

Creating a Global Deal on Climate Change: Responsibilities and Opportunities

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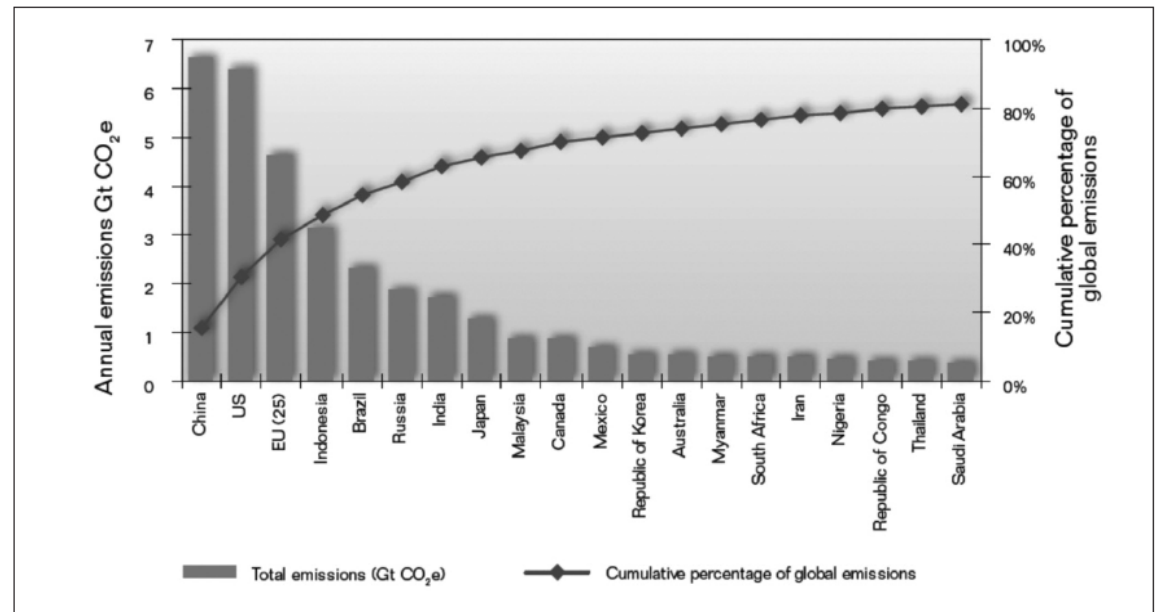
Grantham Research Institute on
Climate Change and
the Environment

Four Part Structure

- Section 1: Global targets.
- Section 2: Possible emissions scenarios for major economies.
- Section 3: Key areas for actions; costs; opportunities.
- Section 4: An ambitious global deal, leadership and recent developments.

From people to emissions

Emissions by country



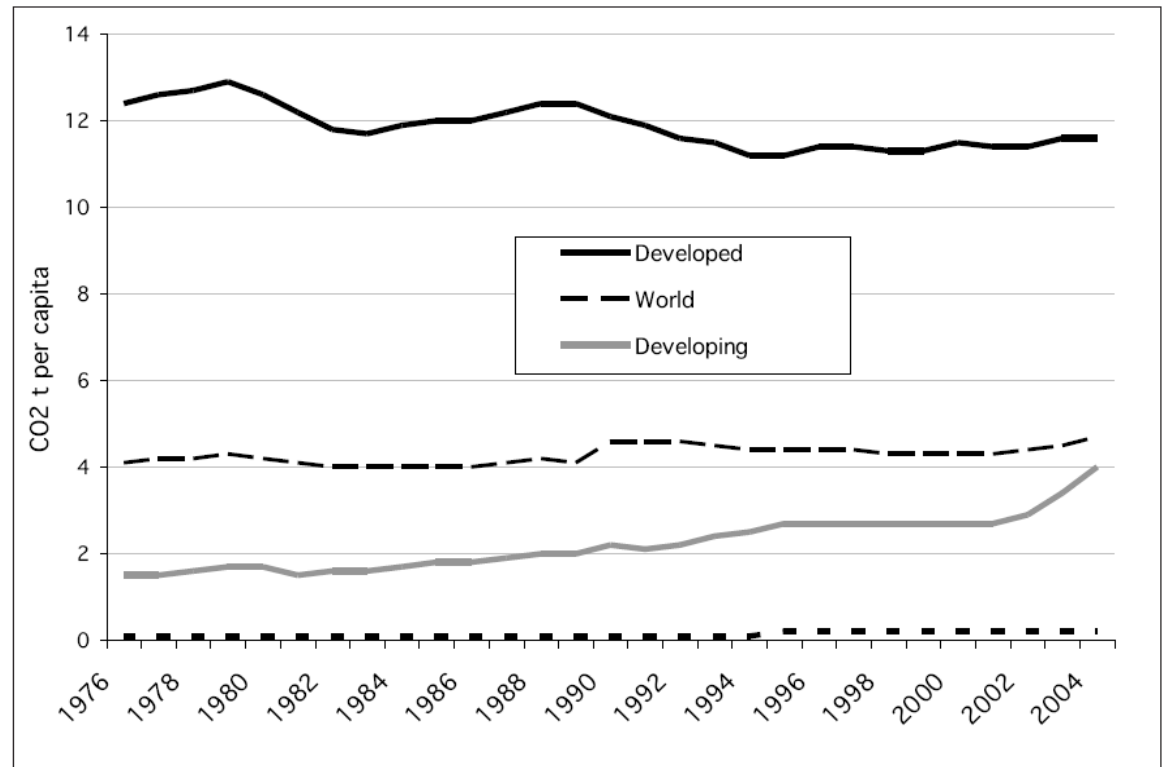
Source: Garnaut (2008), UNFCCC (2007) 2004 data for US, EU (25), Russia, Japan and Canada; Department of Climate Change (2008) 2004 data for Australia (using UNFCCC accounting); and World Resources Institute (2008) for other countries (2000 data except for CO₂ emissions from fossil fuels, which is for 2004).

- The combined effects of growth, industrialisation and hydrocarbon use substantially increased flows of greenhouse gas emissions: thus concentrations of stocks have grown from 285ppm in the mid 19th-century to over 430ppm CO₂e today.

From people to emissions

CO₂ emissions per capita (1976–2004)⁶

- Over the next 20 years developing countries will play an increasing role in driving growth in overall emissions.
- Per capita emissions for rich countries are much higher.



Source: Climate Analysis Indicators Tool (CAIT)

From stocks to temperature

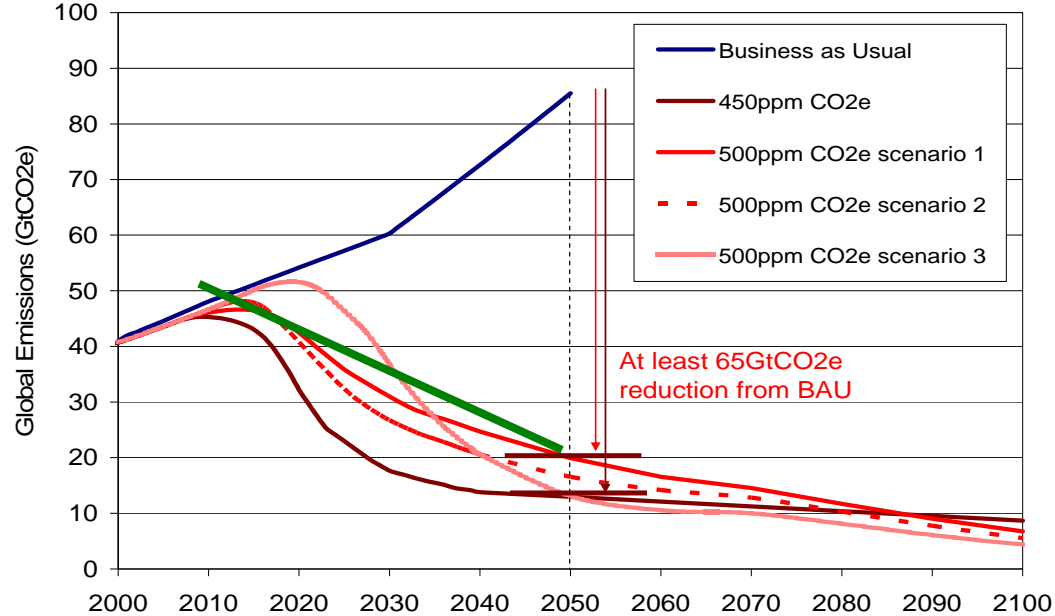
Stabilisation level (in ppm CO ₂ e)	2°C	3°C	4°C	5°C	6°C	7°C
450	78	18	3	1	0	0
500	96	44	11	3	1	0
550	99	69	24	7	2	1
650	100	94	58	24	9	4
750	100	99	82	47	22	9

Extrapolations from Murphy et al. 2004

Source: Meinshausen 2006; Murphy et al. 2004; calculations.

- We are already over 430ppm CO₂e, and are adding at a rate of over 2.5ppm per year (likely to accelerate with little or weak action). BAU will take us over 750ppm by the end of the century.
- This level of concentration would result in a large probability, around 50% or more, of an eventual temperature increase of more than 5°C compared with the pre-industrial era. This would be enormously destructive.
- Physical and human geography would be transformed. The planet has not seen such temperatures for 30 million years. Potential cause of migration of billions of people around the world.

What our targets should be



- Holding below 500ppm CO₂e, and reducing from there, is necessary to give a reasonable chance of staying below 2 degrees. This requires bringing emissions down to below **20Gt CO₂e** (approx. 50% of 1990 levels) by 2050; reducing by a minimum of 65Gt relative to assumed BAU. Would reduce the risk of a 5°C increase to less than a 5% probability.
- A range of trajectories is possible – later peak years require stronger action later on.
- As global population likely to be around 9 billion in 2050, these simple headline numbers imply average emissions around **2 tonnes per person**.
- Cannot afford any delays: a delay of 10 years in initiating action would be likely to increase the 'starting concentration' from around 435ppm CO₂e to over 465ppm CO₂e, making required deductions more costly or impossible.
- To simplify, this presentation examines trajectories with around **50Gt CO₂e** in 2010, **35Gt CO₂e** in 2030 and **20Gt CO₂e** in 2050.

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Emissions scenarios consistent with global emissions of 35 GtCO₂e in 2030

Table 1: Emissions Scenarios Consistent with Global Emissions of 35 GtCO₂e in 2030.

Scenario for emissions (em) change to 2030	Emissions in 2030									
	USA		EU 27 & Japan		China		India		Rest of the World	
	tCO ₂ e per capita	Total (GtCO ₂ e)	tCO ₂ e per capita	Total (GtCO ₂ e)	tCO ₂ e per capita	Total (GtCO ₂ e)	tCO ₂ e per capita	Total (GtCO ₂ e)	tCO ₂ e per capita	Total (GtCO ₂ e)
Scenario 1: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output: India & China constant; US, EU27 & Japan halving.	16.6	6.2	9.9	6.2	20.8	31.3	5.3	7.9	-3.8	-16.5
Scenario 2: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output - India constant; China, US, EU27 & Japan halving.	16.6	6.2	9.9	6.2	10.4	15.6	5.3	7.9	-0.2	-0.9
Scenario 3: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output - India halving, China decrease by factor of 4; US, EU27 & Japan halving.	16.6	6.2	9.9	6.2	5.2	7.8	2.6	4.0	2.5	10.9
Scenario 4: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output: India & China constant; US, EU27 & Japan decrease by factor of 4.	8.3	3.1	4.9	3.1	20.8	31.3	5.3	7.9	-2.4	-10.3
Scenario 5: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output - India constant, China halving; US, EU27 & Japan decrease by factor of 4.	8.3	3.1	4.9	3.1	10.4	15.6	5.3	7.9	1.2	5.3
Scenario 6: Overall growth: India & China 7%, US, EU27 & Japan 2.5%. em/output - India halving; China, US, EU27 & Japan decrease by factor of 4.	8.3	3.1	4.9	3.1	5.2	7.8	2.6	4.0	4.0	17.1

Assumptions:

	Population (bn)		Emissions per capita (CO ₂ e)	Total emissions (GtCO ₂ e)
	2010	2030	2010	2010
China	1.4	1.5	6.0	8.1
India	1.2	1.5	1.7	2.0
USA	0.3	0.4	25.1	7.5
EU27 & Japan	0.6	0.6	12.1	7.5
Rest of the World	3.4	4.3	7.8	26.8

Source: UN 2008 World Population Prospects

Sources: Climate Analysis Indicators Tool (CAIT) & Global Carbon Budget Project.

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Key areas for actions

- Energy efficiency
 - Great scope for energy efficiency improvements across all countries.
 - Japan similar energy use (kWh) per dollar of GDP to many European countries.
- Low-carbon technologies
 - Japan a leader, e.g., Hybrid Vehicle Technology.
 - Strong technology policy essential to ensure rapid development and diffusion of low-carbon technology.
- Halting deforestation, particularly in the tropics
 - Significant investment required in agricultural productivity, local economies, governance and enforcement.
 - China and India have strong objectives on reforestation.

Costs and opportunities

- Annual costs of strong action on mitigation over next few decades are manageable - around 1% to 2% of world GDP. Small relative to costs of inaction.
- Transition to low-carbon economy will be one of the most exciting and dynamic periods in history; innovation, discovery, investment. Comparable to the arrival of railways and electricity in industrialised countries.
- Low-carbon growth will be more energy secure, cleaner, quieter, safer, more bio-diverse, as well as cutting climate risks.
- Many large long-term funds seeking opportunities.
- High-carbon growth will kill itself, first on high hydrocarbon prices and, more fundamentally, on the hostile environment it will create.

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An ambitious global deal

A deal must be effective, efficient and equitable. A deal that fails on one or more of these fundamental principles will not be sustainable.

- **Effectiveness** – it must lead to the necessary cuts in emissions of greenhouse gases;
- **Efficiency** – it must be implemented in a cost-effective way, with mitigation focussed where and when it is cheaper; and
- **Equity** – it must take account of the fact that it is poor countries that will be hit earliest and hardest, while rich countries have greater wealth, more technology and a particular responsibility for the cause through their past emissions. Implies strong reduction targets in rich countries, significant funding for mitigation and adaptation, and sharing of technologies.

An ambitious global deal

- Six key numbers

<50Gt	<35Gt	<20Gt	>80%	US\$100bn	US\$100bn
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- Agreement must be based on the foundations laid out in the “Bali Roadmap”.
- The developed world must lead with strong and credible targets in 2020 and 2030 towards a reduction of at least 80% by 2050. This would bring Europe and Japan close to the 2 tonnes per capita world average required by 2050.
- The developing world will be 8 out of the 9 billion people in 2050 – they must be centrally involved. Even if rich countries were zero the average could not exceed **2.5 tonnes per capita**.

An ambitious global deal

- The developing world could give a “commitment to commit” to targets within 5-10 years based on the following conditions:
 - Strong performance by the developed world over the next decade towards meeting targets for 2020 and 2030 (consistent with 80% by 2050 relative to 1990);
 - Financial support for strong action on mitigation in the developing world and to halt deforestation: \$100bn (significant proportion from carbon market) in early 2020s increasing thereafter (Source: HDR 2007-8);
 - Rich countries to develop and share new technologies for low-carbon growth;
 - Substantial assistance for adaptation: \$100bn in early 2020s increasing thereafter (Source: UNDP & UNFCCC).
 - Commitment now extending over the next few years to support climate change action plans in developing countries.

Japan's leadership on climate change

- Japan's leadership and example is needed to deliver an effective, efficient and equitable deal.
- New targets are more ambitious, 25% cut on 1990 levels by 2020.
- This commitment would see Japan's emissions fall to around 7.2 tonnes per capita CO₂e in 2020, from around 12 today. This represents a cut in emissions per unit of output of factor 2.2.
- A cut by a factor of 1.8 in the next decade would reduce emissions per unit of output 2010-2030 by a factor of 4.
- Policies announced to achieve this: domestic cap-and-trade, feed-in tariffs.
- This strong commitment is, however, conditional. It is "premised on agreement on ambitious targets by all the major economies".
- Emissions reductions should not be interpreted as "burden sharing". This is an exciting period of investment and opportunity.

Recent developments

- UN Climate Change Summit in NY (September)
 - Prime Minister Yukio Hatoyama confirmed Japan’s ambitious commitments and announced policies to achieve these targets.
 - President Hu Jintao announced China will make “notable” reductions in carbon intensity. Likely to be incorporated into 12th 5 year plan.
 - Minister Jairam Ramesh announced India’s intention to quantify emission reductions based on current mitigation policies, e.g., 2020 Solar plan.
- Rich countries must recognise their responsibilities and show leadership.
- Must find a way to navigate through domestic politics of individual countries.
- This is about long-run opportunity. Must counter any short-run “push back”.
- Japan is setting a strong example.