WMO

The challenges of climate change

UNEP

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Chairman, IPCC

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Helsinki University

14th February 2008

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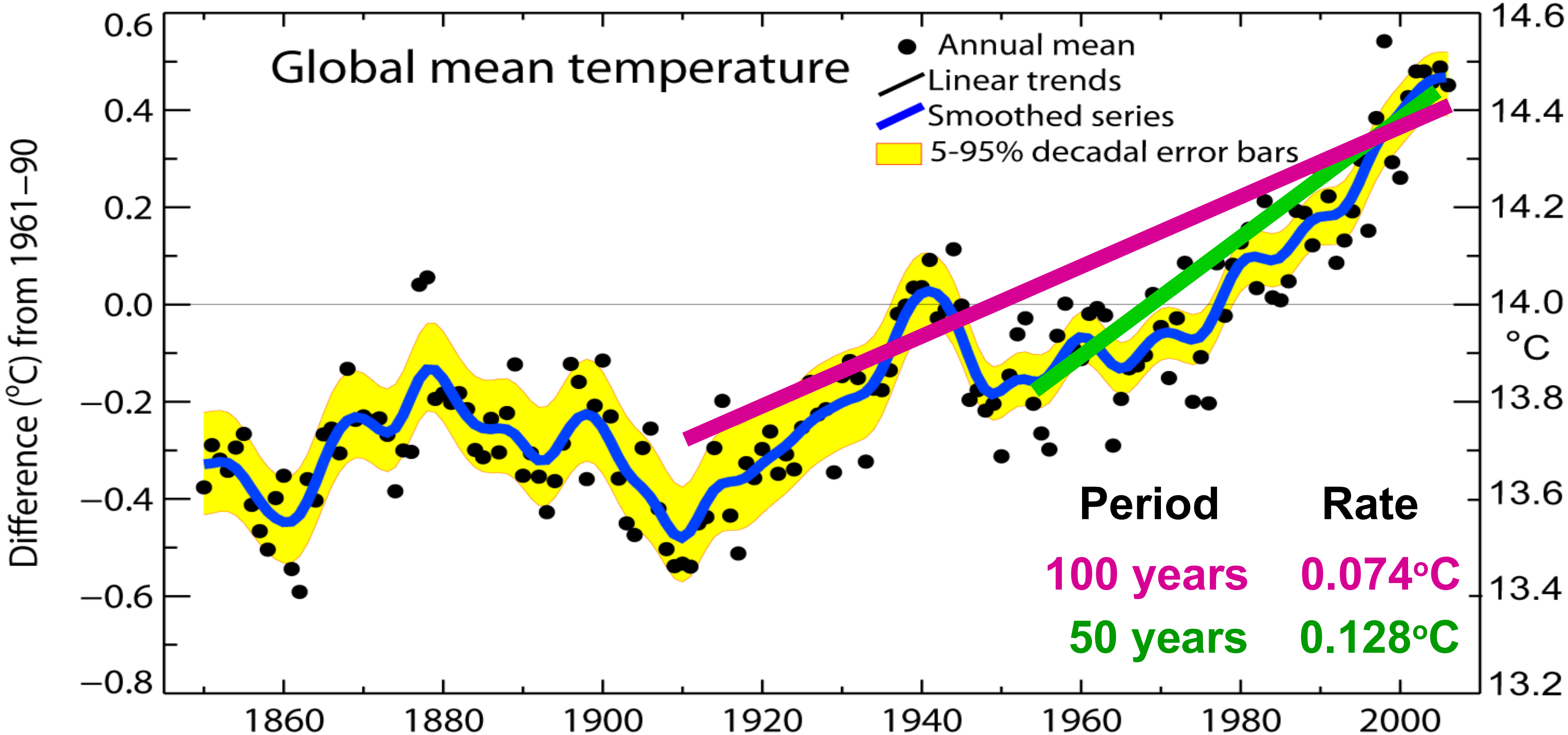
Contents

I. Observed changes in climate

Warming of the climate system is unequivocal, as is now evident from observations of increases in average air and ocean temperatures, widespread melting of snow and ice, and rising average sea level

I. Observed changes in climate

Changes in global average surface temperature



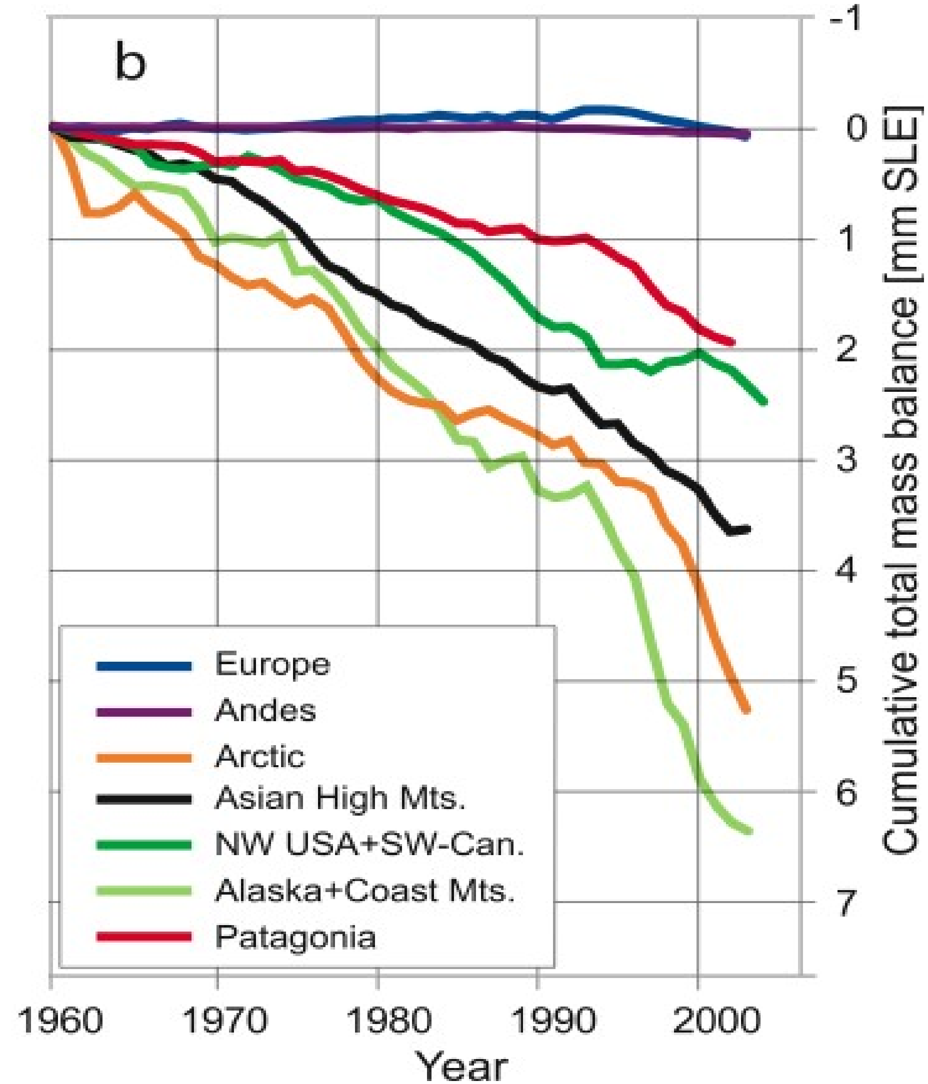
Eleven of the last twelve years rank among the twelve warmest years in the instrumental record of global surface temperature

I. Observed changes in climate

Cumulative balance of glacier mass

Water supplies stored in glaciers are projected to decline in the course of the century

Decreases in glaciers have contributed about 28% of sea level rise since 1993



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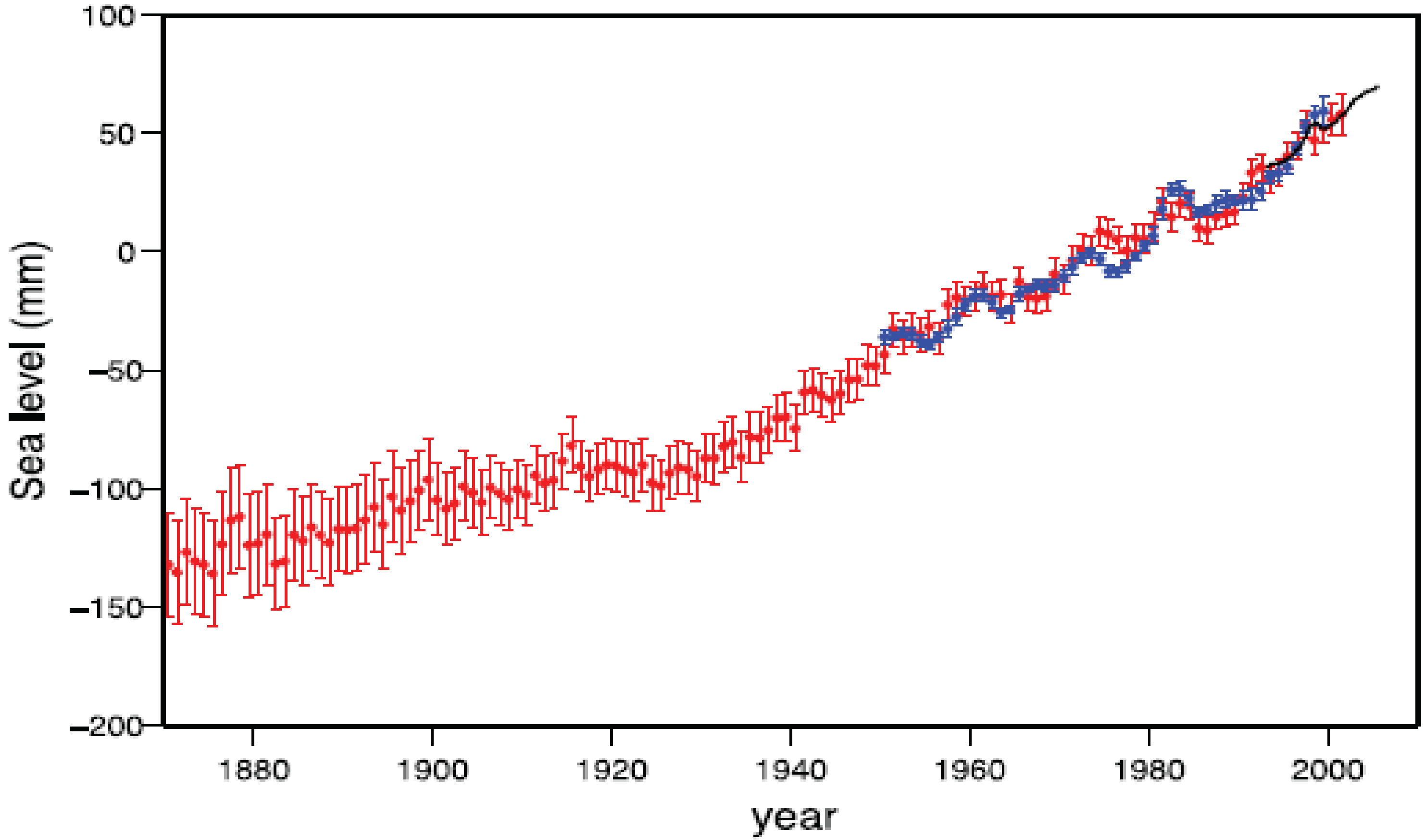
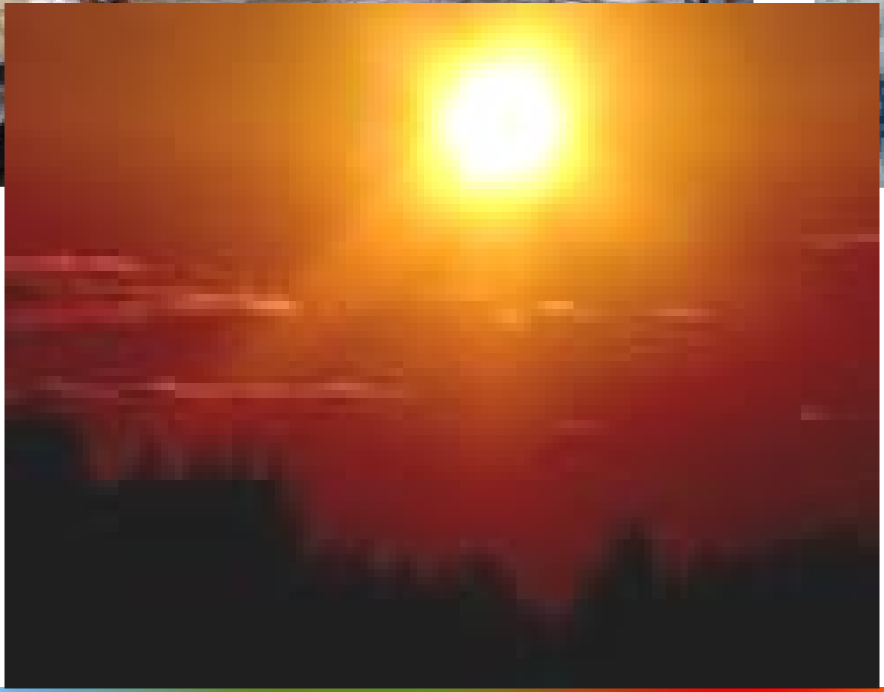
I. Observed changes in climate

Changes in global average sea level



Global average sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr

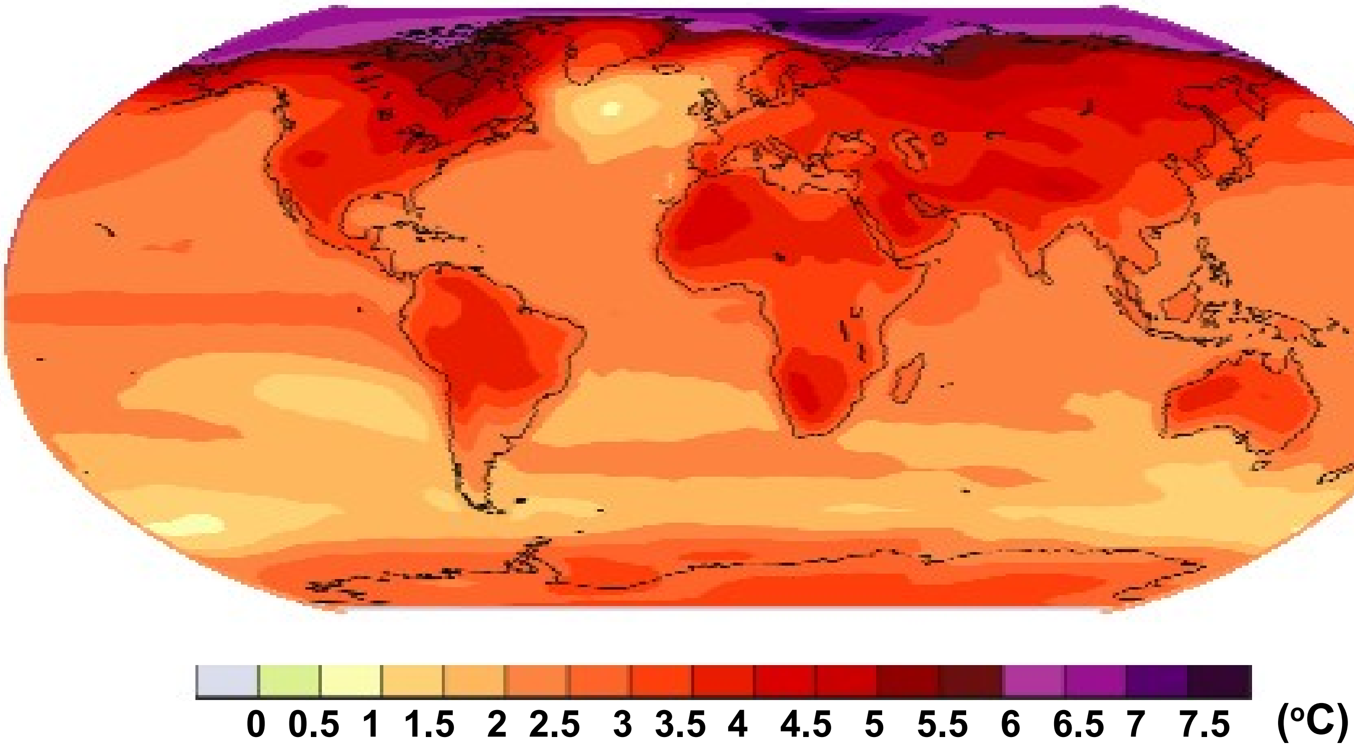
I. Observed changes in climate



II. Projections and impacts

Projected surface temperature changes

(2090-2099 relative to 1980-1999)



Continued emissions would lead to further warming of 1.8°C to 4°C over the 21st century

II. Projections and impacts

Examples of impacts associated with global average temp. change relative to 1980-1999

0 1 2 3 4 5°C

WATER	Increased water availability in moist tropics and high latitudes Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes Hundreds of millions of people exposed to increased water stress
ECO-SYSTEMS	Increased coral bleaching Most corals bleached Widespread coral mortality Terrestrial biosphere tends towards a net carbon source as: 15% 40% of ecosystems affected Increasing species range shifts and wildfire risk Ecosystem changes due to weakening of the meridional overturning circulation
FOOD	Complex, localised negative impacts on small holders, subsistence farmers and fishers Tendencies for cereal productivity to decrease in low latitudes Productivity of all cereals decreases in low latitudes Tendencies for some cereal productivity to increase at mid- to high latitudes Cereal productivity to decrease in some regions
COASTS	Increased damage from floods and storms About 30% of global coastal wetlands lost Millions more people experience coastal flooding each year
HEALTH	Increasing burden from malnutrition, diarrhoeal, cardio-respiratory, infectious diseases Increased morbidity and mortality from heat waves, floods, droughts Changed distribution of some disease vectors

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II. Projections and impacts

Food supply

Agricultural productivity at low latitudes likely to suffer severe losses because of:

- high temperature
- drought
- flood conditions
- soil degradation

Possible yield reduction of:

- 30% by 2050 in Central and South Asia
- 30% by 2080 in Latin America
- 50% by 2020 in some African countries

Crop revenues could fall by 90% by 2100 in Africa

II. Projections and impacts

Water availability

Water availability will be affected for consumption, agriculture and energy generation due to:

- Changes in precipitation patterns
- Increasing salinity of groundwater
- Glaciers melting decreasing river flows

Ranges of people exposed to increased water stress:

- 120 million to 1.2 billion in Asia by 2020
- 75 to 250 million in Africa by 2020
- 16 to 44 million in Europe by 2070

II. Projections and impacts

Negative impacts in Europe

Inland and coastal flooding

Health risks due to heat-waves

Reduction of water availability and crop productivity in South Europe

Species losses and reduced snow cover in mountains

II. Projections and impacts

Climate change could lead to some abrupt or irreversible impacts

Partial loss of ice sheets on polar land could imply several metres of sea level rise

20-30% of species are likely to be at risk of extinction if increases in warming exceed 1.5-2.5°C

III. Mitigation targets

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

But **adaptation alone cannot cope** with all the projected impacts of climate change

➢ **Need for a mix of strategies including adaptation and mitigation of GHG emissions**

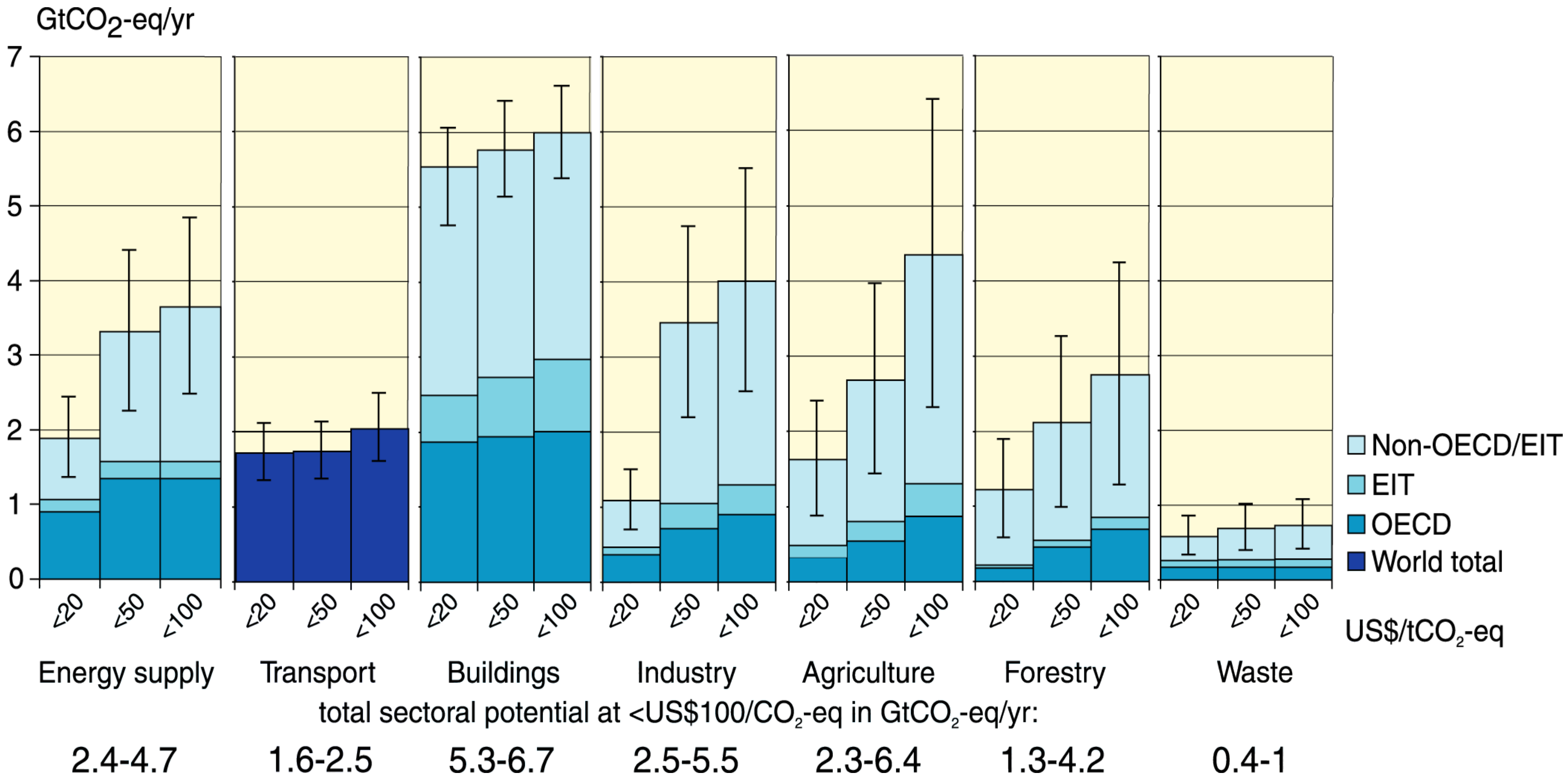
III. Mitigation targets

Stabilization level (ppm CO_2-eq)	Global mean temp. increase (ºC)	Year CO_2 needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020 – 2060	0.6 – 2.4

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

III. Mitigation targets

Economic mitigation potential by sector in 2030



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III. Cost of mitigation

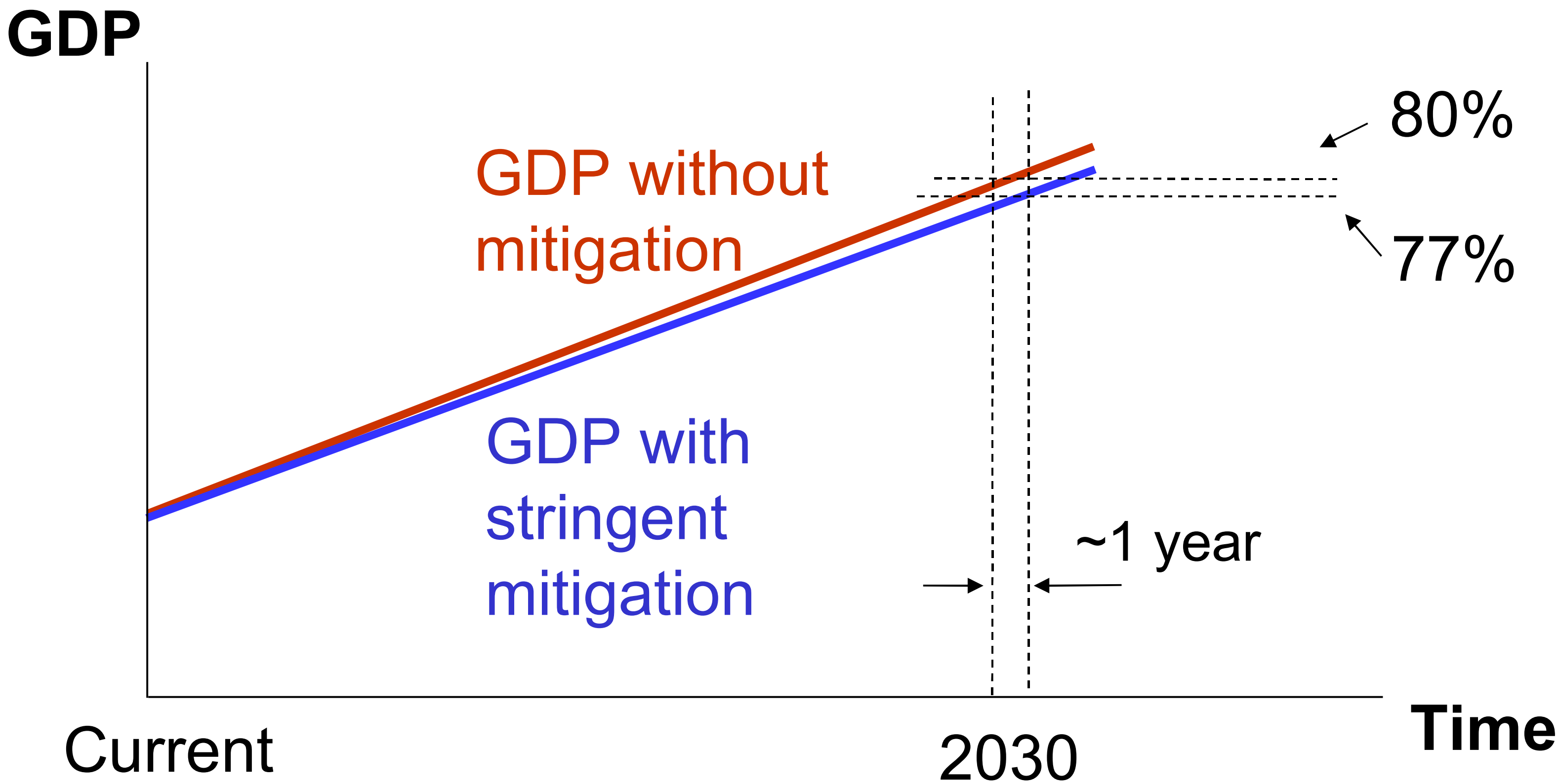
Costs of mitigation in 2030

Stabilisation levels (ppm CO2-eq)	Range of GDP reduction (%)	Reduction of average annual GDP growth rates (percentage pts)
590 - 710	-0.6 – 1.2	< 0.06
535 - 590	0.2 – 2.5	< 0.1
445 - 535	< 3	< 0.12

Mitigation measures would induce 0.6% gain to 3% decrease of GDP in 2030

III. Cost of mitigation

Impacts of mitigation on GDP growth



Stringent mitigation would postpone GDP growth of one year at most over the medium term

III. Cost of mitigation

Co-benefits of mitigation

Health co-benefits from reduced air pollution

Increased **energy security**

More rural **employment**

Increased **agricultural production** and reduced pressure on **natural ecosystems**, due to decreased tropospheric ozone concentrations

The co-benefits of mitigation may offset a substantial fraction of mitigation costs

VI. Key strategies

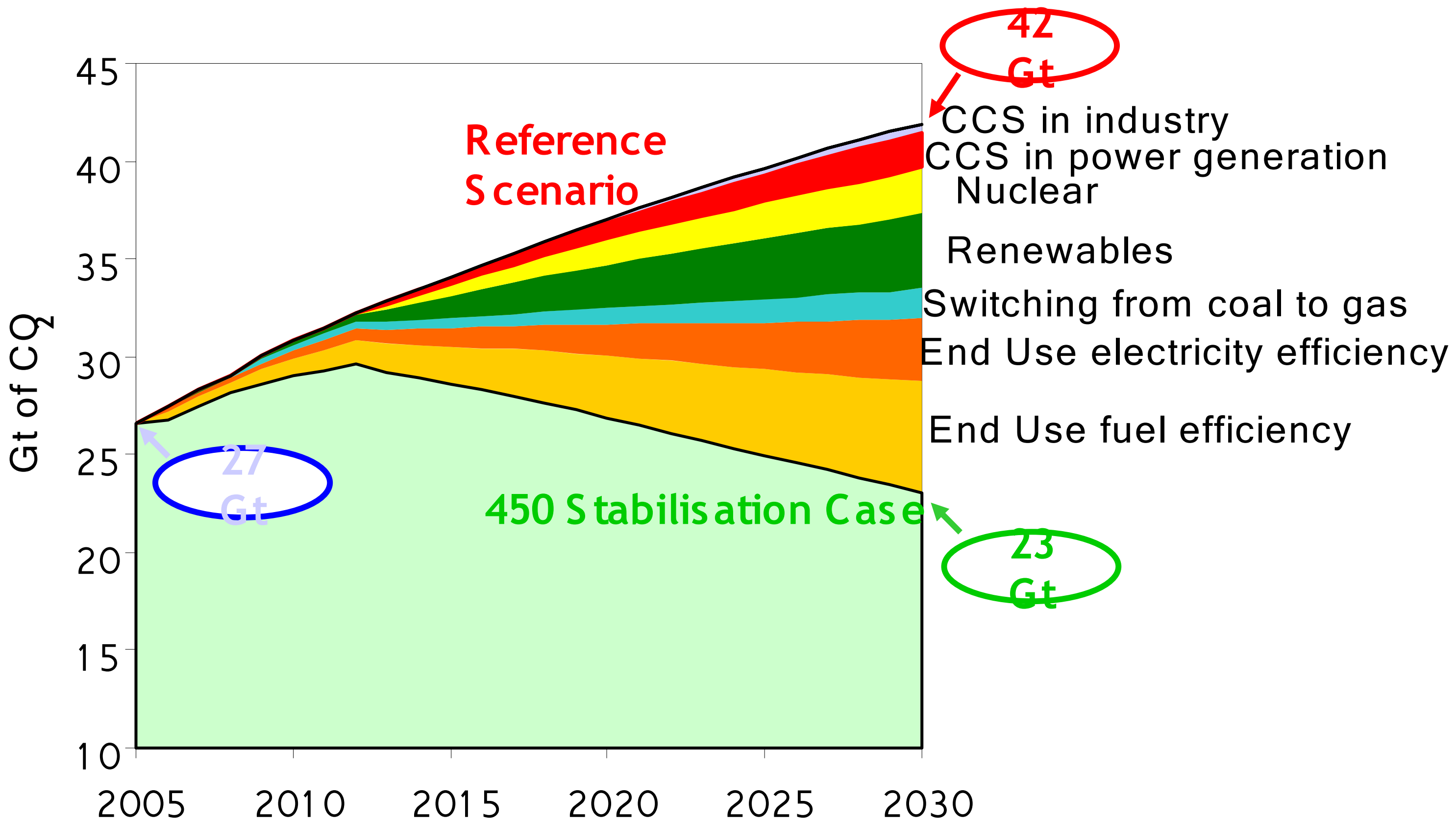
All stabilisation levels assessed can be achieved by deployment of a portfolio of **technologies that are currently available or expected to be commercialised** in coming decades

This assumes that **investment flows, technology transfer and incentives** are in place for technology development

VI. Key strategies

Energy-related CO_2 emissions

(450 Stabilisation Scenario)



VI. Key strategies

Key mitigation instruments, policies and practices

Regulations and standards

Appropriate energy infrastructure investments

Research, development and demonstration

Changes in lifestyle & management practices

VI. Key strategies

The role of civil society

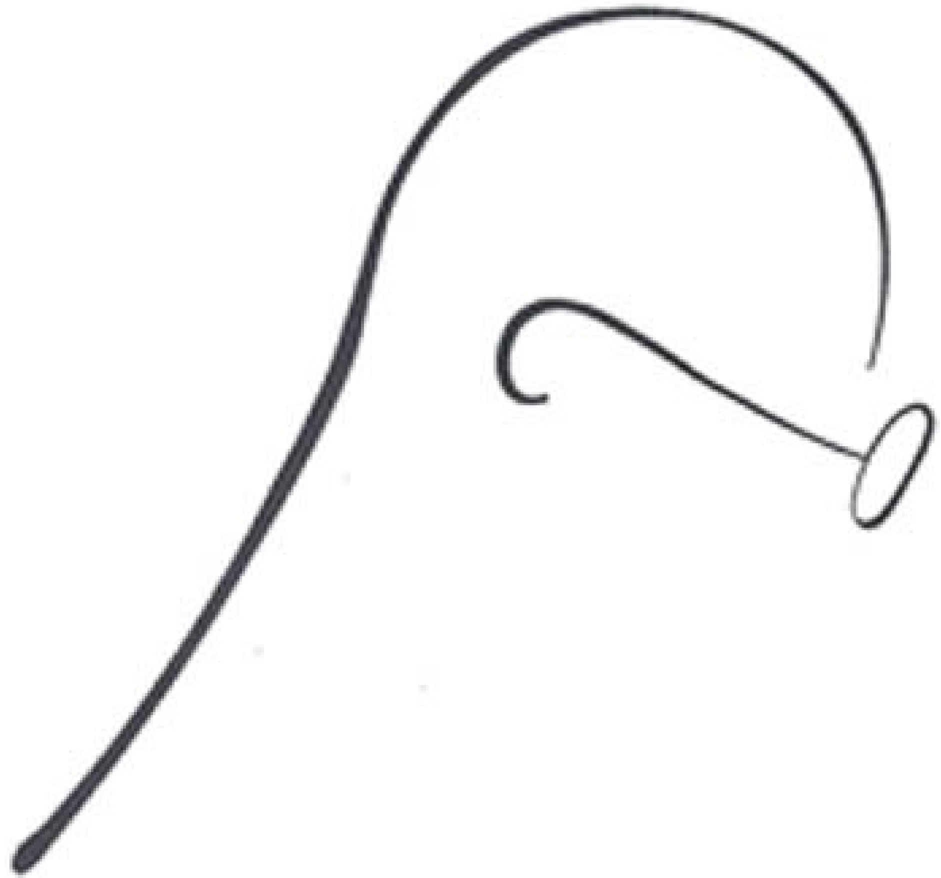
Efforts from civil society are essential to:

- Mitigate GHG emissions through behaviour changes
- Influence policy-making
- Send signals to the market

"As a hub of scientists and future leaders, **universities** can serve as a powerful example for society"*

- Yale committed to reduce GHG to 10% below 1990 level by 2020, despite projected 15% growth in physical plants
- Tufts committed to reduce GHG to 7% below 1990 level by 2012 projected, which translates into a 30% reduction given projected growth

*Richard Levin, president of Yale University



Be the change you want to see in the world

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I. Observed changes in climate

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Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Figure SPM.1). {1.1}

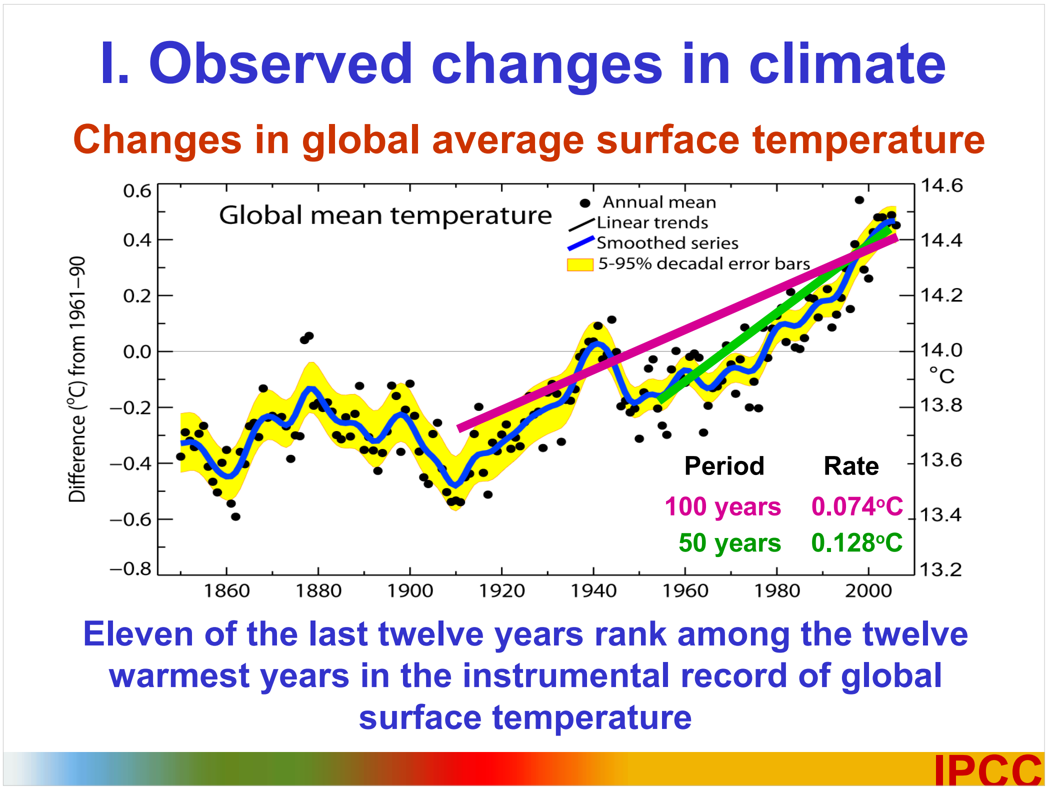


Figure SPM.1. Observed changes in (a) global average surface temperature; (b) global average sea level from tide gauge (blue) and satellite (red) data and (c) Northern Hemisphere snow cover for March-April. All differences are relative to corresponding averages for the period 1961-1990. Smoothed curves represent decadal averaged values while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c). {Figure 1.1}

Eleven of the last twelve years (1995-2006) rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850). The 100-year linear trend (1906-2005) of 0.74 [0.56 to 0.92]°C 1 is larger than the corresponding trend of 0.6 [0.4 to 0.8]°C (1901-2000) given in the Third Assessment Report (TAR) (Figure SPM.1). The temperature increase is widespread over the globe, and is greater at higher northern latitudes.

Land regions have warmed faster than the oceans (Figures SPM.2, SPM.4). {1.1, 1.2}

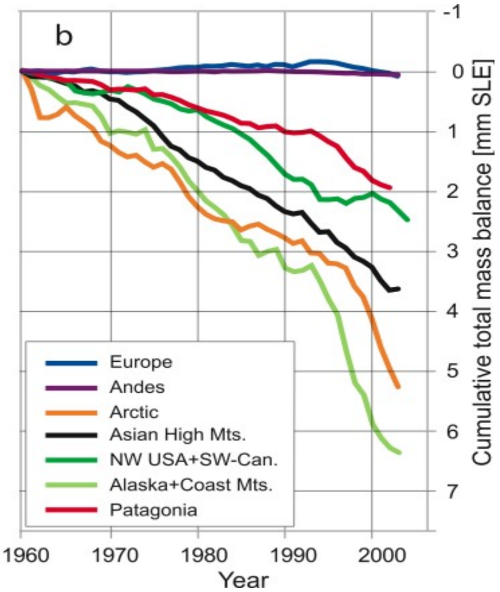
SYR SPM p.1

I. Observed changes in climate

Cumulative balance of glacier mass

Water supplies stored in glaciers are projected to decline in the course of the century

Decreases in glaciers have contributed about 28% of sea level rise since 1993



IPCC

<u>Widespread decreases in glaciers and ice caps have contributed to sea level rise</u>. WG1 SPM p.6

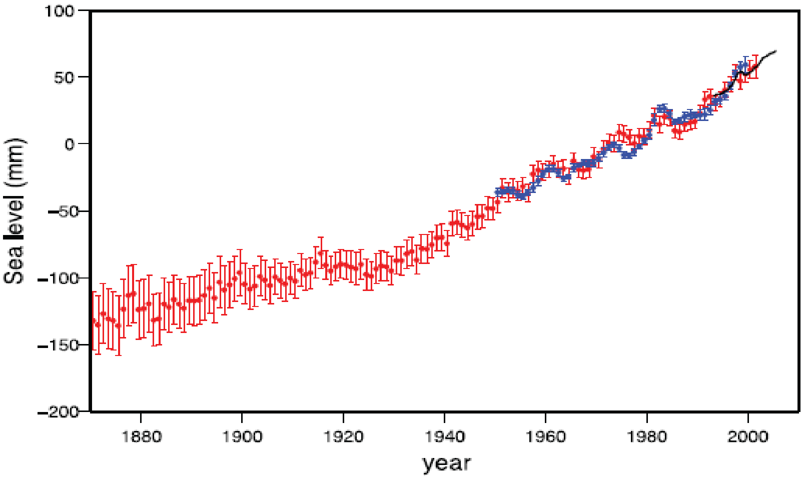
New data since the TAR now show that losses from the ice sheets of Greenland and Antarctica have *very likely* contributed to sea level rise over 1993 to 2003. WG1 SPM p.5

Since 1993 thermal expansion of the oceans has contributed about 57% of the sum of the estimated individual contributions to the sea level rise, with decreases in glaciers and ice-caps contributing about 28% and losses from the polar ice sheets contributing the remainder. SYR Topic 1 p.1

In the course of the century, **water supplies stored in glaciers and snow cover are projected to decline, <u>reducing water availability</u> in regions supplied by meltwater from major mountain ranges,** where more than one-sixth of the world population currently lives. WG2 [3.4] SPM p.5

I. Observed changes in climate

Changes in global average sea level



Global average sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr

IPCC

Figure 5.13. *Annual averages of the global mean sea level (mm). The red curve shows reconstructed sea level fields since 1870 (updated from Church and White, 2006); the blue curve shows coastal tide gauge measurements since 1950 (from Holgate and Woodworth, 2004) and the black curve is based on satellite altimetry (Leuliette et al., 2004). The red and blue curves are deviations from their averages for 1961 to 1990, and the black curve is the deviation from the average of the red curve for the period 1993 to 2001. Error bars show 90% confidence intervals. WG1 Chapter 5 p.410*

Rising sea level is consistent with warming (Figure SPM.1). Global average sea level has risen since 1961 at an

average rate of 1.8 [1.3 to 2.3]mm/yr and since 1993 at 3.1 [2.4 to 3.8]mm/yr, with contributions from thermal

expansion, melting glaciers and ice caps, and the polar ice sheets. Whether the faster rate for 1993 to 2003 reflects decadal variation or an increase in the longer-term trend is unclear. {1.1}

SYR SPM p.1

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. {1.1}

It is *very likely* that over the past 50 years: cold days, cold nights and frosts have become less frequent over most

land areas, and hot days and hot nights have become more frequent. It is *likely* that: heat waves have become more frequent over most land areas, the frequency of heavy precipitation events has increased over most areas, and since1975 the incidence of extreme high sea level has increased worldwide. {1.1}

Average Northern Hemisphere temperatures during the second half of the 20th century were *very likely* higher than during any other 50-year period in the last 500 years and *likely* the highest in at least the past 1300 years. {1.1}

SYR SPM p.1

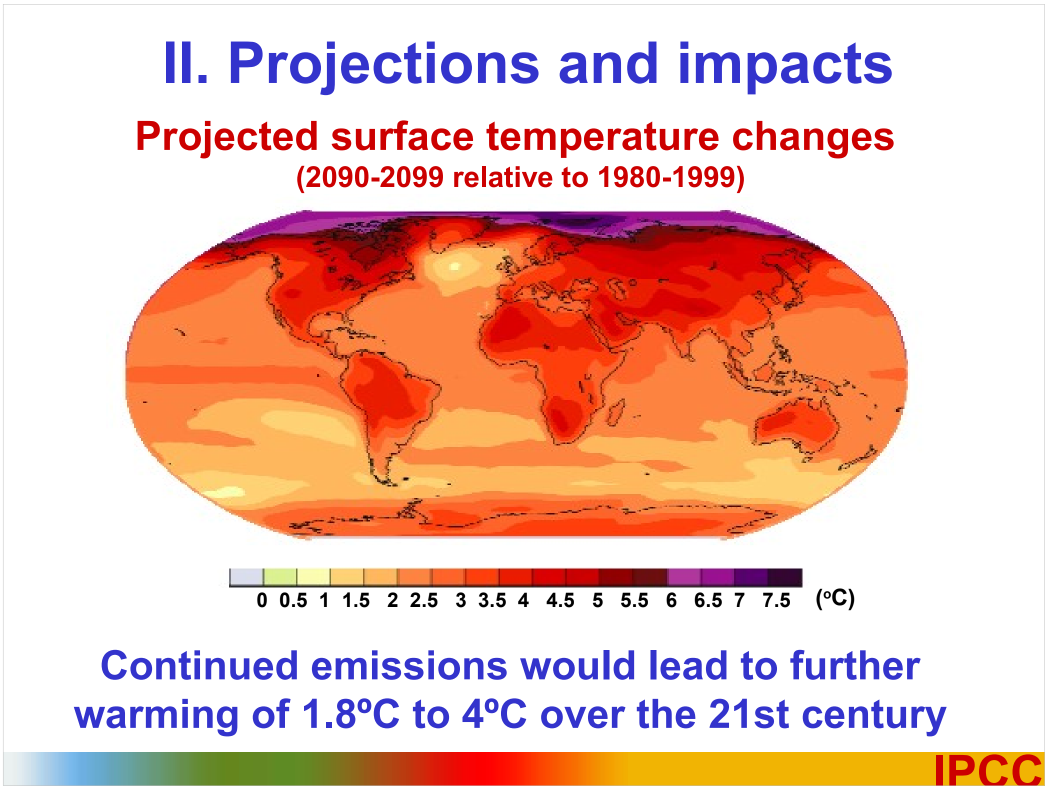


Figure SPM. 6. Projected surface temperature changes for the late 21st century (2090-2099). The map shows the multi-AOGCM average projection for the A1B SRES scenario. All temperatures are relative to the period 1980-1999. {Figure 3.2}

For the next two decades a warming of about 0.2°C per decade is projected for a range of SRES emission

scenarios. Even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a

further warming of about 0.1°C per decade would be expected. Afterwards, temperature projections increasingly

depend on specific emission scenarios. {3.2}

SYR SPM p.6

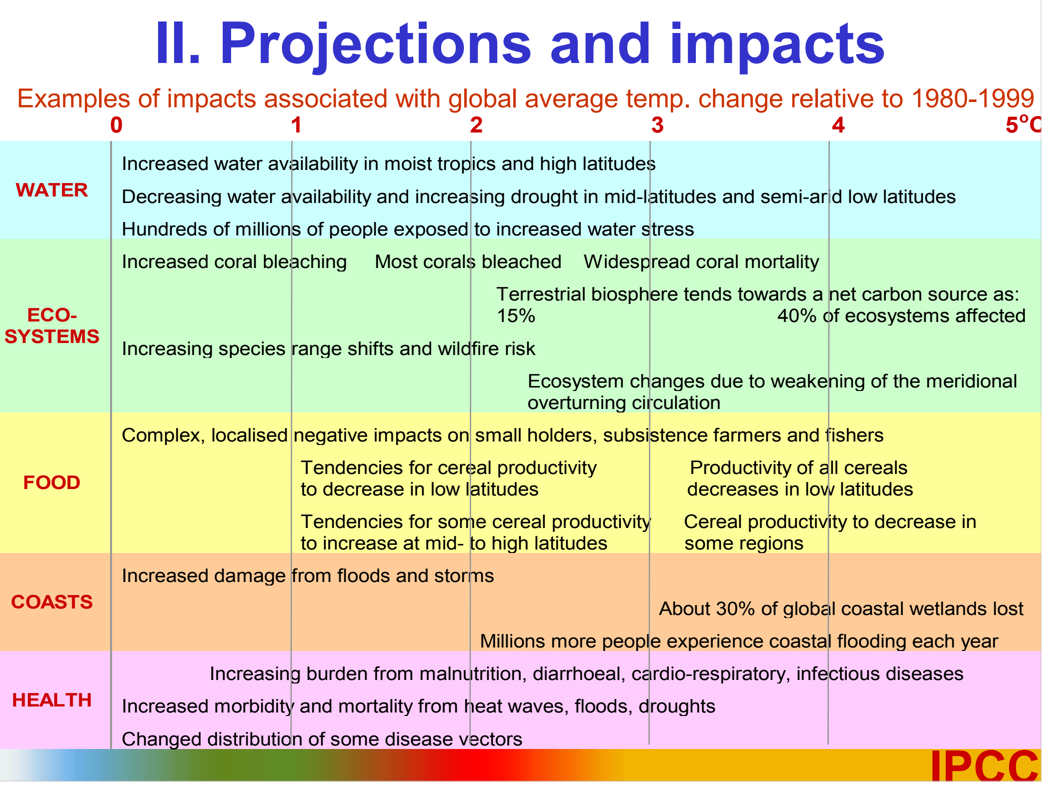


Figure SPM.7. Examples of impacts associated with projected global average surface warming. Upper panel: Illustrative

examples of global impacts projected for climate changes (and sea level and atmospheric CO2 where relevant) associated with

different amounts of increase in global average surface temperature in the 21st century. The black lines link impacts; brokenline

arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left hand side of text

indicates the approximate level of warming that is associated with the onset of a given impact. Quantitative entries for water

scarcity and flooding represent the additional impacts of climate change relative to the conditions projected across the range of

SRES scenarios A1FI, A2, B1 and B2. Adaptation to climate change is not included in these estimations. Confidence levels for

all statements are *high*. Lower panel: Dots and bars indicate the best estimate and *likely* ranges of warming assessed for the

six SRES marker scenarios for 2090-2099 relative to 1980-1999. {Figure 3.6}

SYR SPM P.9

II. Projections and impacts

Food supply

Agricultural productivity at low latitudes likely to suffer severe losses because of:

- high temperature
- drought
- flood conditions
- soil degradation

Possible yield reduction of:

- 30% by 2050 in Central and South Asia
- 30% by 2080 in Latin America
- 50% by 2020 in some African countries

Crop revenues could fall by 90% by 2100 in Africa

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Increases in the frequency of droughts and floods are projected to affect local crop production negatively, especially in subsistence sectors at low latitudes. WG2 SPM p.7

AFRICA

Projected reductions in yield in some countries could be as much as 50% by 2020, and crop net revenues could fall by as much as 90% by 2100, with small-scale farmers being the most affected. WG2 Chapter 9 p.435

These consequences would **further adversely affect food security and exacerbate malnutrition** in the continent. [9.2, 9.4, 9.6] WG2 [1.3] (SPM p.3)

SOUTH ASIA

It is projected that **crop yields** could increase up to 20% in East and Southeast Asia while they could decrease up to 30% in Central and South Asia by the mid-21st century. Taken together and considering the influence of rapid population growth and urbanisation, the risk of hunger is projected to remain very high in several developing countries. WG2 Chapter 10 p.480

LATIN AMERICA

In drier areas, climate change is expected to lead to **salinisation and desertification of agricultural land**. Productivity of some important crops is projected to decrease and livestock productivity to decline, with adverse consequences for food security. In temperate zones soybean yields are

II. Projections and impacts

Water availability

Water availability will be affected for consumption, agriculture and energy generation due to:

- Changes in precipitation patterns
- Increasing salinity of groundwater
- Glaciers melting decreasing river flows

Ranges of people exposed to increased water stress:

- 120 million to 1.2 billion in Asia by 2020
- 75 to 250 million in Africa by 2020
- 16 to 44 million in Europe by 2070

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ASIA

Glacier melt in the Himalayas is projected to increase flooding, and rock avalanches from destabilised slopes, and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede. Over-exploitation of groundwater in many countries of Asia has resulted in a drop in its level, leading to ingress of sea water in coastal areas making the sub-surface water saline. India, China and Bangladesh are especially susceptible to **increasing salinity of their groundwater** as well as surface water resources, especially along the coast, due to increases in sea level as a direct impact of global warming. WG2 Chapter 10 p.483

It is estimated that under the full range of SRES scenarios, 120 million to 1.2 billion, and 185 to 981 million people will experience increased water stress by the 2020s, and the 2050s, respectively. WG2 Chapter 10 p.484

AFRICA

In Africa by 2020, between 75 and 250 million people are projected to be exposed to an increase of **water stress** due to climate change. If coupled with increased demand, this will adversely affect livelihoods and exacerbate water-related problems. WG2 [9.4, 3.4, 8.2, 8.4] (SPM p.8)

LATIN AMERICA

Changes in precipitation patterns and the disappearance of glaciers are projected to significantly affect water availability for human consumption, agriculture and energy generation. WG2 SPM p.11

II. Projections and impacts

Negative impacts in Europe

Inland and coastal flooding

Health risks due to heat-waves

Reduction of water availability and crop productivity in South Europe

Species losses and reduced snow cover in mountains

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Europe

Climate change is expected to magnify regional differences in Europe's natural resources and assets. Negative

impacts will include increased risk of inland flash floods, and more frequent coastal flooding and increased erosion (due to storminess and sea-level rise)

Mountainous areas will face glacier retreat, reduced snow cover and winter tourism, and extensive species losses (in some areas up to 60% under high emissions scenarios by 2080)

In Southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a regionalready vulnerable to climate variability, and to reduce water availability, hydropower potential, summer tourism and, in general, crop productivity

Climate change is also projected to increase the health risks due to heat-waves, and the frequency of wildfires

II. Projections and impacts

Climate change could lead to some abrupt or irreversible impacts

Partial loss of ice sheets on polar land could imply several metres of sea level rise

20-30% of species are likely to be at risk of extinction if increases in warming exceed 1.5-2.5°C

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Anthropogenic warming could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change. {3.4}

Partial loss of ice sheets on polar land could imply metres of sea level rise, major changes in coastlines and

inundation of low-lying areas, with greatest effects in river deltas and low-lying islands. Such changes are

projected to occur over millennial time scales, but more rapid sea level rise on century time scales cannot be

excluded. {3.4}

Climate change is *likely* to lead to some irreversible impacts. There is *medium confidence* that approximately 20-

30% of species assessed so far are *likely* to be at increased risk of extinction if increases in global average

warming exceed 1.5-2.5oC (relative to 1980-1999). As global average temperature increase exceeds about 3.5oC, model projections suggest significant extinctions (40-70% of species assessed) around the globe. {3.4}

SYR SPM p.13

III. Mitigation targets

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

But **adaptation alone cannot cope** with all the projected impacts of climate change

➤ **Need for a mix of strategies including adaptation and mitigation of GHG emissions**

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Adaptation is essential, particularly in addressing near-term impacts.

However, adaptation alone is not expected to cope with all the projected effects of climate change, and especially not over the long run as most impacts increase in magnitude WG2 [Table SPM-1] (SPM p.17)

Impacts of climate change are very likely to impose net annual costs which will increase over

time as global temperatures increase. WG2 [F20.3] (SPM p.16)

This suggests the value of a portfolio or mix of strategies that includes adaptation,

technological development (to enhance both adaptation and mitigation), research (on climate

science, impacts, adaptation and mitigation) and mitigation of GHG. WG2 SPM p.18

III. Mitigation targets

Stabilization level (ppm CO_2-eq)	Global mean temp. increase (ºC)	Year CO_2 needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000 – 2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000 – 2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010 – 2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020 – 2060	0.6 – 2.4

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

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Table SPM.6. Characteristics of post-TAR stabilisation scenarios and resulting long-term equilibrium global average temperature and the sea level rise component from thermal expansion only. {Table 5.1}a

Mitigation efforts and investments over the next two to three decades will have a large impact on opportunities to achieve lower stabilisation levels. Delayed emission reductions significantly constrain the opportunities to achieve lower stabilisation levels and increase the risk of more severe climate change impacts.

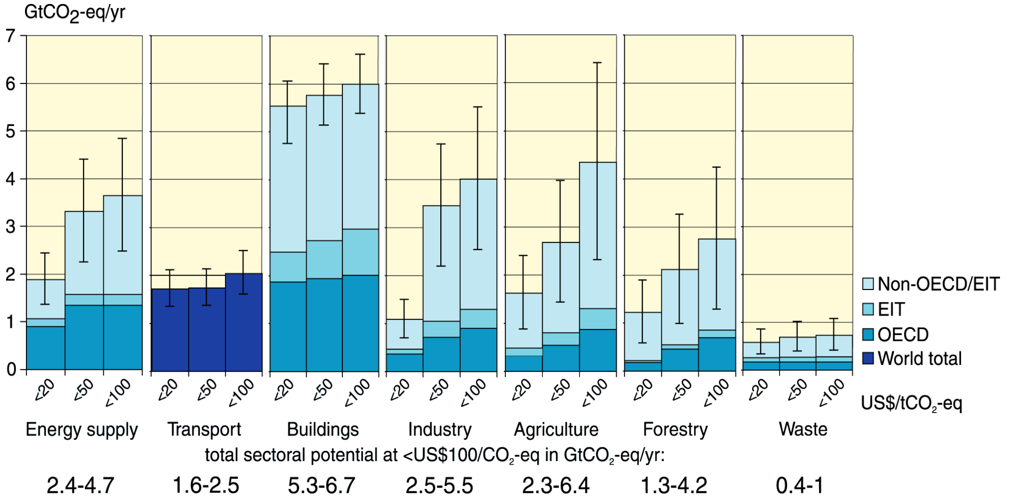
Sea level rise under warming is inevitable. Thermal expansion would continue for many centuries after GHG

concentrations have stabilised, for any of the stabilisation levels assessed, causing an eventual sea level rise much larger than projected for the 21st century. The eventual contributions from Greenland ice sheet loss could be several metres, and larger than from thermal expansion, should warming in excess of 1.9-4.6°C above preindustrial be sustained over many centuries. The long time scales of thermal expansion and ice sheet response to warming imply that stabilisation of GHG concentrations at or above present levels would not stabilise sea level for many centuries. {5.3, 5.4}

SYR SPM p.21

III. Mitigation targets

Economic mitigation potential by sector in 2030



IPCC

Figure SPM.10. Estimated economic mitigation potential by sector in 2030 from bottom-up studies, compared to the respective baselines assumed in the sector assessments. The potentials do not include non-technical options such as lifestyle changes. {Figure 4.2}

SYR SPM p.16

Both bottom-up and top-down studies indicate that there is *high agreement* and *much evidence* of

substantial economic potential for the mitigation of global GHG emissions over the coming decades that could offset the projected growth of global emissions or reduce emissions below current levels (Figures SPM.9, SPM.10).

No single technology can provide all of the mitigation potential in any sector. The economic mitigation potential,

which is generally greater than the market mitigation potential, can only be achieved when adequate policies are in place and barriers removed (Table SPM.5).

SYR SPM p.14

III. Cost of mitigation

Costs of mitigation in 2030

Stabilisation levels (ppm CO2-eq)	Range of GDP reduction (%)	Reduction of average annual GDP growth rates (percentage pts)
590 - 710	-0.6 – 1.2	< 0.06
535 - 590	0.2 – 2.5	< 0.1
445 - 535	< 3	< 0.12

Mitigation measures would induce 0.6% gain to 3% decrease of GDP in 2030

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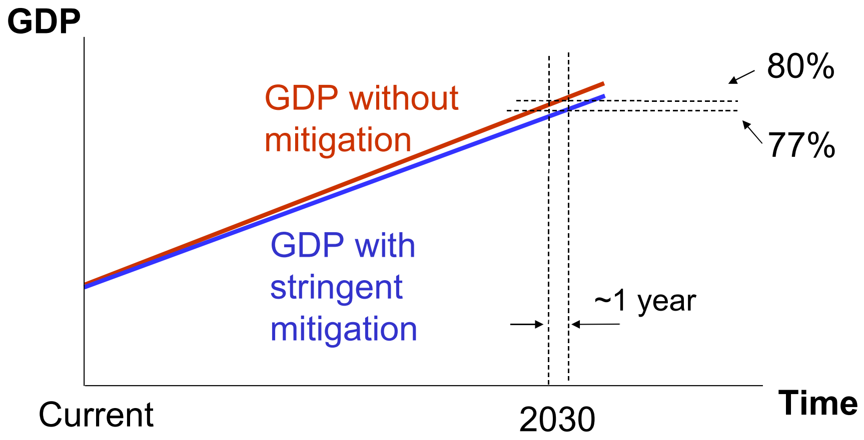
III. Cost of mitigation

Impacts of mitigation on GDP growth



Stringent mitigation would postpone GDP growth of one year at most over the medium term

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III. Cost of mitigation

Co-benefits of mitigation

Health co-benefits from reduced air pollution

Increased **energy security**

More rural **employment**

Increased **agricultural production** and reduced pressure on **natural ecosystems**, due to decreased tropospheric ozone concentrations

The co-benefits of mitigation may offset a substantial fraction of mitigation costs

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Near-term **health co-benefits** from reduced air pollution as a result of actions to reduce GHG emissions can be substantial and may offset a substantial fraction of mitigation costs.

Including co-benefits other than health, such as **increased energy security, and increased agricultural production and reduced pressure on natural ecosystems,** due to decreased tropospheric ozone concentrations, would further enhance cost savings WG3 [11.8] (SPM p.17)

Co-benefits of action in the form of reduced air pollution, more energy security or more rural employment offset mitigation costs. While the studies use different methodological approaches,

there is general consensus for all world regions analyzed that near-term health and other benefits from GHG reductions can be substantial, both in industrialized and developing countries.

However, the benefits are highly dependent on the policies, technologies and sectors chosen. In developing countries, much of the health benefit could result from improvements in the efficiency of, or switching away from, the traditional use of coal and biomass. Such near-term co-benefits of GHG control provide the opportunity for a true no-regrets GHG reduction policy in which substantial advantages accrue even if the impact of human-induced climate change itself turns out to be

less than that indicated by current projections.

WG3 Chapter 11 p.623

VI. Key strategies

All stabilisation levels assessed can be achieved by deployment of a portfolio of **technologies that are currently available or expected to be commercialised** in coming decades

This assumes that **investment flows, technology transfer and incentives** are in place for technology development

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There is *high agreement* and *much evidence* that all stabilisation levels assessed can be achieved by

deployment of a portfolio of technologies that are either currently available or expected to be

commercialised in coming decades, assuming appropriate and effective incentives are in place for their development, acquisition, deployment and diffusion and addressing related barriers.

Without substantial investment flows and effective technology transfer, it may be difficult to achieve emission

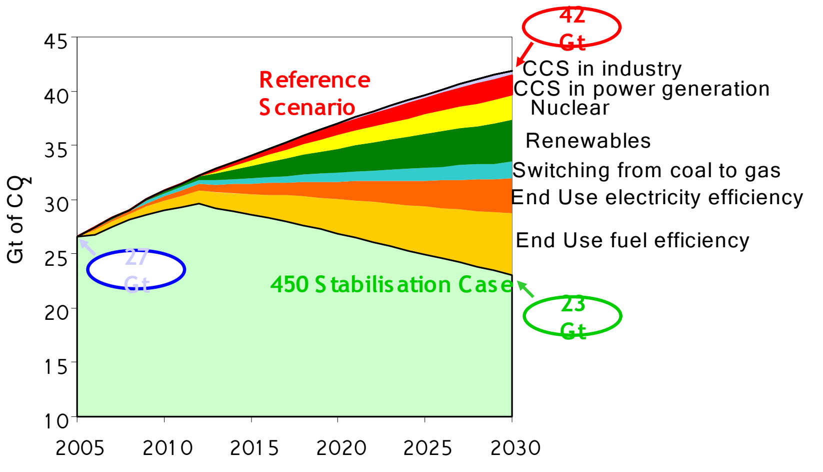
reduction at a significant scale. Mobilizing financing of incremental costs of low-carbon technologies is important.

{5.5}

VI. Key strategies

Energy-related CO_2 emissions

(450 Stabilisation Scenario)



IEA, World Energy Outlook 2007 IPCC

VI. Key strategies

Key mitigation instruments, policies and practices



Regulations and standards

Appropriate energy infrastructure investments

Research, development and demonstration

Changes in lifestyle & management practices

IPCC

A wide variety of policies and instruments are available to governments to create the incentives for mitigation action. Their applicability depends on national circumstances and sectoral context (Table SPM.5). {4.3}

They include integrating climate policies in wider development policies, regulations and standards, taxes and charges, tradable permits, financial incentives, voluntary agreements, information instruments, and research, development and demonstration (RD&D). {4.3}

There is also *high agreement* and *medium evidence* that changes in lifestyle, behaviour patterns and management practices can contribute to climate change mitigation across all sectors. {4.3}

Greater cooperative efforts and expansion of market mechanisms will help to reduce global costs for achieving a given level of mitigation, or will improve environmental effectiveness. Efforts can include diverse elements such as emissions targets; sectoral, local, sub-national and regional actions; RD&D programmes; adopting common policies; implementing development oriented actions; or expanding financing instruments. {4.5} SYR SPM p.19

Future energy infrastructure investment decisions, expected to exceed 20 trillion US$16 between 2005 and 2030, will have long-term impacts on GHG emissions, because of the long life-times of energy plants and other infrastructure capital stock. The widespread diffusion of low-carbon technologies may take many decades, even if early investments in these technologies are made attractive. Initial estimates show that returning global energyrelated CO2 emissions to 2005 levels by 2030 would require a large shift in investment patterns, although the net additional investment required ranges from negligible to 5-10%. {4.3} SYR SPM p.18

An effective carbon-price signal could realise significant mitigation potential in all sectors. Modelling studies show global carbon prices rising to 20-80

VI. Key strategies

The role of civil society

Efforts from civil society are essential to:

- Mitigate GHG emissions through behaviour changes
- Influence policy-making
- Send signals to the market

"As a hub of scientists and future leaders, **universities** can serve as a powerful example for society"*

- Yale committed to reduce GHG to 10% below 1990 level by 2020, despite projected 15% growth in physical plants
- Tufts committed to reduce GHG to 7% below 1990 level by 2012 projected, which translates into a 30% reduction given projected growth

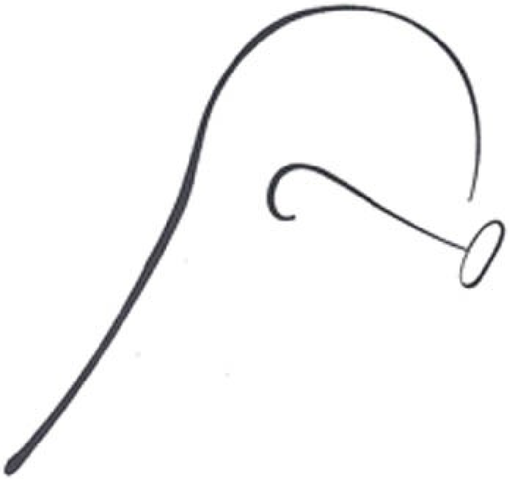
*Richard Levin, president of Yale University IPCC

As a hub of scientists and future leaders, universities are a natural place for devising innovative strategies for emission reduction and can serve as a powerful example for society, explains Richard Levin, president of Yale University. Strategies to reduce greenhouse gas emissions at Yale include conservation, sustainable construction and support of renewable-energy sources. Many investments actually save money in the long run. Levin concludes that some sacrifices today are minimal if they result in saving our planet for future generations.

At Yale, we committed in 2005 to reduce our greenhouse gas emissions to 10 percent below the 1990 level by the year 2020. This represents a 43 percent reduction from our 2004 level, even while our plans call for 15 percent growth in our physical plant.

– http://yaleglobal.yale.edu/display.article?id=8822

Tufts University is committed to meeting or beating the Kyoto target for university-related greenhouse gas emissions. Given the university's projected growth rate, this translates into a 30% emissions reduction by the year 2012.



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