

# The IPCC Fourth Assessment Working Group Reports: Key findings



WMO



UNEP



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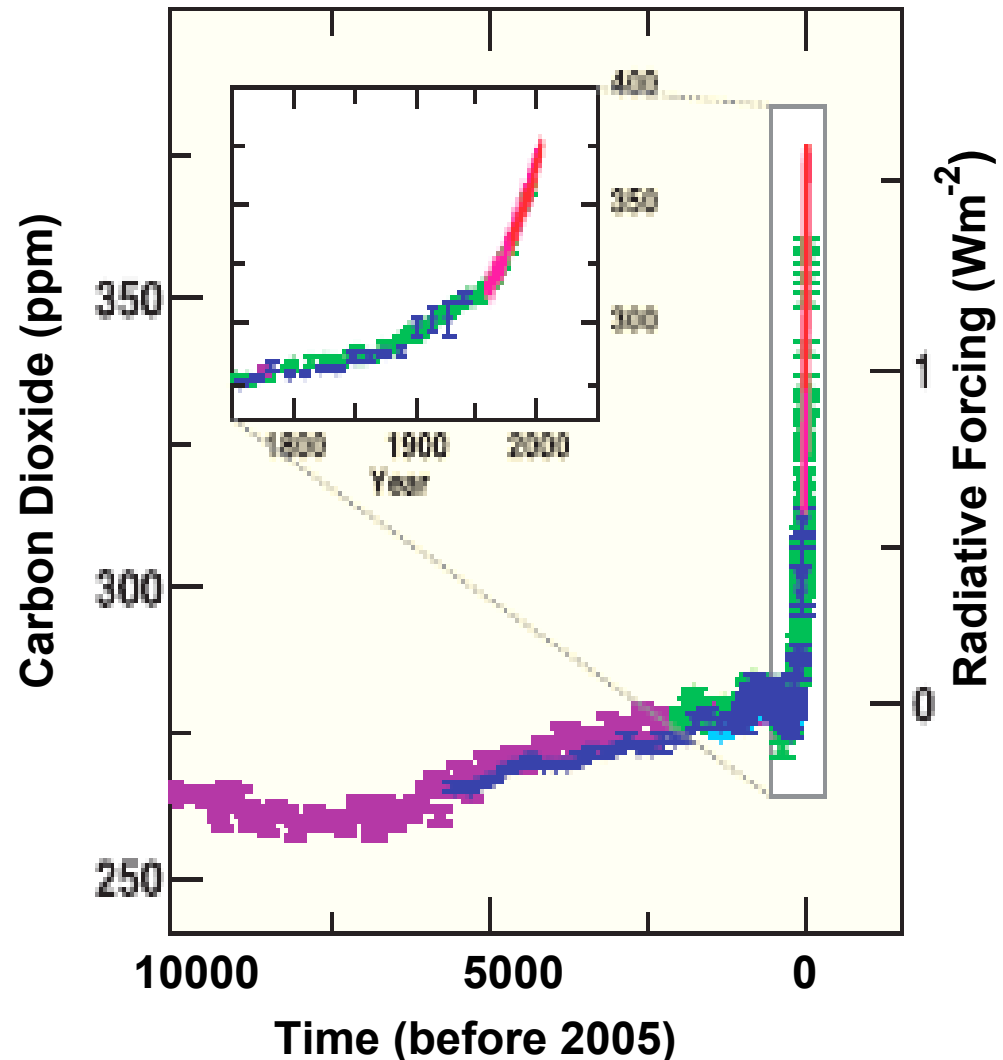
United Nations Headquarters  
New York City  
24<sup>th</sup> September 2007

# Human contribution to climate change

Global atmospheric concentrations of greenhouse gases **increased markedly as result of human activities**

In 2005 concentration of CO<sub>2</sub> **exceeded by far the natural range** over the last 650,000 years

Changes in CO<sub>2</sub> from ice core and modern data



# Direct observations of recent climate change

## Changes in temperature, sea level and northern hemisphere snow cover



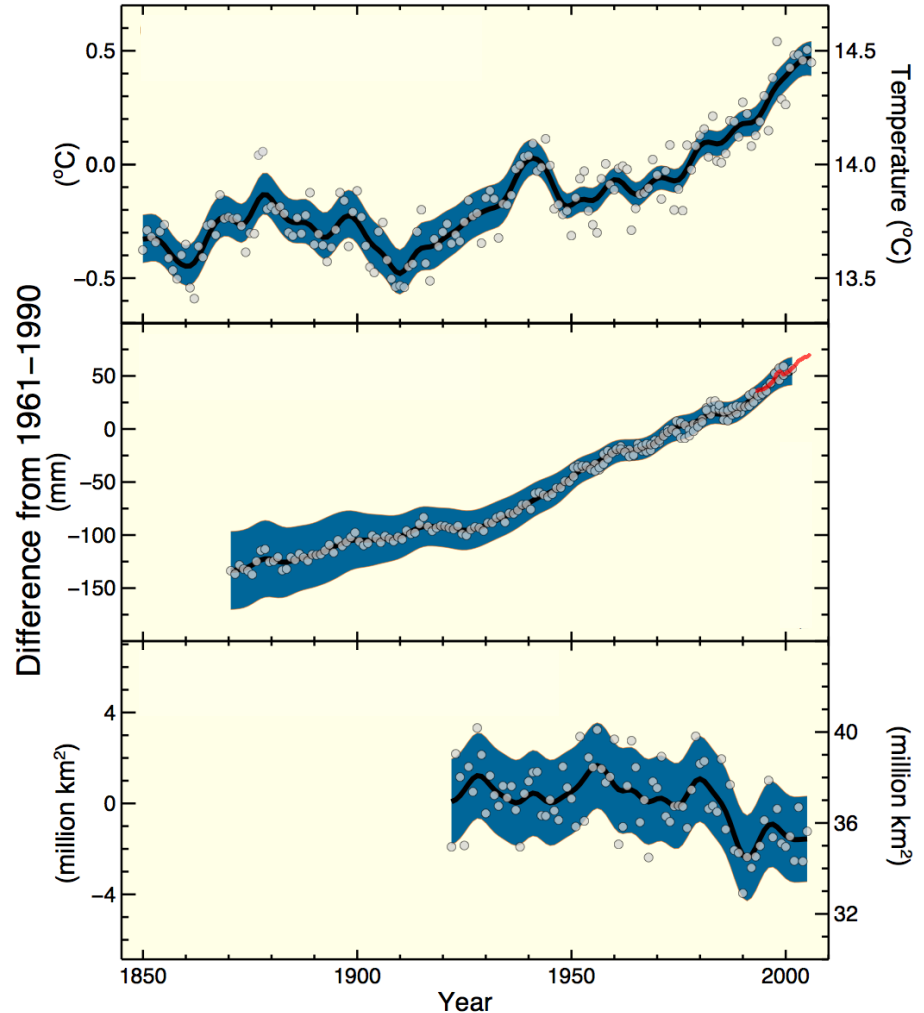
Global average temperature



Global average sea level



Northern hemisphere snow cover

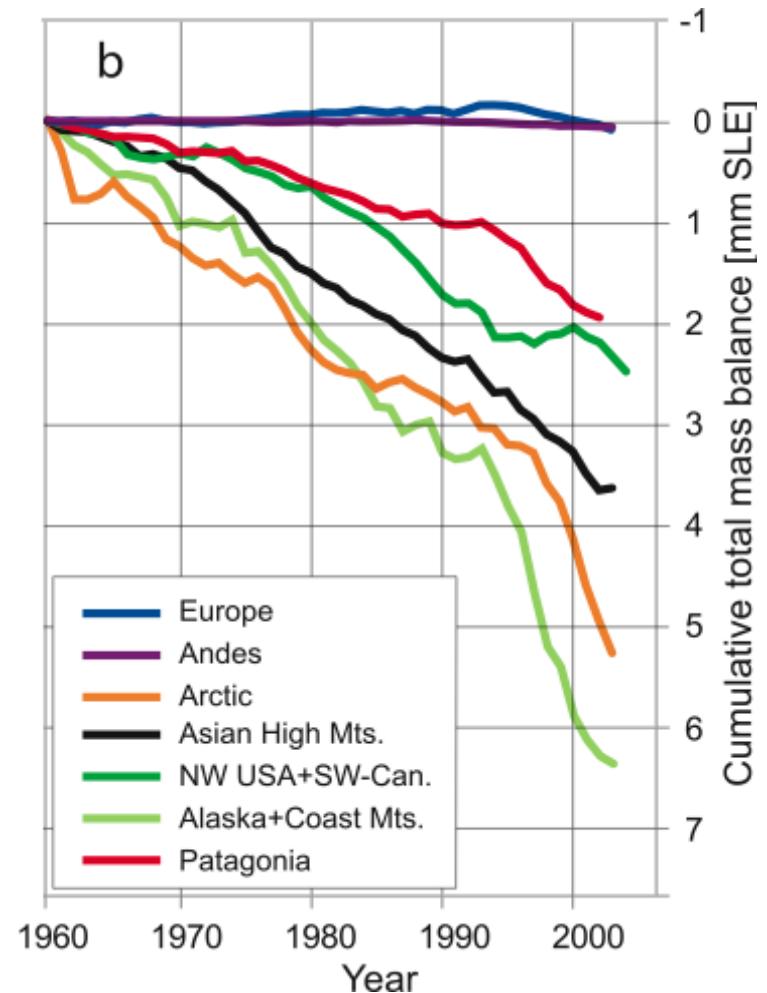


# Glacier mass balance

During the 20th century, glaciers and ice caps have experienced **widespread mass losses** and have contributed to **sea level rise**

Further **decline of mountain glaciers** projected to **reduce water availability** in many regions

**Cumulative balance of glacier mass in some regions**



# Heavier precipitation, more intense and longer droughts....



# Key vulnerabilities to climate change

## ◆ **Some regions** will be more affected than others:

- The Arctic (ice sheet loss, ecosystem changes)
- Sub-Saharan Africa (water stress, reduced crops)
- Small islands (coastal erosion, inundation)
- Asian mega-deltas (flooding from sea and rivers)

## ◆ **Some ecosystems** are highly vulnerable:

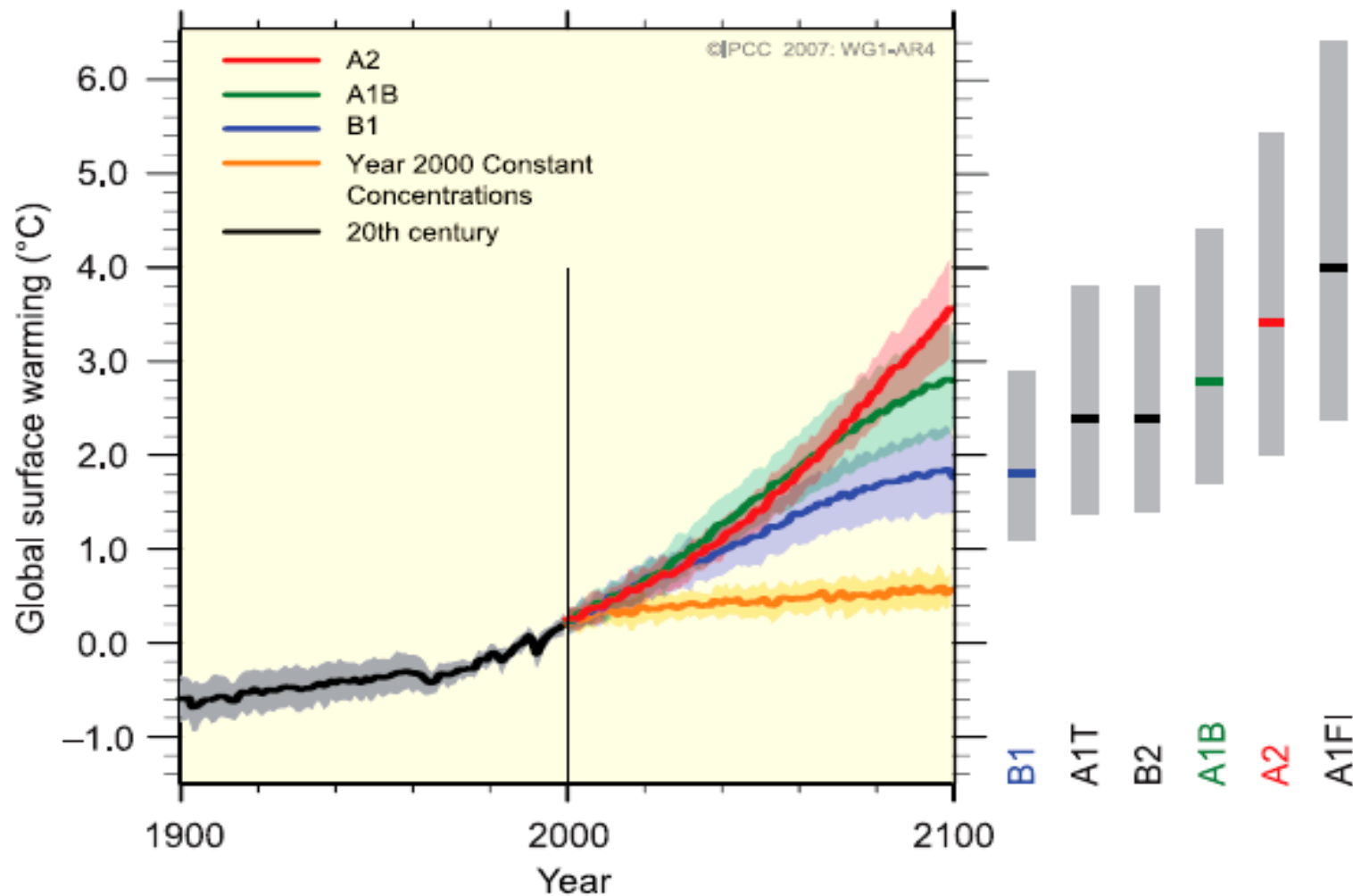
- Coral reefs, marine shell organisms
- Tundra, boreal forests, mountain and Mediterranean regions
- 20-30% of plant and animal species at risk of extinction

# Coastal settlements most at risk



# Ranges for predicted surface warming

Multi-model averages and assessed ranges for surface warming





# Mitigation urgently needed

- ◆ Continued GHG emissions at or above current rate would induce **larger climatic changes** than those observed in 20<sup>th</sup> century
- ◆ Emissions of the greenhouse gases covered by the Kyoto Protocol **increased by about 70%** from 1970–2004

**Mitigation needs to start in short term, even when benefits may only arise in a few decades**

# Beyond adaptation

◆ **Adaptation to climate change is necessary** to address impacts resulting from the warming which is already unavoidable due to past emissions

◆ However:

- Adaptation alone cannot cope with all the projected impacts of climate change
- The costs of adaptation and impacts will increase as global temperatures increase

**Making development more sustainable** can enhance both mitigative and adaptive capacity, and reduce emissions and vulnerability to climate change

# Pathways towards stabilization

## Characteristics of stabilization scenarios

Stabilization level (ppm CO <sub>2</sub> -eq)	Global mean temp. increase at equilibrium (°C)	Year CO <sub>2</sub> needs to peak	Year CO <sub>2</sub> emissions back at 2000 level	Reduction in 2050 CO <sub>2</sub> emissions compared to 2000
445 – 490	2.0 – 2.4	2000 - 2015	2000- 2030	-85 to -50
490 – 535	2.4 – 2.8	2000 - 2020	2000- 2040	-60 to -30
535 – 590	2.8 – 3.2	2010 - 2030	2020- 2060	-30 to +5
590 – 710	3.2 – 4.0	2020 - 2060	2050- 2100	+10 to +60
710 – 855	4.0 – 4.9	2050 - 2080		+25 to +85
855 – 1130	4.9 – 6.1	2060 - 2090		+90 to +140

◆ Mitigation efforts over the next two to three decades will have a large impact on opportunities to achieve lower stabilization levels

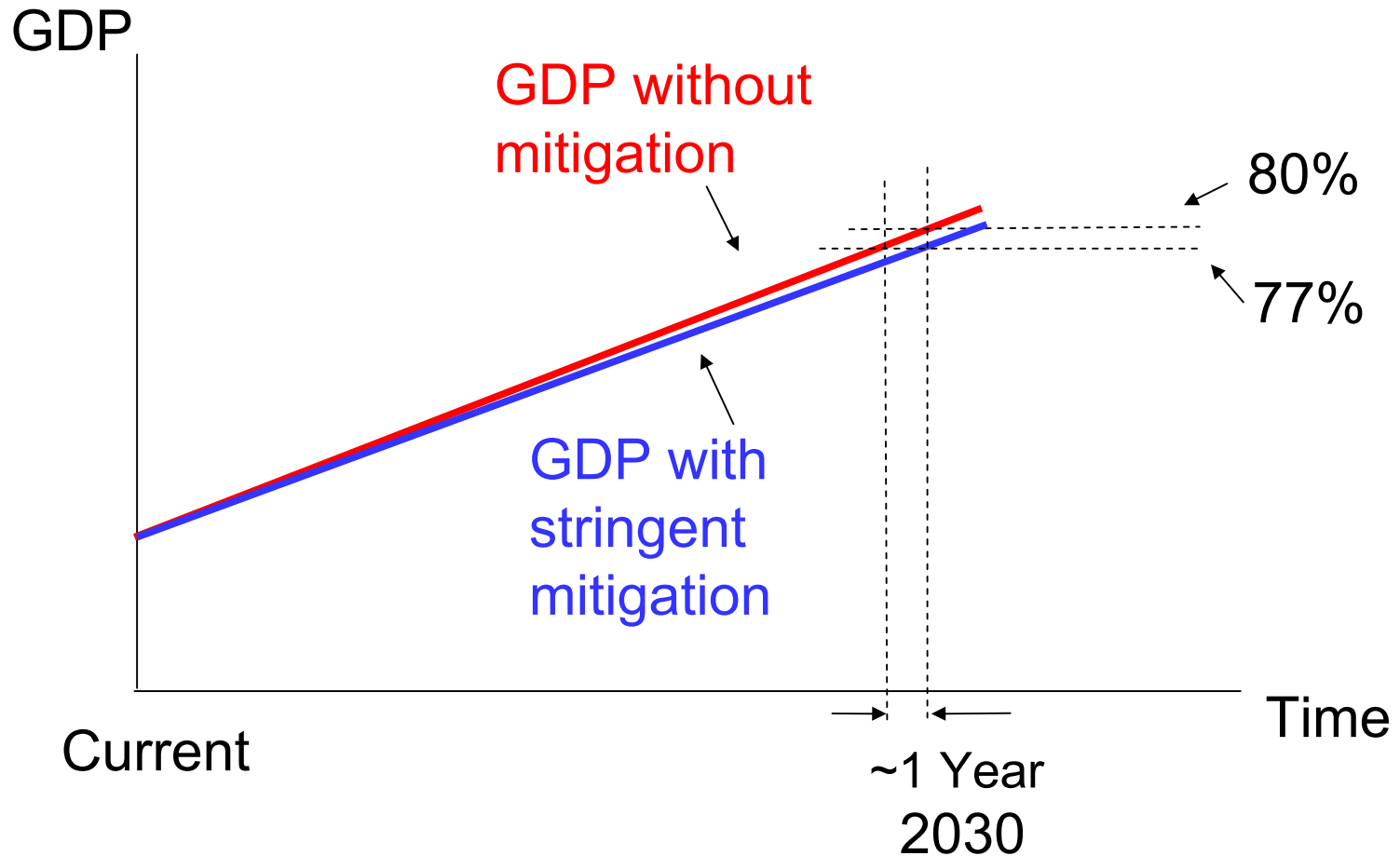
# Mitigation costs in 2030

**Estimated global macro-economic costs in 2030 for least-cost trajectories towards different long-term stabilization levels**

Trajectories towards stabilization levels (ppm CO <sub>2</sub> -eq)	Median GDP reduction (%)	Range of GDP reduction (%)	Reduction of average annual GDP growth rates (percentage points)
590-710	0.2	-0.6 – 1.2	< 0.06
535-590	0.6	0.2 – 2.5	<0.1
445-535	Not available	< 3	< 0.12

■ 0.6% gain to 3% decrease of GDP

# Illustration of cost numbers



# Key technologies to reduce emissions

## Key mitigation technologies and practices currently commercially available

### Energy Supply



Efficiency; fuel switching; renewable (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; nuclear power; early applications of CO2 capture and storage

### Transport



More fuel efficient vehicles; hybrid vehicles; biofuels; modal shifts from road transport to rail and public transport systems; cycling, walking; land-use planning

### Buildings

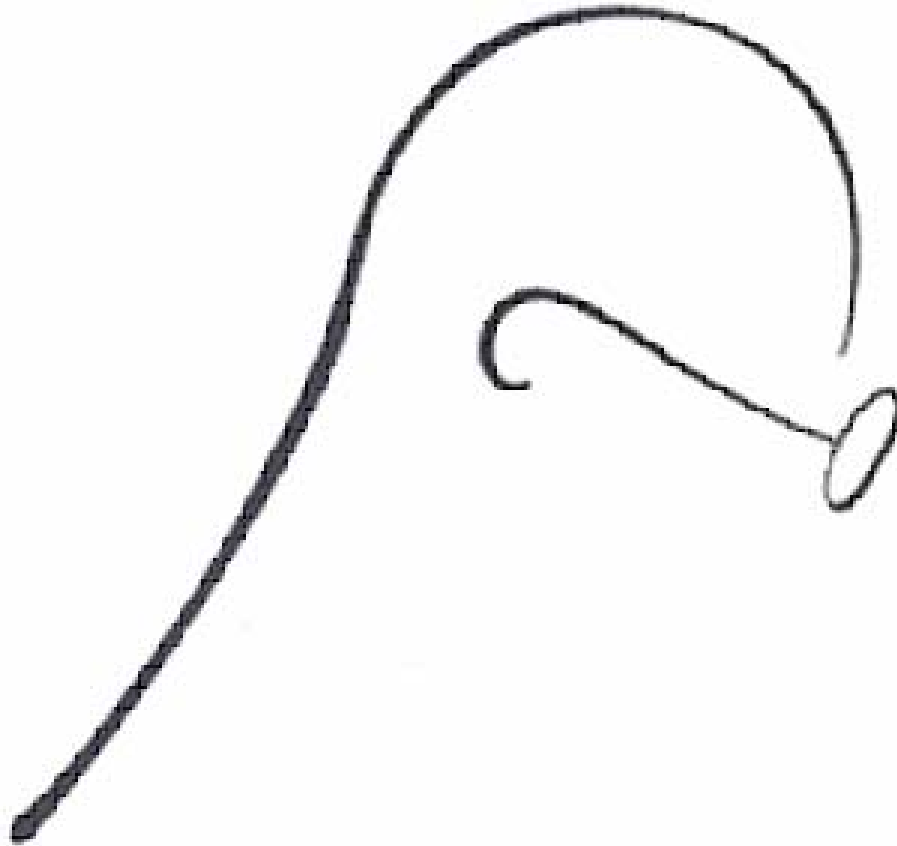


Efficient lighting; efficient appliances and airconditioning; improved insulation ; solar heating and cooling; alternatives for fluorinated gases in insulation and appliances

# Key policies to reduce emissions

- ◆ Appropriate incentives for **development of technologies**
- ◆ Effective **carbon price** signal to create incentives to invest in low-GHG products, technologies and processes
- ◆ Appropriate **energy infrastructure** investment decisions, which have long term effects on emissions
- ◆ Changes in **lifestyle and behavior** patterns, especially in building, transport and industrial sectors





A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions...

Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.