

The message from science: The emissions gap and how to bridge it

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UNEP

United Nations Environment Programme

Moving forward on global climate policy



Copenhagen
December,
2009

Cancun
December,
2010



Durban
December,
2011



Two developments ...

✓ **A target** ...

Staying below an increase of 2 degrees Celsius (1.5⁰ C)

✓ **A means to get there** ...

Country pledges to control emissions (pegged to 2020)

Two questions ...

✓ **Is there a gap between** ...

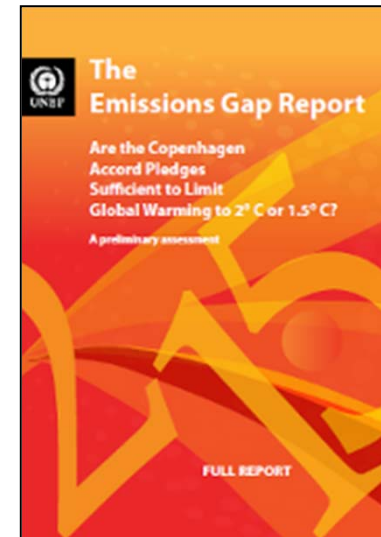
What we are aiming for ... and where we are heading ?

✓ **How can the gap be *bridged*?**

The Emissions Gap

2010 Cancun Climate Summit UNEP “Emissions Gap” report

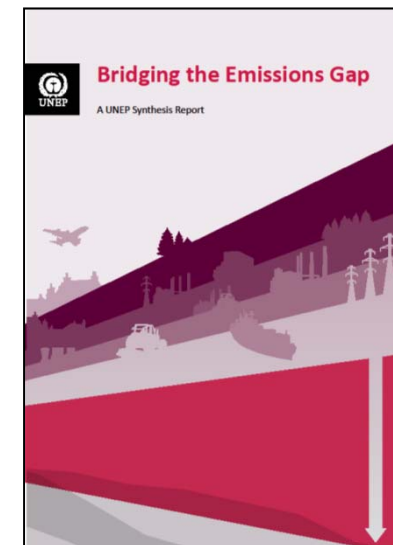
United Nations Environment Programme with the
European Climate Foundation & National Institute of
Ecology, Mexico



2011 Durban Climate Summit UNEP “Bridging the Emissions Gap” report

United Nations Environment Programme with the European
Climate Foundation & Ministry of Environment, South Africa

55 scientists, 28 institutions, 15 countries

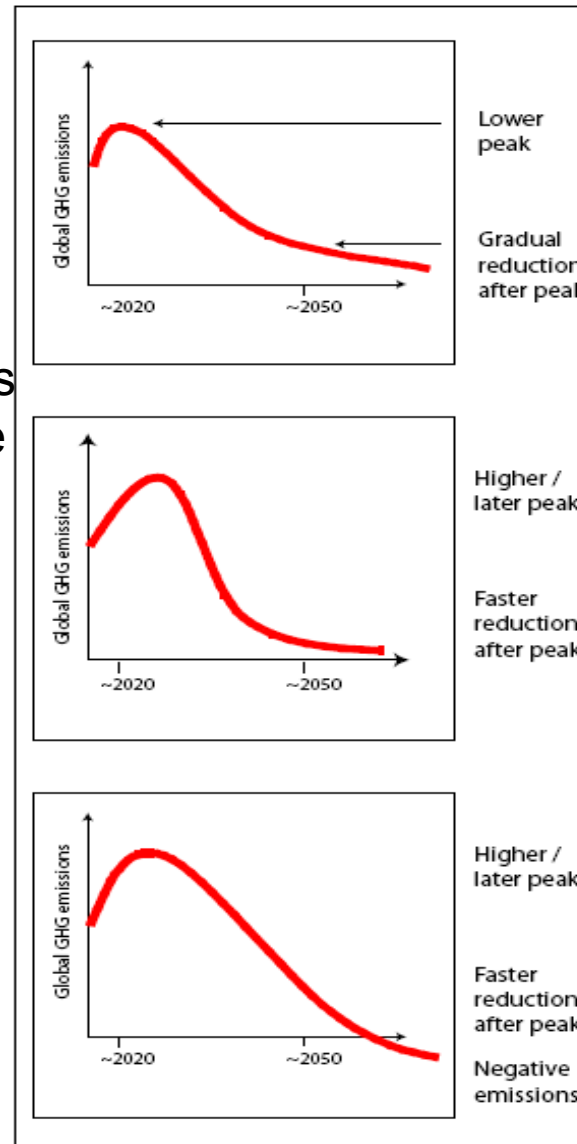




What are we aiming for?

Complying with the 2°C target

1. Meeting a temperature target depends largely on *cumulative* emissions
2. Different pathways of emissions correspond to same cumulative emissions

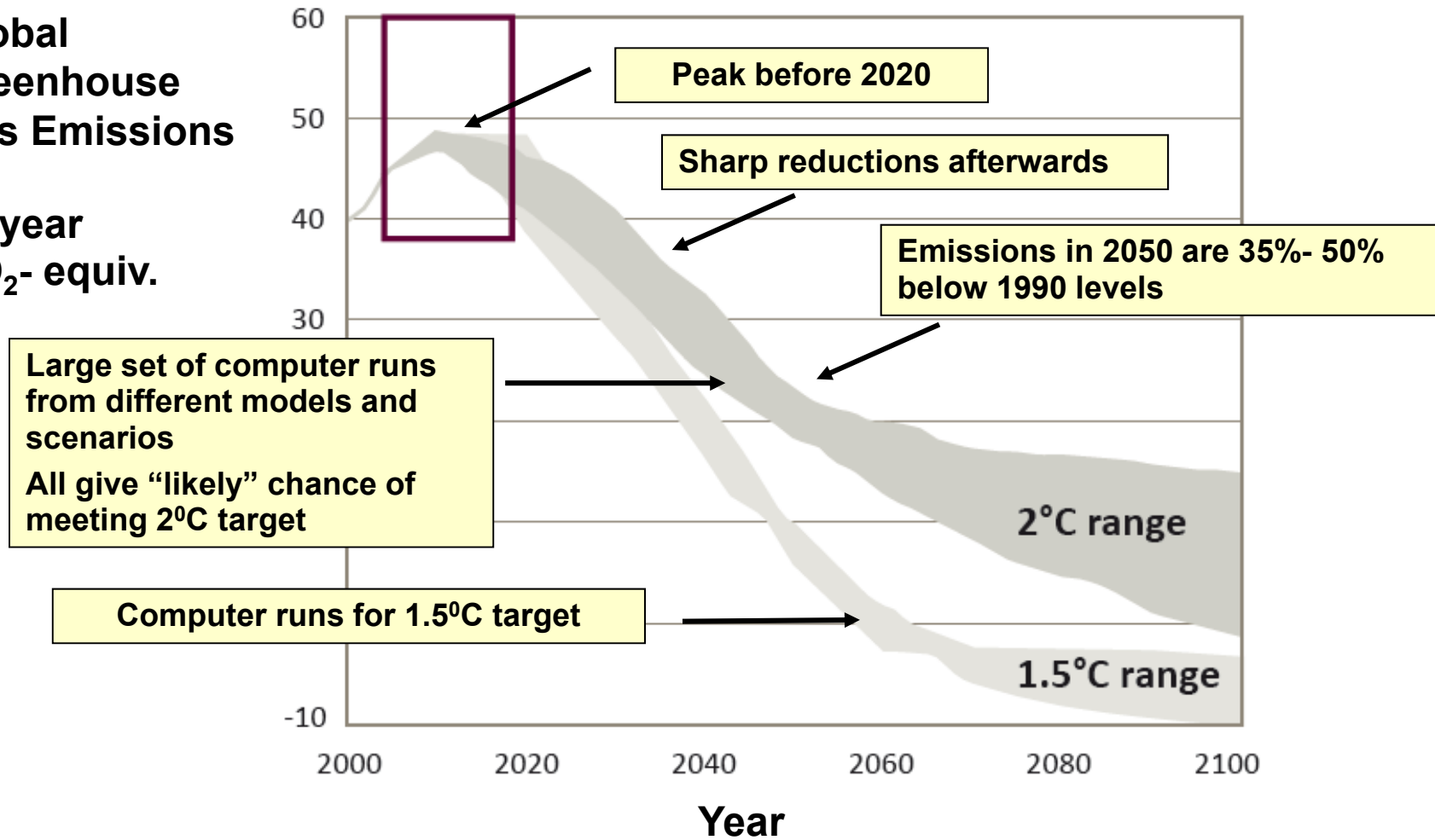


What are we aiming for?

Complying with the 2°C target

**Global
Greenhouse
Gas Emissions**

Gt/year
CO₂-equiv.

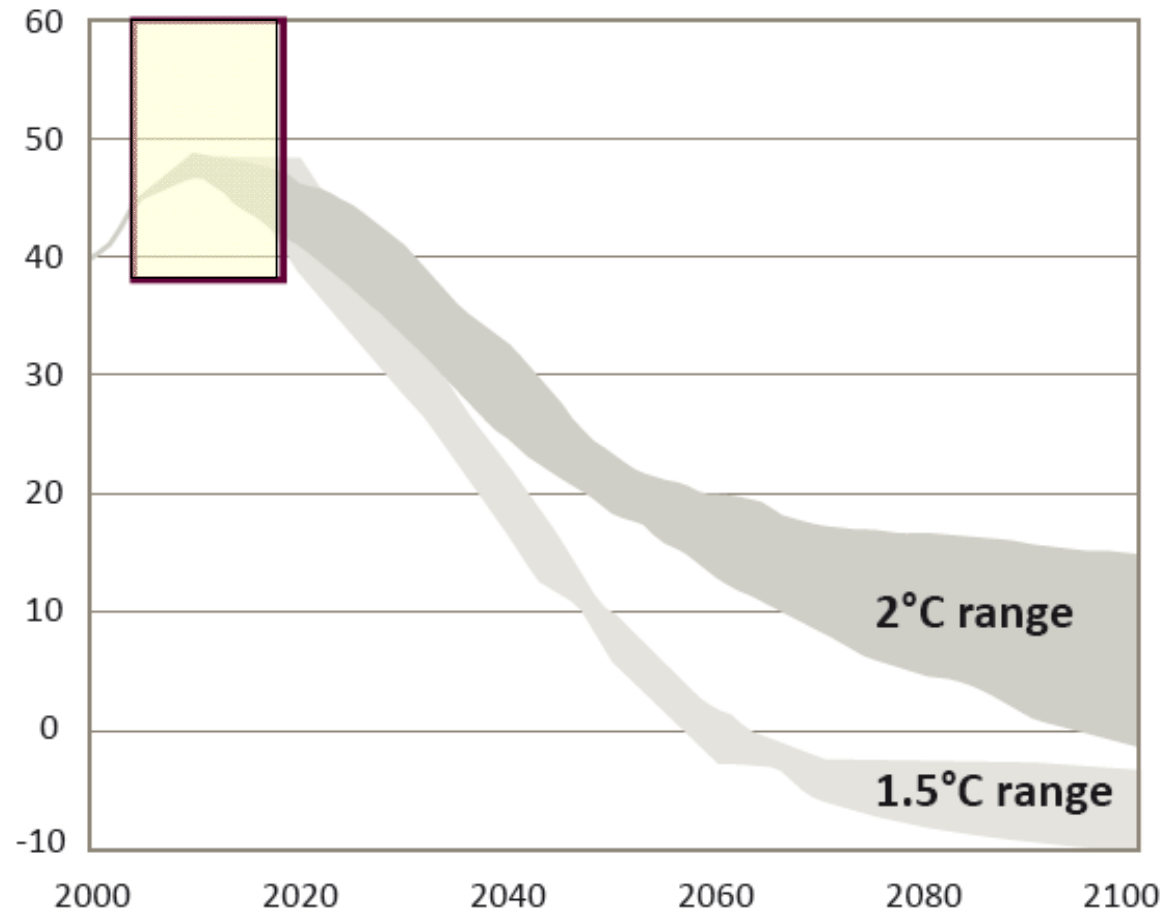


What are we aiming for? Complying with the 2°C target

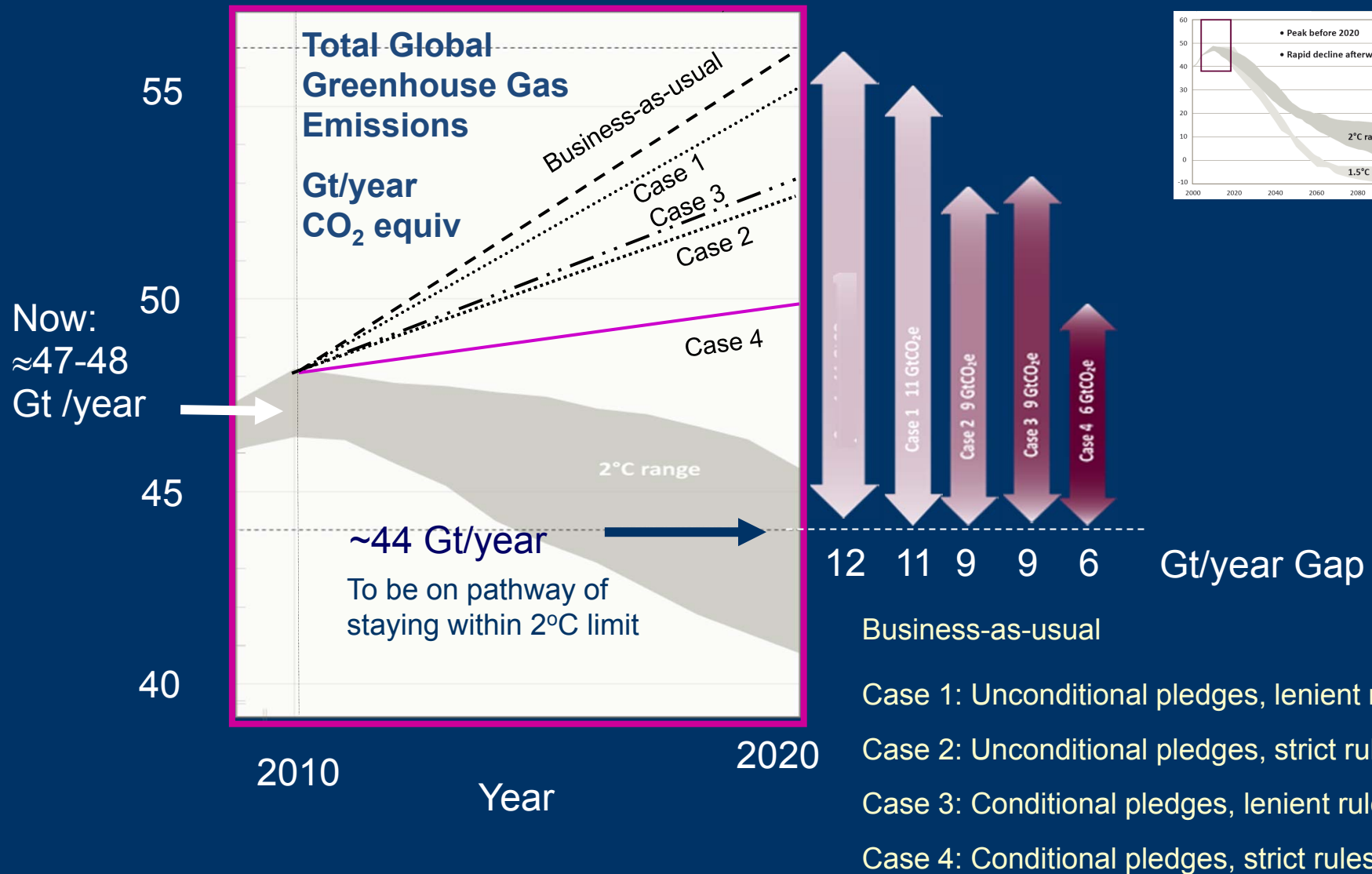


**Global
Greenhouse
Gas Emissions**

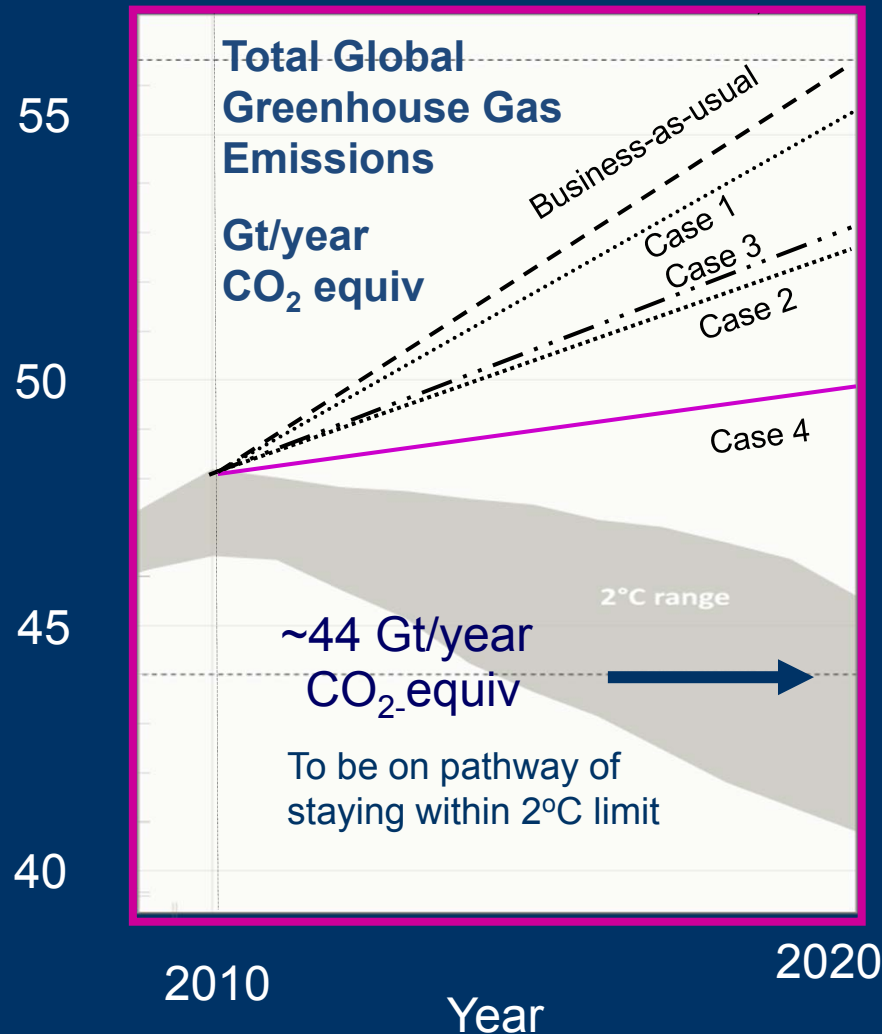
**Gt/year
CO₂-equiv.**



Where are we headed? How big is gap in 2020?



Where are we headed? How big is gap in 2020?



Under business-as-usual
Gap = 12 Gt/year CO₂-equiv

Under different cases of country pledges :
Gap = 6 – 11 Gt/year

Under most ambitious case
Gap = 6 Gt/year:
Half way to 2° target; but not far enough ...

What happens if the gap is not closed?

Best guess temperature increase:

$\approx + 2.5$ to $+ 5.0^{\circ}\text{C}$ (up to 2100 relative to pre-industrial)

How can the 2020 gap be bridged?

Two ways of looking at the question 1st: Integrated Assessment Models

What scenarios meet the 2°C target and close the gap?



1. Improve energy efficiency decrease energy/GDP by $\approx 1 - 2$ % per year (between 2005 & 2020)



2. Change to lower-emission energy mix
(percentage of total primary energy in 2020)



- Non-fossil fuels up to 28% (now 18.5%)

- Biomass = up to 17% (now 10.5%)



- Other renewables = up to 9% (now 2.5%)



3. Reduce non-CO₂ emissions: up to - 19% (Co-benefits)
(relative to 2020 business-as-usual)

Each group/scenario had a different combination.

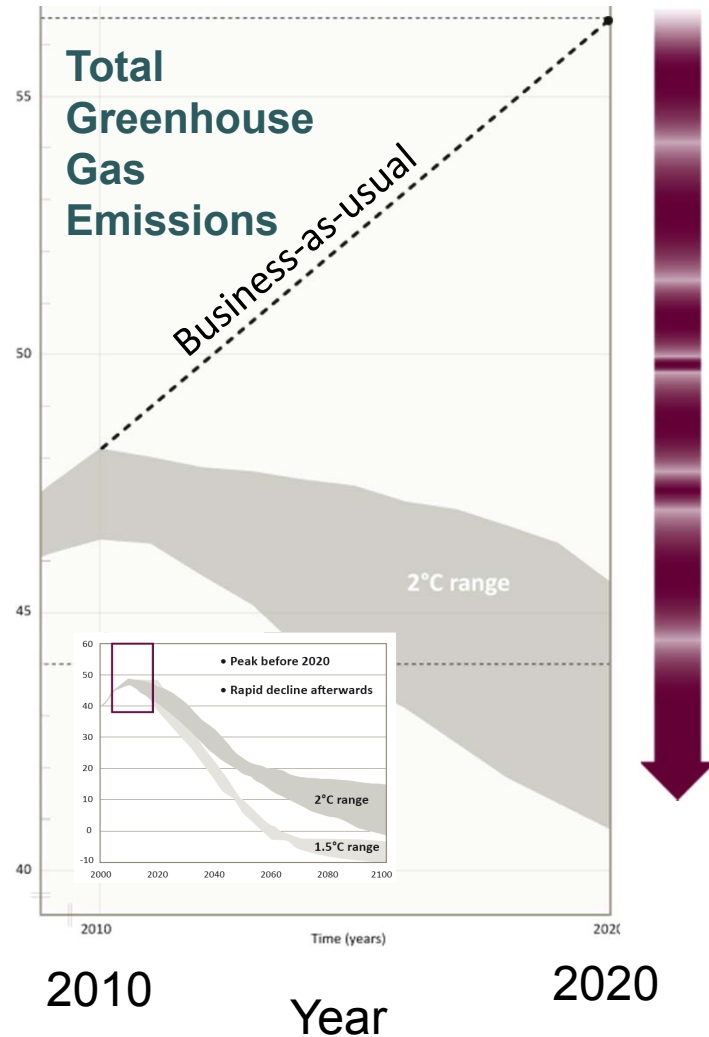
Average marginal cost \approx up to 38 USD/ton equiv CO₂ reduced

No breakthroughs needed to bridge the gap.

How can the 2020 gap be bridged?






Two ways of looking at the problem: 2nd: Bottom-up sectoral studies

What is the emission reduction potential in each sector?



How can the 2020 gap be bridged?




Two ways of looking at the problem: 2nd: Bottom-up sectoral studies
What is the emission reduction potential in each sector?

-  Power
 -  Industry
 -  Transport
 -  Aviation & Shipping
 -  Buildings
- Energy conservation
 - Renewable energy
 - Fuel switching
 - Design & planning (building, land use, transportation)



How can the 2020 gap be bridged?

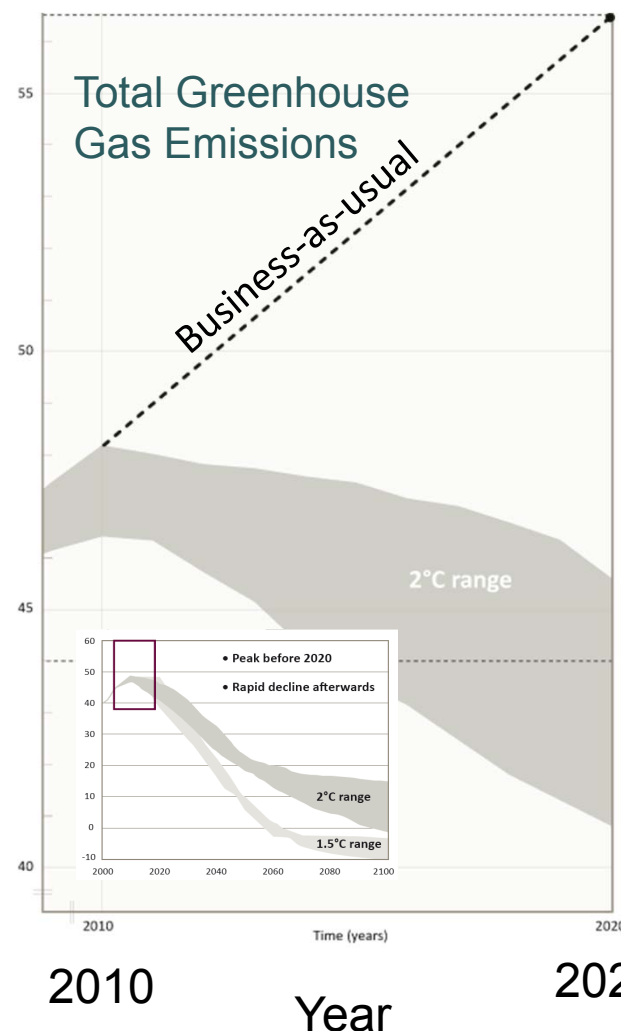
Two ways of looking at the problem: 2nd: Bottom-up sectoral studies
What is the emission reduction potential in each sector?

-  Forestry
 - Sustainable forest management
-  Agriculture
 - Sustainable agriculture (nutrient & soil management)
-  Waste
 - Land use planning; avoided deforestation
 - Biogas recovery











How can the 2020 gap be bridged?

Two ways of looking at the problem: 2nd: Bottom-up sectoral studies



Emission reduction potential in 2020 (Gt/year equivalent CO₂)

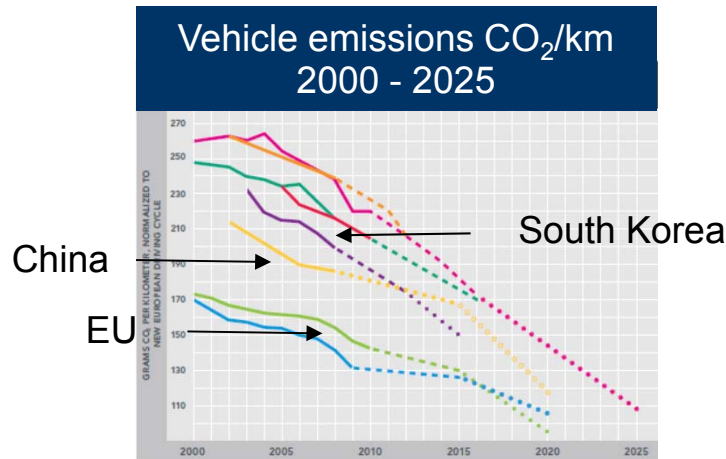
	Power	2.2 – 3.9
	Industry	1.5 – 4.6
	Transport	1.4 – 2.0
	Aviation & Shipping	0.3 – 0.5
	Buildings	1.4 – 2.9
	Waste	≈ 0.8
	Forestry	1.3 – 4.2
	Agriculture	1.1 – 4.3

Total Emission = 17 ± 3 Gt/year CO₂e
Reduction Potential

The Gap in 2020 = 12 Gt/year CO₂e
 (relative to business-as-usual)

Potential in sectors big enough to bridge the gap.

And the potential is already being realized ... Major actions to reduce greenhouse gas emissions



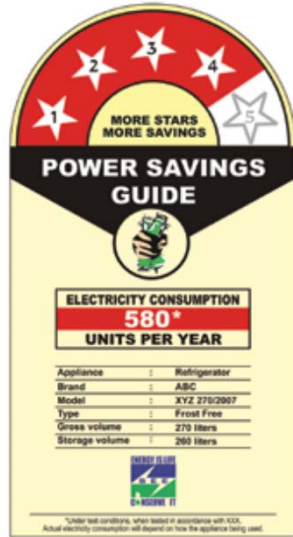
Vehicle emission standards – China, EU, Japan, S.Korea, US, ...

Reduction of vehicle CO₂ emissions from Germany: - 10% / year (1978 - 2005)



Bus Rapid Transit (BRT) – Colombia, China, Mexico, South Korea. Reduction of CO₂ equivalent emissions from Colombia: 1 Mt/yr relative to baseline

And the potential is already being realized ... Major actions to reduce greenhouse gas emissions



Energy appliance label, India

Energy labeling of appliances - India, China, Mexico, EU, US, ... total of 78 countries

Avoided CO₂ emissions in Mexico due to energy savings related to standards on 4 appliance types (cumulative 1995-2005): 41 Mt

Avoided CO₂ emissions in China due to energy savings related to appliance standards (cumulative 2000-2005): 50 Mt



Energy appliance label, US EPA

The urgency of acting ...

Losing opportunities ...

“Lock in” of high emission technologies, structures and processes

- Currently produced energy-inefficient vehicles will still be on the road in 2020
- Energy-wasteful buildings now under construction will last 100 years
- Becoming dependent on new cropland requiring high energy and fertilizer inputs
- Power plants are being constructed with fuel efficiency below what is technically feasible, and will have lifetime of >25 years

Conclusions

To meet the two degree target

- Global emissions peak before 2020
- Global emissions in 2050 \approx 1/3-1/2 below 1990
- Global emissions in 2020 \approx 44 Gt/yr (41-46)

But the Emissions Gap in 2020

(between emissions consistent with 2°C target and emissions expected due to pledges) is big \rightarrow 6 -11 Gt CO₂e (= 12 under business-as-usual)

- Pledges not enough, countries have to work harder to stay within 2°C
- Much has to be done by 2020 to comply with the temperature target

Conclusions

The Gap can be narrowed ... with action in the negotiations

- Minimizing use of surplus emission credits & LULUCF credits
- Avoiding double-counting of offsets
- Pursuing more ambitious (“conditional”) pledges

The Gap can be bridged ... by realizing large potential in each sector

- Intervening in energy system → improvements in energy efficiency & accelerating the introduction of renewable energy;
- More sustainable management of wastes, agriculture and forests;
- Reducing CO₂ and non-CO₂ emissions;
- By implementing measures that are technically feasible and economic

But time is a factor ...

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