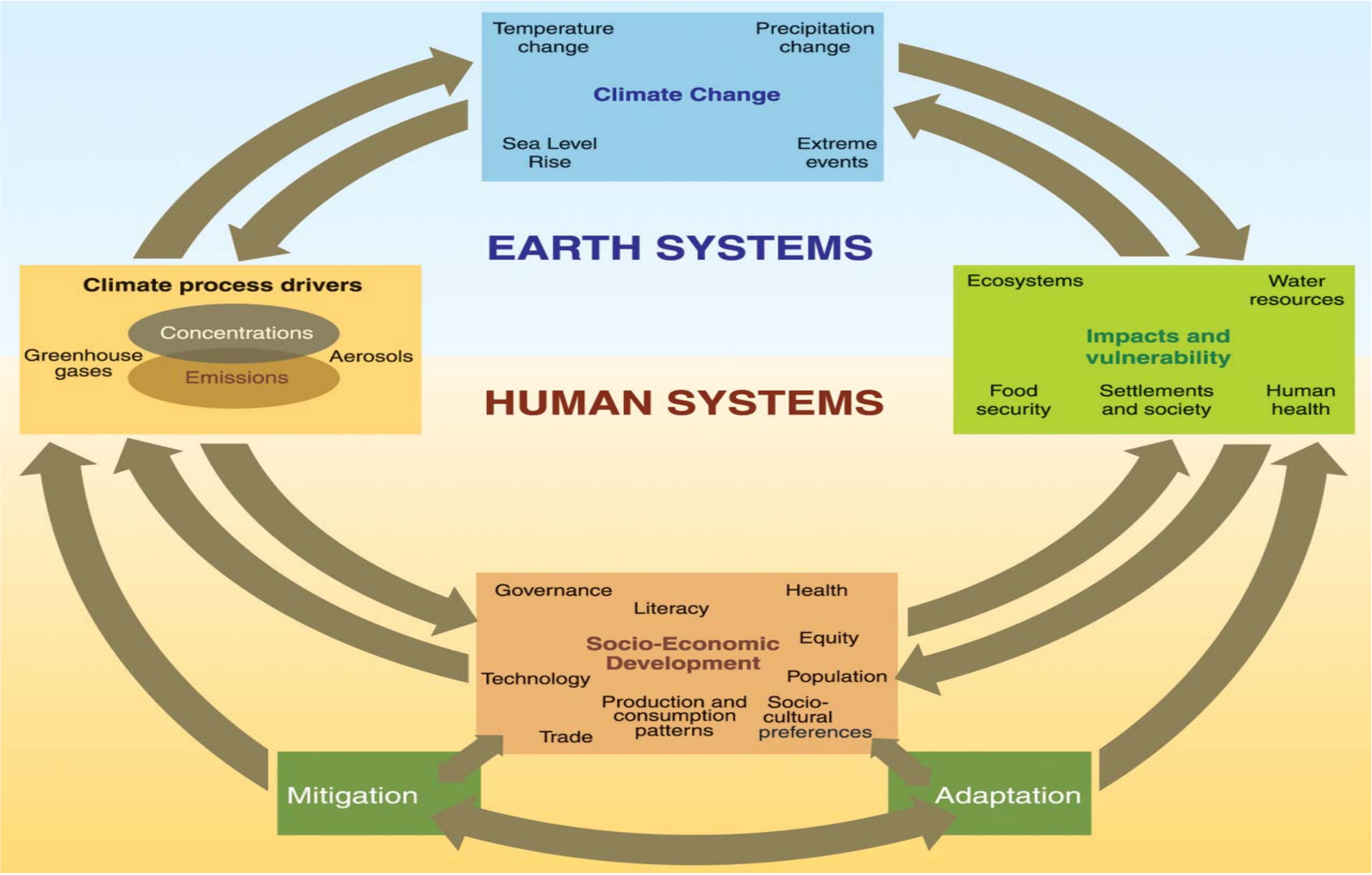
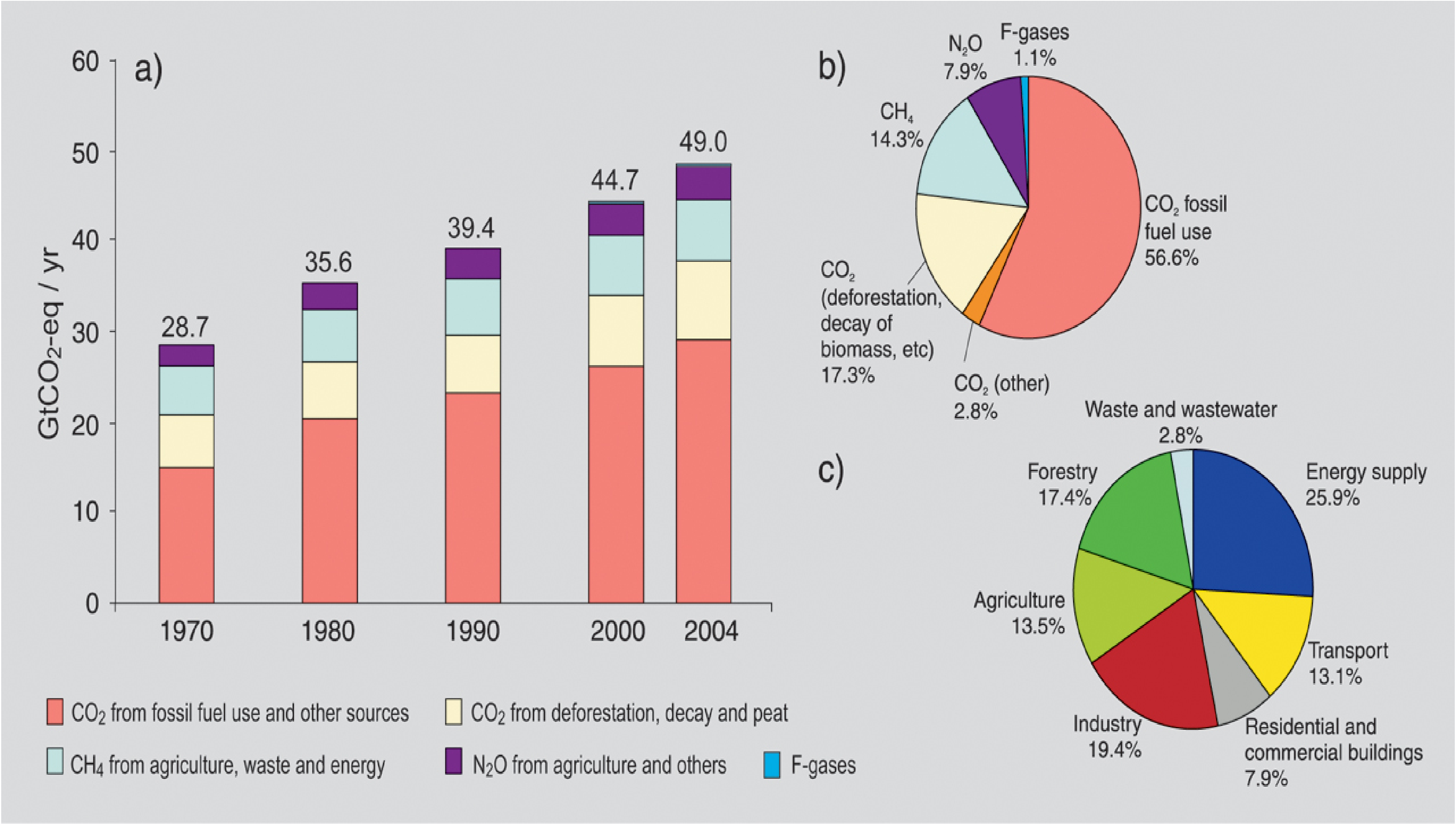
Climate and human systems interactions

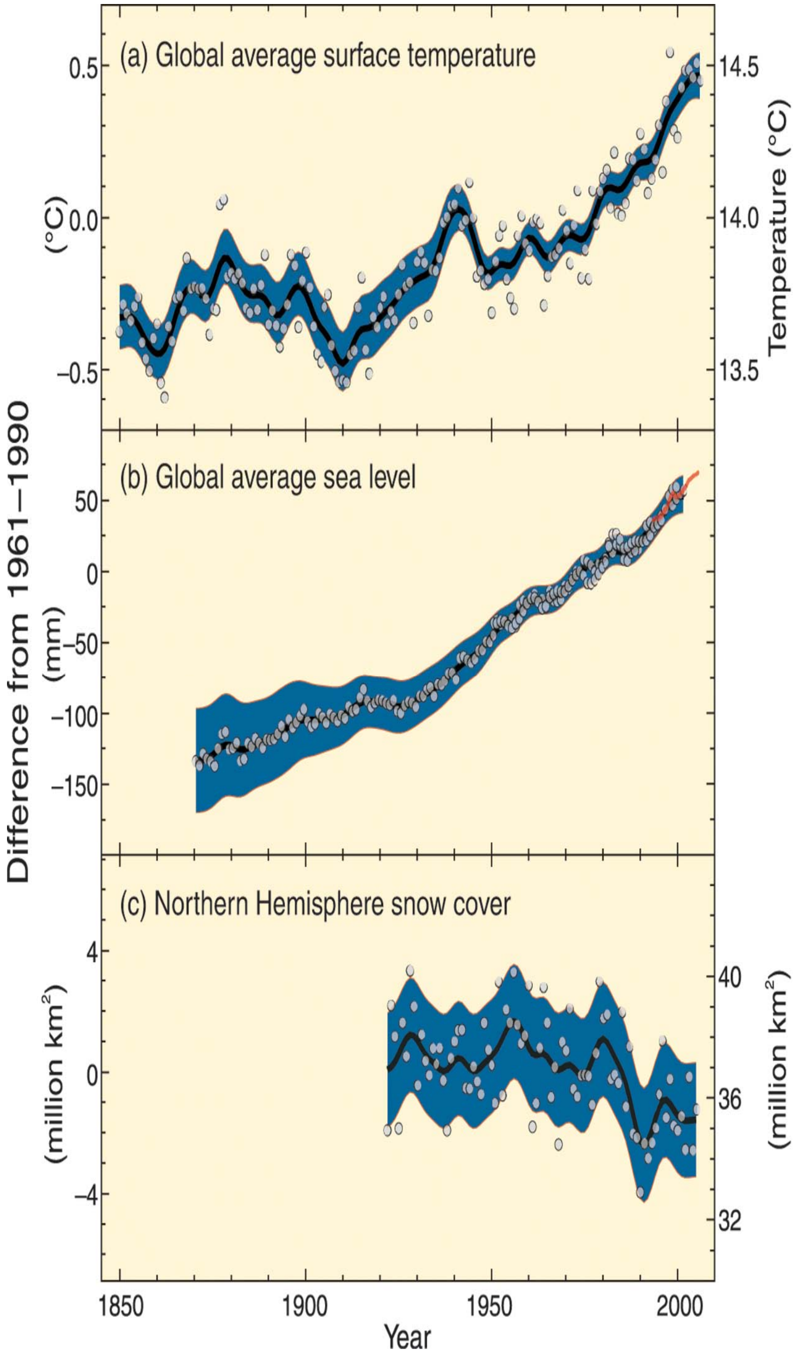


Causes of change

- Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004

Global anthropogenic greenhouse gases





Warming of the climate system is unequivocal

- Increasing global temperatures
- Rising global average seal level
- Reductions in snow and ice cover

Extreme Events

- The frequency of heavy precipitation events has increased over most areas
- From 1900 to 2005, precipitation increased significantly in eastern parts of North and South America, northern Europe and northern and central Asia but declined in the Sahel, the Mediterranean, southern Africa and parts of southern Asia
- Globally, the area affected by drought has likely increased since the 1970s
- There is now higher confidence than in the TAR in projected patterns of warming and other regional-scale features, including changes in wind patterns, precipitation, and some aspects of extremes and sea ice

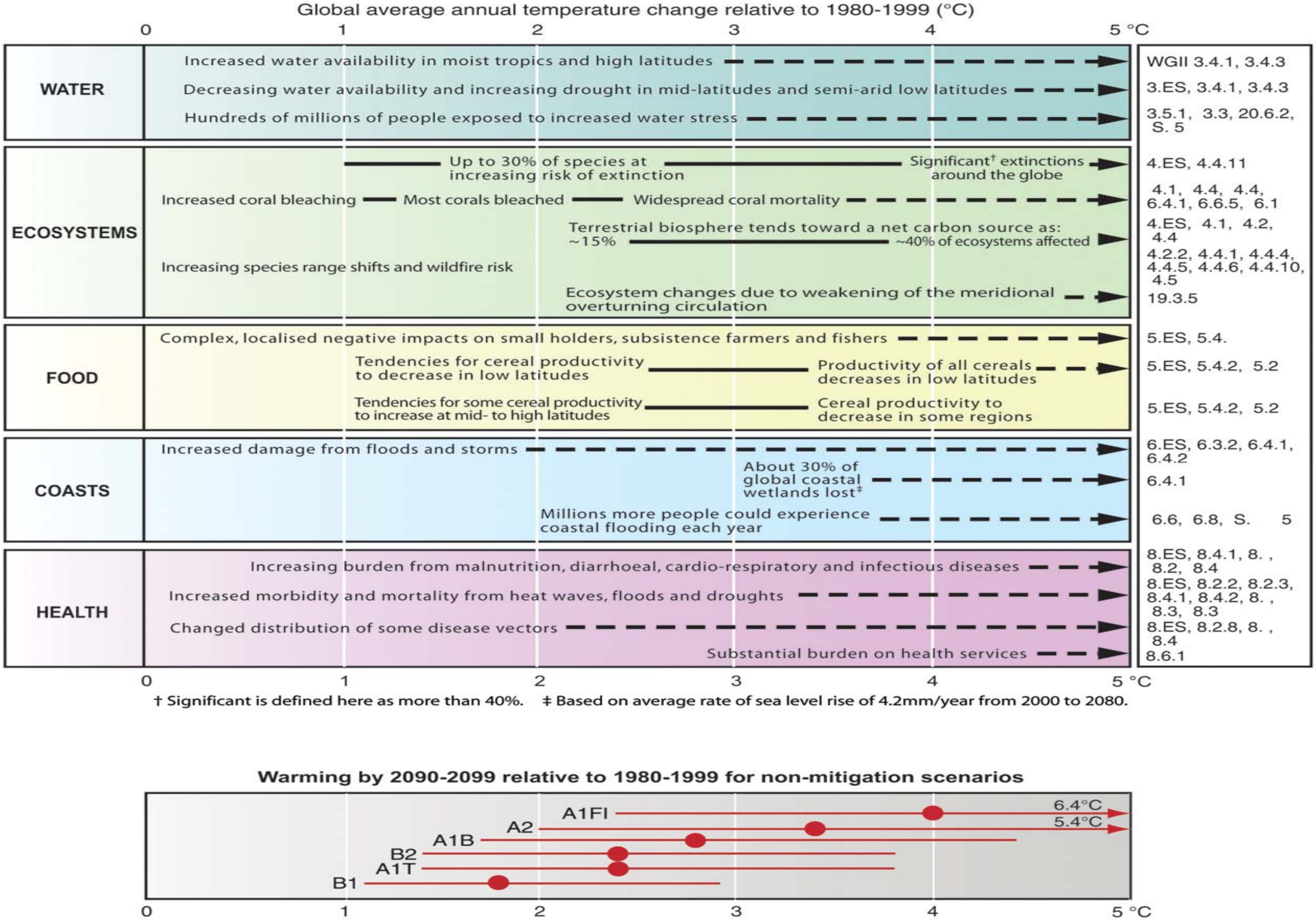
Increasing Sea Level Rise

- Rate of global average sea level rise has risen from 1.8mm/yr to 3.1mm/yr from 1961 to 1993
- The reasons for sea level rise has been due to thermal expansion, melting glaciers & ice caps and the polar ice sheets
- Projected sea level rise at the end of the 21st Century will be 18-59 cm

Impacts of anthropogenic warming

- Partial loss of ice sheets in polar regions could imply:
  - Meters of sea level rise
  - Major changes in coastlines and inundation of low-lying islands and coastal areas
  - Great effects in river deltas and low-lying islands
- Approximately 20-30% of species assessed so far are likely to be at increased risk of extinction
- Large scale and persistent changes in Meridional Overturning Circulation (MOC) will have impacts on marine ecosystem productively, fisheries, ocean CO2 uptake and terrestrial vegetation

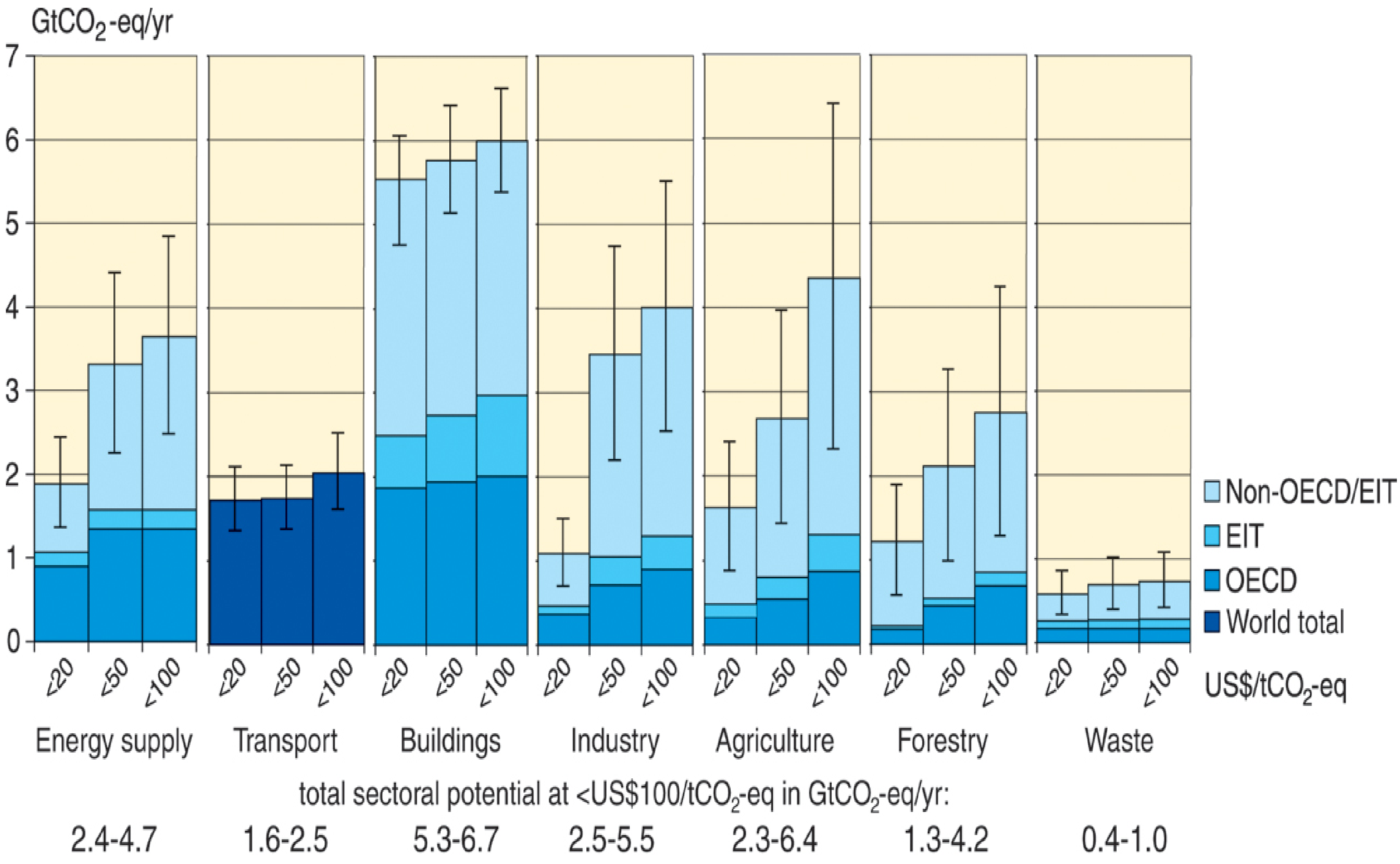
Climate Change Impacts by Sectors



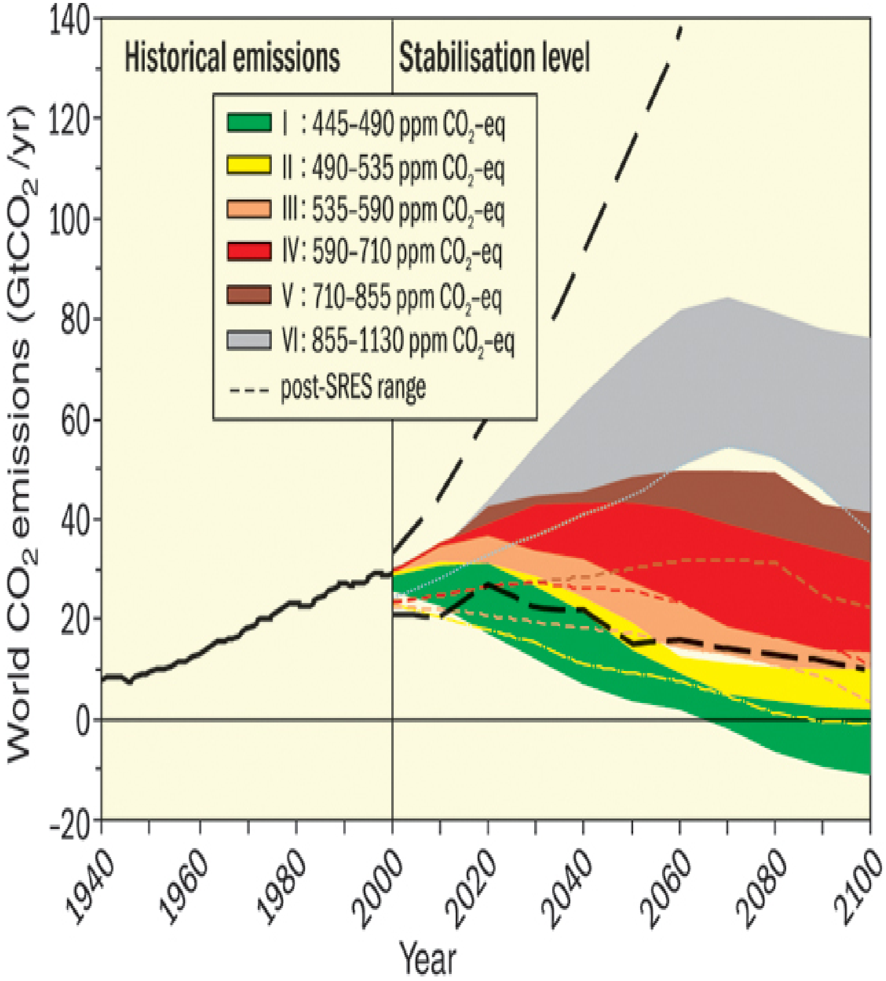
What are the solutions?

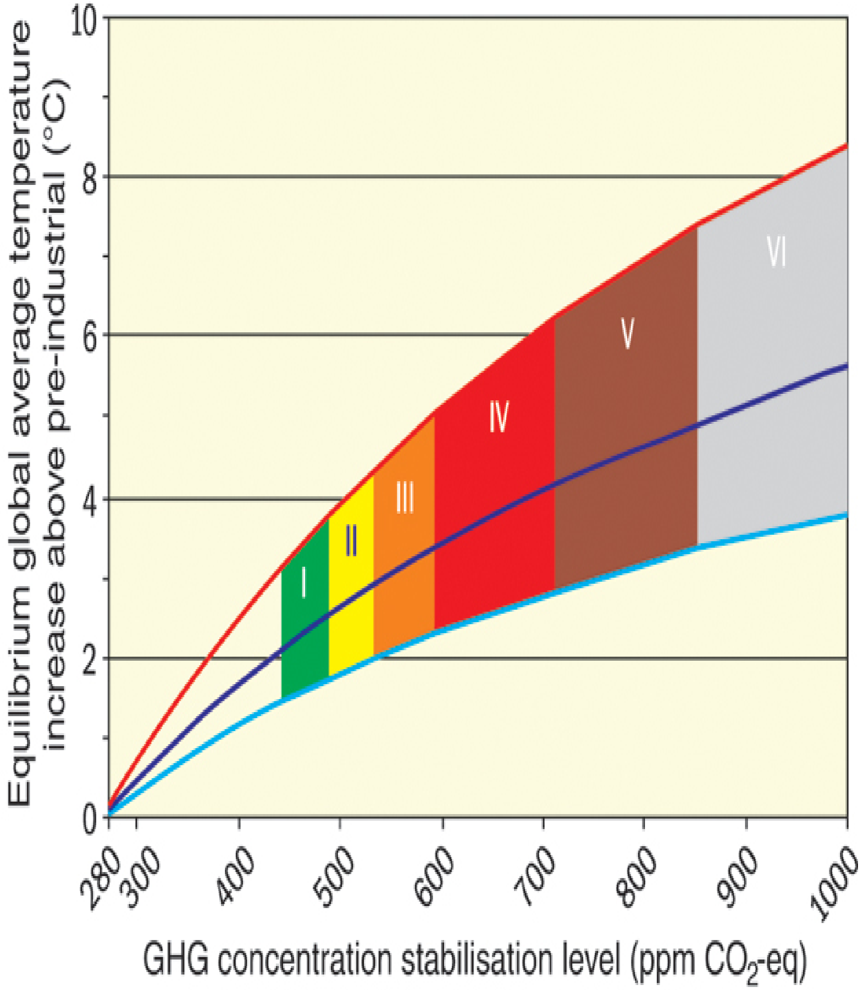
- A wide variety of policies and instruments are available to governments to create the incentives for mitigation action.
- Stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades
- An effective and sustained carbon-price signal could realize significant mitigation potential in all sectors

Mitigation potential by sector by 2030



Stabilization and emission levels





The lower the stabilization required the earlier and the more greenhouse gas cuts are required. The implication is that the macro-economic costs of mitigation generally rise with the stringency of the stabilization target.

Stabilization and emission levels

- 550 ppm: is “unlikely” to meet the 2^{o}C target
- 450 ppm: fifty-fifty chance to meet 2^{o}C
- Peaking increases the likelihood

Equity Issues

- **Africa by 2020:**
  - Between 75 & 250 million people projected to be exposed increased water stress
  - In some countries, yields from rain-fed agriculture would be reduced by 50%
- **Asia by 2050s:**
  - Freshwater availability is projected to decrease
  - Coastal areas, especially heavily-populated mega delta regions will be greatest risk from sea flooding
- **Small Island States:**
  - Sea Level rise is expected to exacerbate inundation, storm surge, erosion and other coastal hazards threatening vital infrastructure
  - By mid-century reduced water resources in many small island states

Key Messages

- Responding to climate change involves an iterative risk management process that includes both mitigation and adaptation, taking into account actual and avoided climate change damages, co-benefits, sustainability, equity and attitudes to risk
- **There is *high confidence* that neither adaptation nor mitigation alone can avoid all climate change impacts.**
- **Adaptation is necessary both in the short term and longer term to address impacts resulting from the warming that would occur even for the lowest stabilization scenarios assessed.**

Key Messages

- **There are barriers, limits and costs that are not fully understood. Adaptation and mitigation can complement each other and together can significantly reduce the risks of climate change.**
- **Efforts to mitigate GHG emissions to reduce the rate and magnitude of climate change need to account for inertia in the climate and socio-economic systems.**

Key Messages

- **In order to stabilise the concentration of GHGs in the atmosphere, emissions would need to peak and decline thereafter. 28 The lower the stabilisation level, the more quickly this peak and decline would need to occur**
- **Mitigation efforts over the next two to three decades will have a large impact on opportunities to achieve lower stabilisation levels**

Key Meassges

- **There is *high agreement* and *much evidence* that all stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades, assuming appropriate and effective incentives are in place for development, acquisition, deployment and diffusion of technologies and addressing related barriers.**

Key Messages

- **Sustainable development can reduce vulnerability to climate change, and climate change could impede nations' abilities to achieve sustainable development pathways.**
- **Making development more sustainable can enhance mitigative and adaptive capacities, reduce emissions, and reduce vulnerability, but there may be barriers to implementation.**