Mitigation of Climate Change

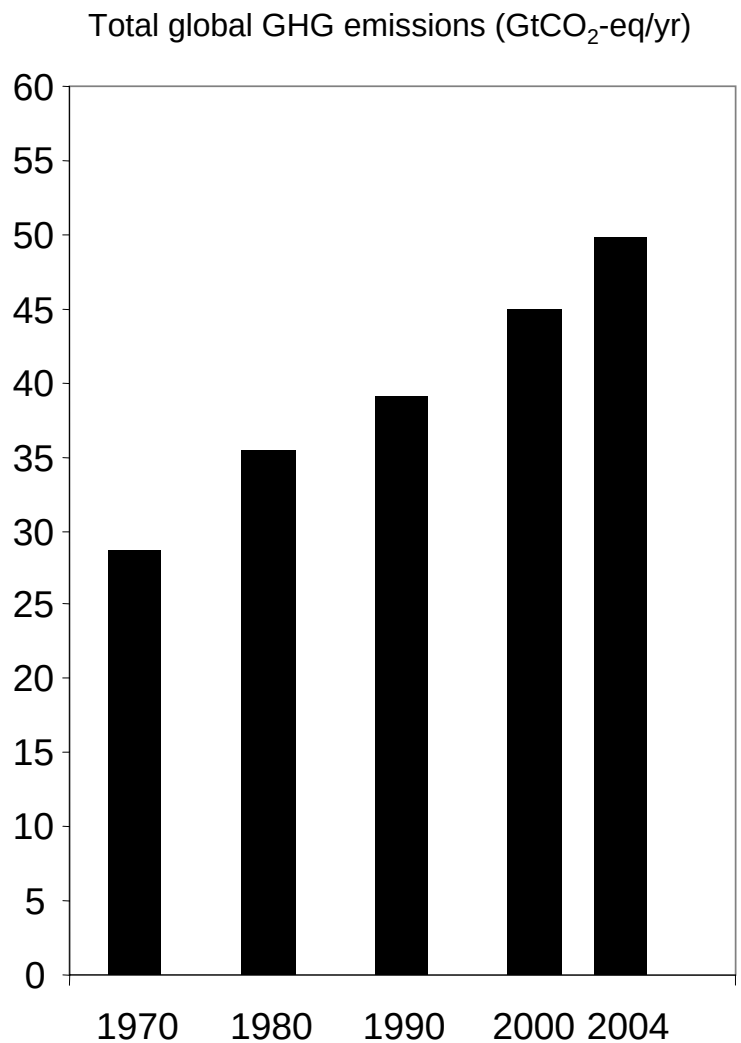
IPCC Working Group III
contribution to the

Fourth Assessment Report

The people

– 168 Lead Authors
– 55 Authors from developing countries
– 106 Authors from developed countries
– 84 Contributing authors
– 485 Expert Reviewers

Between 1970 and 2004 global greenhouse gas emissions have increased by 70 %

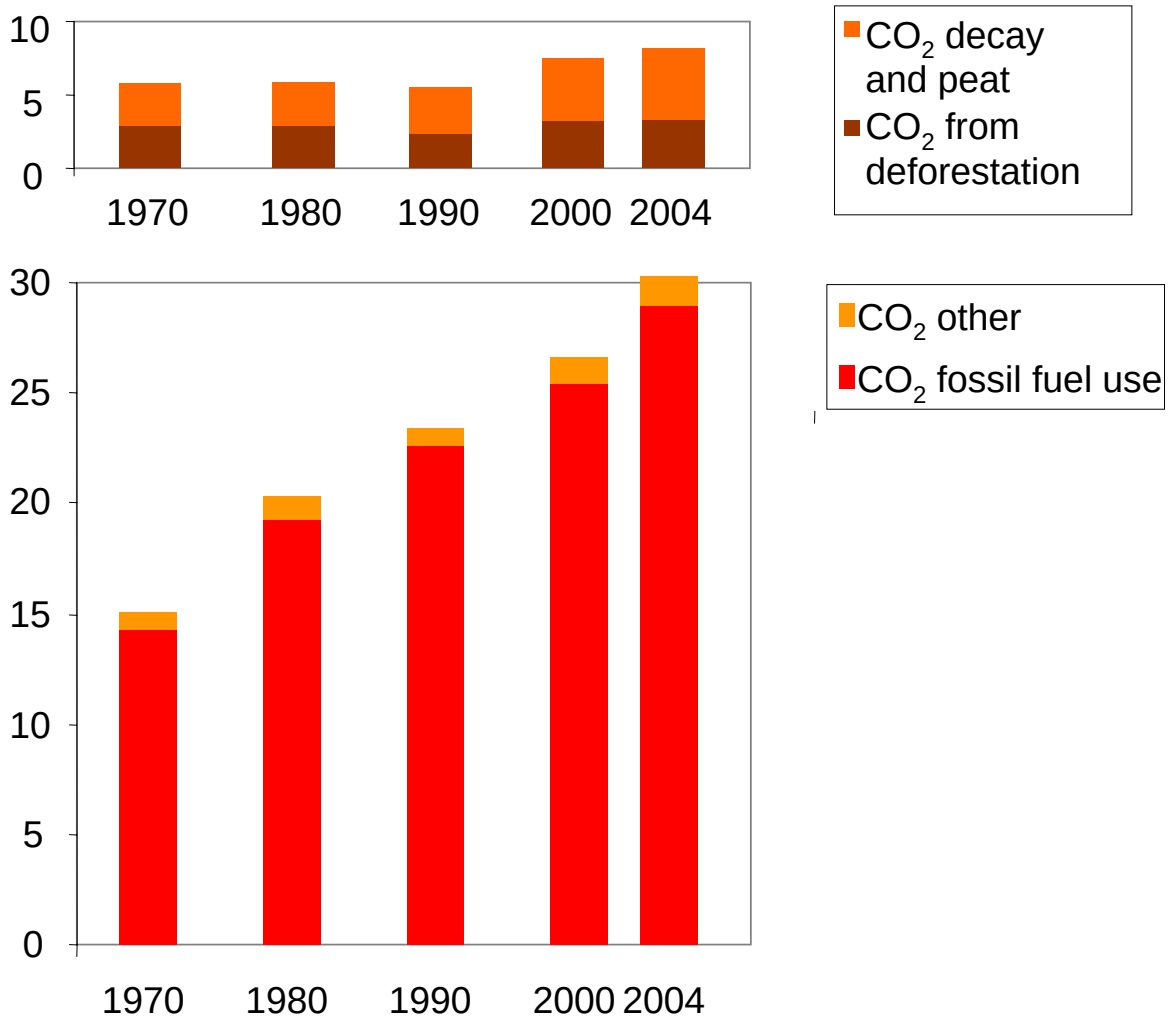


INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

WMO

UNEP

Carbon dioxide is the largest contributor



Future emissions

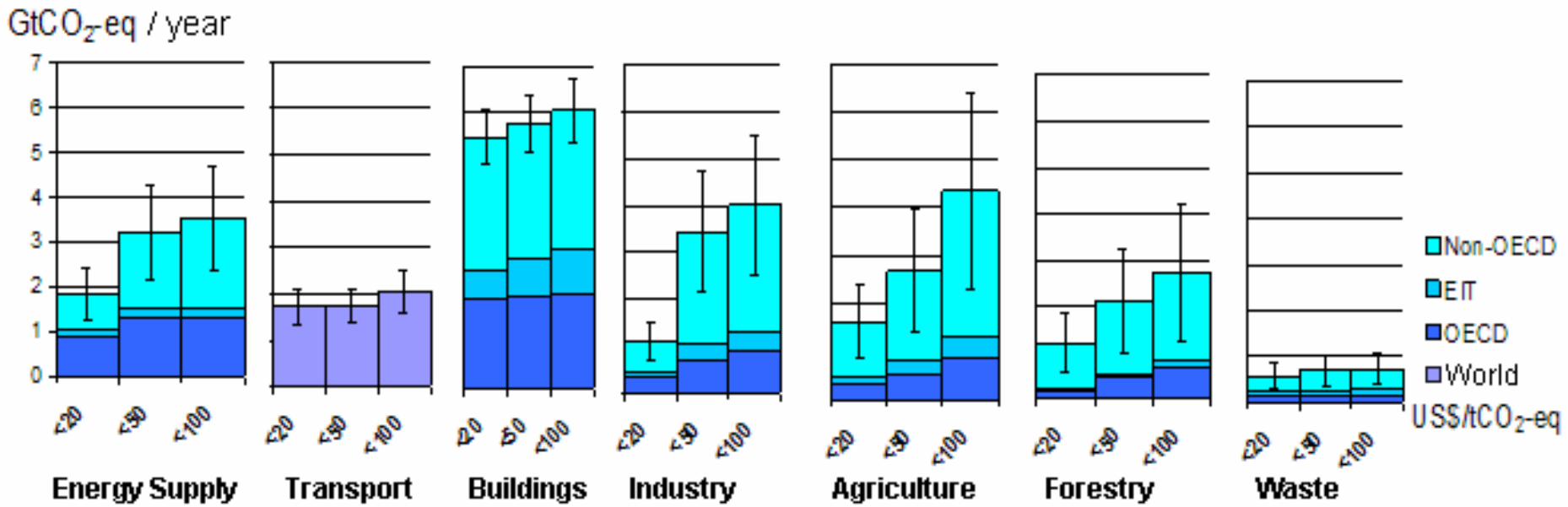
- With current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades
- IPCC SRES scenarios: 25-90 % increase of GHG emissions in 2030 relative to 2000

What is the potential for reducing emissions?

- Substantial economic potential for the mitigation of global GHG emissions over the coming decades
- Could offset the projected growth of global emissions
- Or reduce emissions below current levels

Carbon price (US/tCO_2-eq)	Economic mitigation potential ($GtCO_2$-eq/yr)	Reduction relative to SRES A1 B (68 $GtCO_2$- eq/yr) %	Reduction relative to SRES B2 (49 $GtCO_2$- eq/yr %
0	5-7	7-10	10-14
20	9-17	14-25	19-35
50	13-26	20-38	27-52
100	16-31	23-46	32-63

All sectors and regions can contribute



How to reduce emissions?

Sector	Key mitigation technologies and practices currently commercially available
Energy Supply	efficiency; fuel switching; nuclear power; renewable (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; CCS (e.g. storage of removed CO_2 from natural gas)
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 airco; improved insulation ; solar heating and cooling; alternatives for fluorinated gases

How to reduce emissions?

Sector	Key mitigation technologies and practices currently commercially available.
Industry	More efficient electrical equipment; heat and power recovery; material recycling; control of non-CO_2 gas emissions;
Agriculture	increase soil carbon storage; restoration degraded lands; improved rice cultivation techniques; improved nitrogen fertilizer application; dedicated energy crops;
Forests	Afforestation; reforestation; forest management; reduced deforestation; use of forestry products for bioenergy
Waste	Landfill methane recovery; waste incineration with energy recovery; composting; recycling and waste minimization

Changes in lifestyle and behaviour patterns can contribute to climate change mitigation across all sectors.

What are the costs in 2030?

Stabilization levels (ppm CO_2-eq)	Median GDP reduction[1] (%)	Range of GDP reduction [1][2](%)	Reduction of average annual GDP growth rates (percentage points) [1][3]
590-710	0.2	-0.6 – 1.2	< 0.06
535-590	0.6	0.2 – 2.5	<0.1
445-535[4]	Not available	< 3	< 0.12

[1] This is global GDP based market exchange rates.
[2] The median and the 10th and 90th percentile range of the analyzed data are given.
[3] The calculation of the reduction of the annual growth rate is based on the average reduction during the period till 2030
that would result in the indicated GDP decrease in 2030.
[4] The number of studies that report GDP results is relatively small and they generally use low baselines.

There are also co-benefits of mitigation

- Near–term health benefits from reduced air pollution as results of GHG reduction may offset a substantial fraction of mitigation costs
- Can also be positive for: energy security, balance of trade improvement, provision of modern energy services to rural areas and employment

BUT

- Possibility for “Carbon leakage” and “spill-over effects”

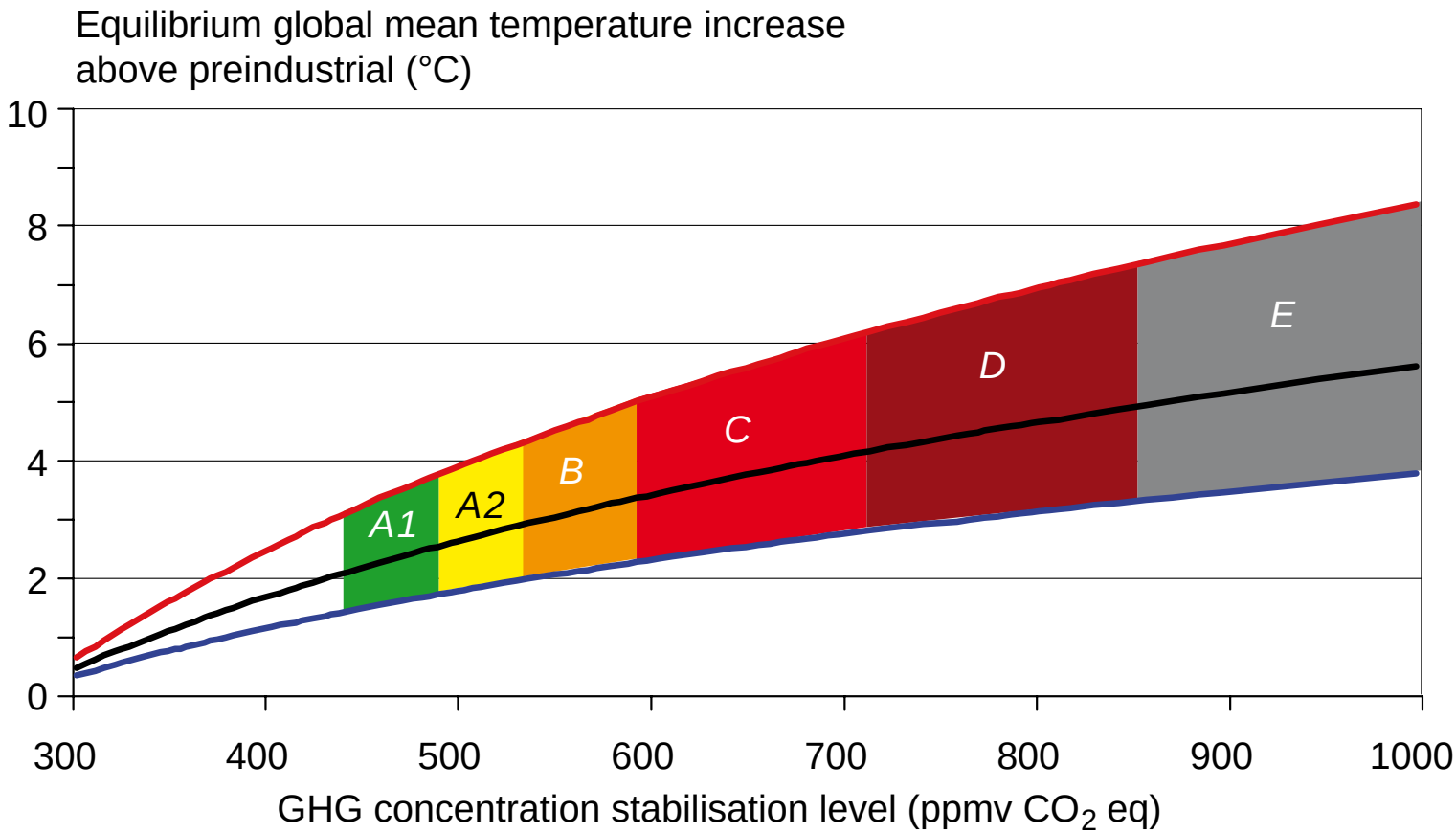
Long-term mitigation (after 2030)

- In order to stabilize the concentration of GHGs in the atmosphere, emissions would need to peak and decline thereafter.
- The lower the stabilization 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 stabilization levels

Stabilization levels

Cat.	Concentration	Global mean temperature increase	Peaking year	CO_2 emission change
	ppm CO_2-eq	ºC	Year	Percent
A1	445 – 490	2.0 – 2.4	2000 - 2015	-85 to -50
A2	490 – 535	2.4 – 2.8	2000 - 2020	-60 to -30
B	535 – 590	2.8 – 3.2	2010 - 2030	-30 to +5
C	590 – 710	3.2 – 4.0	2020 - 2060	+10 to +60
D	710 – 855	4.0 – 4.9	2050 - 2080	+25 to +85
E	855 – 1130	4.9 – 6.1	2060 - 2090	+90 to +140

Stabilization and global mean temperatures



Policies to realize mitigation of climate change

- Integrating climate policies in broader development policies
- Regulations and standards
- Taxes and charges
- Tradable permits
- Financial incentives
- Voluntary agreements
- Information instruments
- Research and development.

Policies to realize mitigation of climate change

- Policies that provide a real or implicit price of carbon could create incentives for producers and consumers to significantly invest in low-GHG products, technologies and processes.
- Such policies could include economic instruments, government funding and regulation

Policies to realize mitigation of climate change

- Government support through financial contributions, tax credits, standard setting and market creation is important for effective technology development, innovation and deployment.
- Transfer of technology to developing countries depends on enabling conditions and financing

Sustainable development & climate change mitigation

- Making development more sustainable by changing development paths can make a major contribution to climate change mitigation, but implementation may require resources to overcome multiple barriers.
- Growing understanding of the possibilities to choose and implement mitigation options to realise synergies and avoid conflicts with other dimensions of sustainable development.