

03 BURDEN SHARING

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The history of the politics

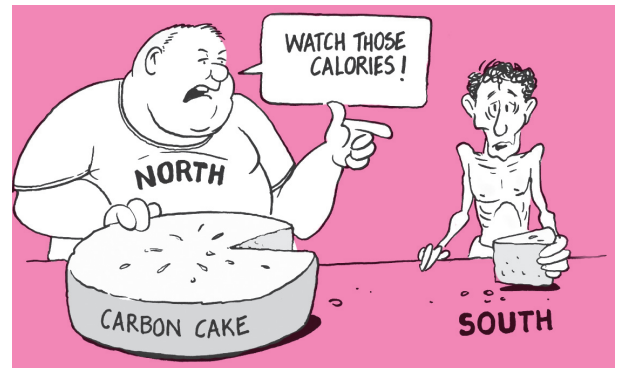
Equity has been central to the multilateral negotiations on climate change mitigation and adaptation between the South and the North. The dispute is not with the science that establishes the need to keep global temperature rise below 2°C, measured from pre-industrial levels, as the threshold that will leash in climate change from being 'dangerous' to becoming 'catastrophic'. The dispute is that once the world accepts the need to cap temperature, it is also accepting the need to cap emissions, because of which temperatures are increasing. The problem with the L'Aquila declaration of the major economies forum and the Copenhagen Accord is not that it caps the increase in temperature, but that it does not make explicit that this limit will require sharing the budget equally between nations who have already used up their common atmospheric space and the new entrants to economic growth, who want a space in the sun.

Without this budget-sharing deal, the temperature cap becomes a virtual cap on the emissions of the developing world – countries of this world will be told to reduce emissions and compromise on economic growth, simply because presently there is no growth model that delinks economic growth with carbon emissions.

2°C: a planetary insurance policy

It is widely accepted that keeping global temperature rise below 2°C, measured from pre-industrial levels (1850), will exercise a moderating influence on climate change, and keep it from becoming 'catastrophic'. Given that current average global temperature increase is measured to be 0.8°C, an addition of another 0.8°C is inevitable because of the amount of greenhouse gases the world has already pumped into the atmosphere, bringing the world close to the limit. In fact, most believe that 2°C is already too high and that we should be limiting increase to 1.5°C. The question then is, what is the level of emissions that will push the world beyond the limit.

The IPCC's AR4, in its Working Group III report, states that emissions must peak within the next 10-15



years and must be reduced to well below half of the 2000 level by the middle of this century in order to stabilise concentrations in the atmosphere at the lowest level assessed by the IPCC – 2°C. The report also summarises the required emission reduction ranges to meet greenhouse gas concentrations between 450 to 650 ppm CO_2e . In terms of who does what, it states (in Box 13.7) that Annex 1 countries would need to reduce their emissions to 25-40 per cent below 1990 levels by 2020 for the world to meet the 450 ppm target; 10-30 per cent for meeting the 550 ppm target; and up to 25 per cent for meeting the 650 ppm target. In these scenarios, emissions in developing countries must also deviate substantially from the baseline. The politics is now focused on defining what the 'substantial or meaningful deviation' means for developing countries, without any consensus on what the target of industrialised countries should be, if it is based on equity in the sharing of the common atmospheric space.

Writing in the journal *Climatic Change*, Dutch researchers Michel den Eizen and Niklas Hohne estimate this substantial deviation would mean non-Annex 1 emissions as a group would be 15-30 per cent below the baseline to meet the 450 ppm target by 2020. In other words, the targets are being set not by first deciding on the basis for apportionment of the carbon budget between nations, but by deciding what the industrialised countries can do, and so what the rest of the world will be compelled to do.

What is the emission cap for 2°C?

There is considerable scientific uncertainty when the world will hit 2°C – or what will be the level of



Table 1: Probability of exceeding 2°C

Indicator	Emissions	Probability
Cumulative total CO ₂ emissions 2000-49	886 Gt CO ₂	8-37%
	1000 Gt CO ₂	10-42%
	1158 Gt CO ₂	16-51%
	1437 Gt CO ₂	29-70%
Cumulative Kyoto gas emissions 2000-49	1356 Gt CO ₂ e	8-37%
	1500 Gt CO ₂ e	10-43%
	1678 Gt CO ₂ e	15-51%
	2000 Gt CO ₂ e	29-70%
2050 Kyoto gas emissions	10 Gt CO ₂ e/year	6-32%
	18 Gt CO ₂ e/year (1/2 1990)	12-45%
	20 Gt CO ₂ e/year (1/2 2000)	15-49%
	36 Gt CO ₂ e/year	39-38%
2020 Kyoto gas emissions	30 Gt CO ₂ e/year	8-38%
	35 Gt CO ₂ e/year	13-46%
	40 Gt CO ₂ e/year	19-56%
	50 Gt CO ₂ e/year	53-87%

Source: Malte Meinshausen *et al* 2009, 'Greenhouse gas emission targets for limiting global warming to 2°C', *Nature*, vol 458, April 30, doi:10.1038/nature08017

emissions that will push the 2°C button. According to a recent paper by Malte Meinshausen and others published in the British journal *Nature*, if, between 2000-2050, emissions are limited to 750 Gt CO₂ on a cumulative basis, then there is a 33 per cent probability of exceeding 2°C; at 1,000 Gt CO₂ the risk increases and a 1,440 Gt CO₂ budget would give the world a 50 per cent risk of exceeding this target. Therefore, the least risky budget is close to 600 Gt CO₂. After 2050, the budget is exhausted and so the world will, in any case, have to end its addiction to fossil fuels by then.

But the issue is about peaking of emissions, and so the authors warn that the probability of exceeding 2°C rises to 53-87 per cent if global greenhouse gas emissions are more than 25 per cent above 2000 levels in 2020. The authors point out that as around 234 Gt CO₂ were emitted between 2000 to 2006 and assuming constant rates of 36.3 Gt CO₂ per year, the world would exhaust the CO₂ emission budget by 2024, 2027 or 2039, depending on the probability accepted for exceeding 2°C.

Sharing the carbon budget

Keeping in mind the fact that meeting the global temperature target is only possible if the world limits the concentration of all GHGs at 450 ppm, the question is: how will the carbon budget be allocated? Consider the atmosphere as a cup of water, filled almost to the top. Now, more water can only be filled if the cup is emptied and space is created. But since there are many claimants on the water that needs to be filled into the cup, the space will have to be apportioned – budgeted – so that the earlier occupants vacate and new claimants can fill in, in some proportion of equity. This is the politics of the global common atmospheric space.

In other words, the emissions budget of 450 ppm has to be apportioned, based on equity, between nations. Let us be clear: the space is very limited. We know concentration of GHG emissions is already close to 430 ppm. But with some 'cooling' allowance, because of aerosols in the atmosphere, it comes to somewhere close to 390-400 ppm. In sum, not much space is left to be distributed and shared in our intensely unequal world.

But this is not all that confounds the science. The fact is, greenhouse gases have a very long life in the atmosphere. Gases pumped in, say, since the late 1800s when the Western world was beginning to industrialise, are still up there. This is the natural debt that needs, like the financial debt of nations, to be repaid. It was for this reason the Kyoto Protocol, agreed to in late 1997, set emission limits on industrialised countries – they had to reduce, so that the developing world could increase. But the emissions of these countries continued to increase. As a result, today, there is even less atmospheric space for the developing world to occupy. It is also evident the industrial world did nothing; it knew it needed to fill the space as quickly as possible. Now, we are left with just crumbs to fight over.

It is also no surprise, then, that Western academics (big names in this business) are now calling upon the developing world to take on emission reduction targets for the simple reason that there is no space left for them to grow. The logic is simple, though twisted and ingenious: "You cannot ask for the right to pollute," they tell the developing world.

This is unacceptable. We know emissions of carbon dioxide are linked to economic growth. Therefore, capping emissions without equal apportionment will mean freezing inequity in this world.

We know this apportionment of the carbon budget is an intensely political decision, as it will literally determine the way the world will share both the common space and economic growth. It is only when we agree on the formula for sharing that we can agree on how much the already-industrialised countries have to cut and by when, and how much the rest (India included) have to cut and by when.

Instead, what we have is a pincer movement. The already-industrialised do not want to set interim targets on when they will reduce their emissions drastically. They want to change the base-year from when emission reduction will be counted: 2005 or 2007, instead of 1990. This means two things. One, they want to continue to grow (occupy space) in coming years. Two, the space they have already occupied – as their emissions have vastly increased between 1990 and 2007 – should be forgiven. But this if when we know that meeting the 450 ppm emission concentration target requires space to be vacated fast – they must peak within the next few years and then reduce drastically by at least 40 per cent by 2020 over 1990 levels. But why do this, when you can muscle your way into space?

The critical question is: how will the world share the carbon budget?

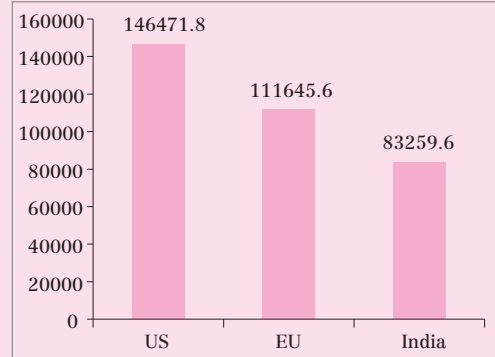
2°C INJUSTICE

If the world caps temperature without an agreement on how the burden will be shared, it will be inequitable and unacceptable. Just consider how the numbers stack up:

India

- The average of five different models estimates that India's CO_2e emissions in 2030 will be 5.6 Gt (billion tonne of CO_2e).
- In the 24-year period (2006-2030), India will emit 83.2 Gt CO_2e .

Graph 1: Emissions and space – 2006-2030



Source: Climate Analysis Indicators Tool (CAIT) Version 6.0, World Resources Institute, Washington, DC, 2009

The US

- Assuming that the US cuts on the basis of the emission trajectory of the Waxman-Markey bill (some 42 per cent below 2005 levels), in the 24-year period (2006-2030), it will still emit 146.6 Gt CO_2e .

The EU

- Assuming a reduction of 20 per cent over 1990 levels by 2030, in the 24-year period (2006-2030), the EU will still emit 111.6 Gt CO_2e .

The space is clearly inequitably divided. Is this acceptable?

Carbon budget arithmetic

● UN Formulation

A recent report by the UN Department of Economic and Social Affairs suggests a way to stay within the budget. For a 75 per cent chance of staying on track, the world should emit no more than 1,000 tonne of CO_2 (273 Gt of carbon) in total between 2000-2050. This is when by 2000, 271 Gt of carbon had already been emitted into the atmosphere, of which 209 GtC – 77 per cent – had come from Annex 1 countries.

According to the report, in this scenario, the

Table 2: Will the West accept negative growth?

World carbon budget (1850-2050)	650 GtC
Already consumed by Annex 1 (1850-2000)	209 GtC
If we assume that Annex I countries will reduce emissions by 85 per cent by 2050, then from 2000 to 2050 they will emit	85 GtC
Total Annex I budget by 2050	209 GtC + 85 GtC = 314 GtC
Allocation based on population for Annex 1 (1850-2050)	137 GtC
They have overused their budget by	314 GtC – 137 GtC = 177 GtC

Source: UN Department of Economic and Social Affairs

carbon budget for the period 1850-2050 is 650 GtC. If the world accepts the seemingly generous sharing rule suggested by the European Union for Annex 1 to take on 85 per cent of the reduction budget, it would still be unfair. The reason is that as these countries have already emitted 209 Gt, in this 85 per cent rule, they would be granted another 85 Gt carbon for the period 2000-2050. This would give them a total budget of 314 GtC – allowing them to consume 48 per cent of the available carbon budget.

The report argues that based on current population, these countries should get only 21 per cent of the global carbon budget for 1850-2050. This would mean an allocation of 137 GtC for Annex 1 countries. In other words, they need negative growth or need to compensate the developing world for the disproportionate space they have occupied.

- **The German budget approach: Dividing on per capita basis**

The German Advisory Council on Global Change (WBGU) has suggested a way to break the climate logjam – through the allocation of the CO₂ budget to meet the 2°C guard rail. The proposal suggests the following:

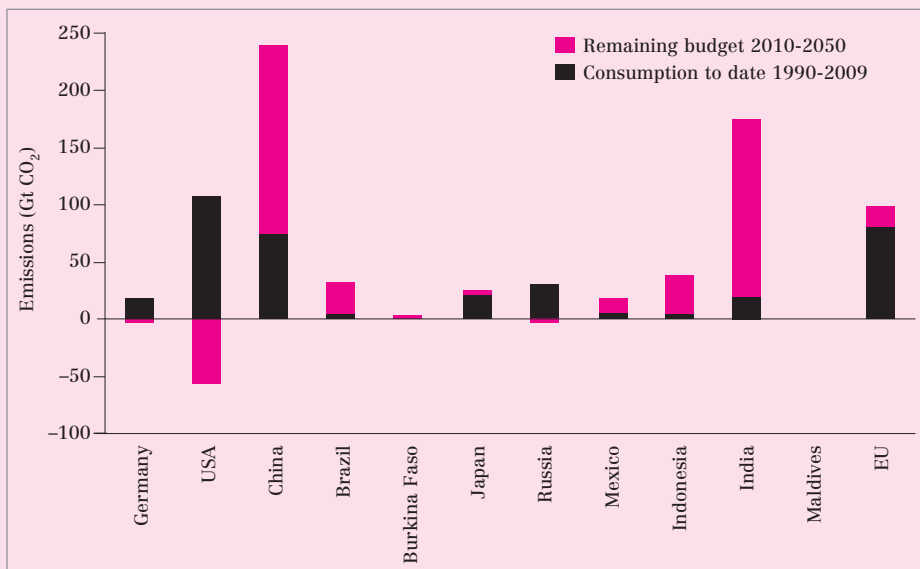
- By 2050, a maximum of 600-750 Gt CO₂ may be released into the atmosphere for a 67-75 per cent probability to meet the 2°C target. Based on this, a budget of emissions is available between now and 2050, which needs to be equitably distributed among all countries.
- It is best if this budget is allocated on a per capita

basis, so that national budgets can be calculated according to the size of the population. This would give each country a defined atmospheric capital, which it can flexibly manage and trade on international markets between now and the year 2050.

- The budget approach takes historical responsibilities of the industrialised countries into account but looks towards the future: the entire budget is equally distributed across the various countries on a per capita basis, taking 2010 as the demographic reference period.
- On the basis of polluter pays principle, an additional financial compensation between the North and the South will be devised to take into account emissions for the period 1990-2010.
- Each country is then committed to producing decarbonisation road maps, which provide information on the planned national emission path up to 2050.
- The countries are grouped based on their annual CO₂ emissions per capita from fossil fuel sources: Country group 1 (above 5 tonne CO₂ per capita per year – mainly industrialised countries and oil exporting countries; Country group 2: (between 2-7-5.4 tonne CO₂ per capita per year, includes newly industrialised countries like China, Mexico and Thailand) and Country group 3: (below 2.7 tonne CO₂ per capita per year, includes mainly developing countries and some large industrialising countries like India and Brazil).

Graph 2: Carbon dioxide budget: 1990-2050

Based on historical responsibility calculated from 1990-2050 countries like USA, Germany and Russia have, today, already emitted more from fossil sources than the total they would be entitled to in 2050. Developing countries still have lot of budget left. But to allow them to grow, negative emission growth has to happen, starting from today, in countries like US

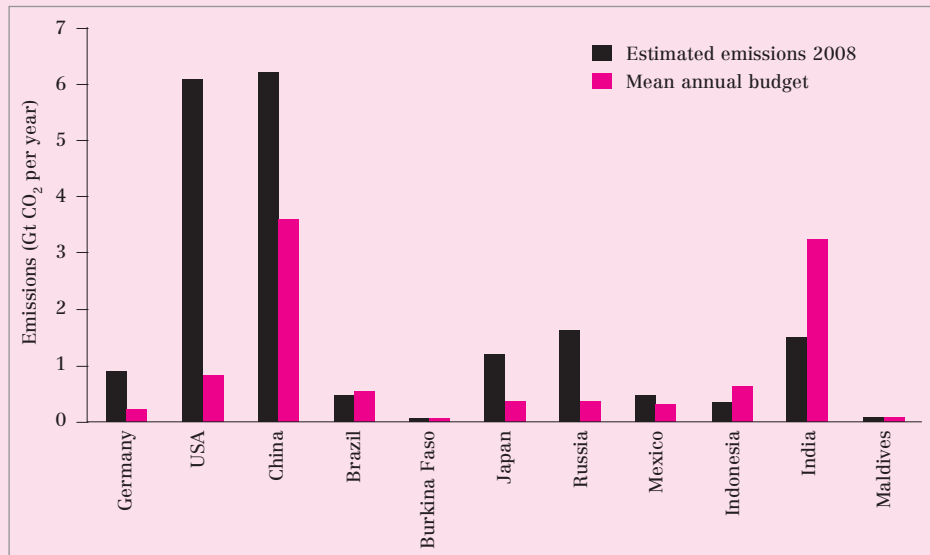


Source: Anon 2009, *Solving the climate dilemma: The budget approach*, German Advisory Council on Global Change, Berlin, p 26



Graph 3: Carbon dioxide budget: 2008

CO₂ emissions from fossil fuel sources for most developed countries like US, Japan, Germany and Russia, and also a few developing countries, were far more than they were allowed for 2008. India remained well within its range, using less than 50 per cent of the budget it was allowed



Source: Anon 2009, *Solving the climate dilemma: The budget approach*, German Advisory Council on Global Change, Berlin, p28

- In the option, which takes into account historical responsibility (emissions for the period 1990-2050), most of the big industrialised countries have already emitted more than they would be entitled to – they have to begin to reduce with no space to grow further.

The Council, however, suggests that it would be best to take a dual approach – compensation payment for historical (1990-2010) and allocation based on per capita for the future (2010-2050). Under this option as well, industrialised countries have little space to grow or increase. Their only option is to trade – buy their quota from the countries with the budget to spare.

- **CSE proposal: Equal per capita emission rights**

In 1990, the Washington-based World Resources Institute (WRI) published a report which showed annual greenhouse gas emissions in the developing world almost equalled those in the industrialised world, and predicted emissions of the former would overtake those of the industrialised world in the near future (WRI, 1990). However, in a critique of this report, the Delhi-based Centre for Science and Environment (CSE) found that the methodology WRI used had favoured the polluter.

Under the WRI methodology, each nation was assigned a share of the Earth's ecological sinks, but proportional to the nation's contribution to emissions. Global warming occurs because emissions exceed the capacity of sinks to absorb GHGs. WRI estimated the world produces 31 billion tonne of CO₂ and 255

million tonne of methane every year. It then estimated the Earth's sinks naturally assimilate 17.5 billion tonne of CO₂ and 212 million tonne of methane annually. On this basis, it calculated the 'net' emissions of each nation, by allocating a share of sinks to each nation, based on its gross emission contribution.

CSE, in its critique, argued that while terrestrial sinks such as forests and grasslands may be considered national property, oceanic sinks belong to humankind. They are common global property. CSE then apportioned the sinks on the basis of a country's share of the world's population, arguing each individual in the world has equal entitlement to the global commons. This allocation, based on individual rights to the Earth's natural cleansing capacity, changed the calculation of nations' responsibility drastically. For instance, under the WRI methodology, the USA contributed 17 per cent of the net emissions of the world, while CSE showed it actually contributed roughly 27.4 per cent of net annual emissions. Similarly, the contribution of China decreased from the WRI estimate of 6.4 per cent of net annual emissions to 0.57 per cent, and India's from 3.9 per cent to just 0.013 per cent of net annual emissions.

This allocation of the Earth's global sinks to each nation, based on population, creates a system of per-capita emissions entitlements, which taken together form the 'permissible' emissions level of each country. This, according to CSE, could form a framework for trading between nations, as countries exceeding CO₂ annual quotas of carbon dioxide could trade with other countries that do not use up their 'permissible' emissions. This would create financial

incentives for countries to keep their emissions as low as possible and to invest in zero-carbon trajectories.

Ad hoc equal emission entitlements

In 2001, CSE proposed an alternative: The targeted atmospheric concentrations could be translated into a global emissions budget that would be distributed among nations in the form of equal per capita entitlements. A country that does not use its budget during a particular year could again have the right to trade its unused share. It is known that the concentration of 450 ppm of CO_2e by the year 2050 would mean an annual per capita entitlement of two tonne. In 2005, the world was already emitting (on an average) 4 tonne of CO_2e per person per year, but many countries are still below this baseline. Nations also could simply agree on an *ad hoc* per capita entitlement to which all countries eventually will converge. This target could be more or less ambitious, but again, it would be subject to periodic reviews, allowing changes based on new scientific information.

Emissions entitlements and the transition to renewables

Equal per capita emissions entitlements offer the most just and effective way of getting developing countries to

engage with the climate change problem. If low-level polluters can trade their unused emissions rights with high-level polluters, this would provide an incentive to keep their emissions growth path as low as possible. Additionally, emissions trading can promote transition to renewable energy technologies if it is restricted to zero-carbon energy projects. Currently, if the Clean Development Mechanism, set up through the Kyoto Protocol, is used only to fund zero-carbon energy technologies, the emissions reduction costs will be higher than the least-cost options such as coal washing projects and investments in thermal power plants.

The Annual Energy Outlook of the US Energy Information Administration estimates that the capital cost of a photovoltaic power plant over a coal-based power plant is about US \$1.81 million per MW. In other words, a CDM market worth US \$25 billion would be needed to set up some 55,500 MW of solar power plants. Investment on this scale could play a critical role in bringing down the world price of solar cells.

Once the pro-renewables strategy is accepted, the purpose of per capita emissions entitlements is redefined. Its most important purpose is not to create a framework that forces all countries to converge to a sustainable level of emissions at a future date, but rather to create a framework for engaging developing

Graph 4: Climate justice: Per capita equal entitlement

The world can only sustain 2 tonne per capita. A system based on per capita entitlements can be used to trade. It will provide incentives to developing countries to move to renewables



Source: Carbon Dioxide Information Analysis Centre, 2007, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, US (<http://cdiac.ornl.gov/>)

nations such that the world can kick start the movement towards a zero-carbon energy transition. Once the world seriously begins moving towards such a transition, the entitlement framework will become increasingly redundant.

The greatest advantage of a global equitable and tradable emissions entitlements mechanism is that it engages developing countries and provides an incentive to keep emissions low. Although many developing economies are growing rapidly, it is unlikely that they will use up their entitlements in the near future. The potential to trade their unused entitlements would immediately give them an incentive to move towards a low emissions developmental path.

Intra-national equity

CSE also argued that nations of the world need to design a system of equity within each nation. It is not the rich in India who emit less than their share of the global quota. It is the poor in India, who do not have access to energy, who provide the rest some breathing space. Currently, in India, only 31 per cent of rural households use electricity. Connecting all of India's villages to grid-based electricity will be expensive and difficult. It is here the option of leapfrogging to off-grid solutions based on renewable energy technologies becomes most economically viable. If India's entitlements were assigned on an equal, per-capita basis, so that the country's richer citizens paid the poor for excess energy use, this would provide both the resources and the incentives for current low-energy users to adopt zero-emissions technologies. In this way, too, a rights-based framework would stimulate a powerful demand for investment in new renewable energy technologies.

The current state of negotiations

- *The BASIC group formulation:* The BASIC group meeting held at Tianjin in October 2010 endorsed the following two formulations for sharing the remaining carbon space.
- *Burden sharing:* It is based on the principle of how much emission reduction need to be done by different countries to remain within the global budget. Equal burden sharing based on historical responsibility for temperature increase and the three principle-based criteria – responsibility, capability and sustainable development is factored in this formulation.

There is a need to define a business as usual (BAU) scenario and an emission pathway, based on which the amount of reduction can be equitably allocated. Periodical reviews of burdens and future emissions have to be carried

out to take into account changes in capabilities and in the structures of the economies of different countries.

- *Entitlement allocation:* This is based on per capita emissions entitlement for each person. Equal entitlements based on per capita accumulative approach is used to share the remaining carbon budget.

The total global budget is equitably distributed without reference to the BAU scenario. However, each country will have to make an aggregate of its available budget and determine an emission pathway – including emission trading – compatible with its budget.

Periodic review is also required for future periods of emissions.

Both the approaches can lead to equitable access to emission space; both require periodic reviews and emissions trading.

Both burden sharing and entitlement approaches would have clear implications for Annex 1 countries. Under burden sharing, Annex 1 countries will have a larger burden than they currently pledge. Under entitlement, they will have a more limited space left than the space they claim. Compared to their fair share, Annex 1 countries have already over-occupied their emission space. They have to have negative emissions in both scenarios.

Copenhagen to Cancun

Post-Copenhagen, emissions of GHGs cannot be seen only in terms of environmental damage, as they also have a development dimension. Global policy requires agreement on allocation criteria directly linked to outcomes that can be measured. Climate negotiations must recognise that both global temperature and GHG concentration targets are needed as the basis for long-term cooperation to meet the climate challenge.

Recent research in developed countries emphasises on the importance of allocating carbon budgets. For example, the UK already has a legislation establishing a national carbon budget. A recent report of the US National Academy of Sciences suggests that the policy goal must be stated as a quantitative limit on domestic GHG emissions over a specified time period – in other words, a GHG emissions budget. It concludes that national shares of global emissions need to be agreed to at the multilateral level as the basis for developing and assessing domestic strategies.

A carbon budget-based approach also enables a review of long held developing country positions that have been seen as hindering progress in multilateral negotiations. Developed country overuse of the carbon



space, or two-thirds of their cumulative emissions, has occurred after 1970, and such emissions should be considered as their current, rather than historical, responsibility.

Even after discounting historical emissions, the allocation of the remaining carbon space can be made to developing countries to ensure their fair share of the carbon space by 2050, enabled and supported by development and transfer of innovative technology.

According to a new report by the World Resources Institute, it requires 14 Giga tonnes (Gt.) of emissions abatement by 2020 to keep the temperatures below 2°C, whereas the firm pledges made after the Copenhagen Conference amount to only around 9 Gt, with developing countries contributing more than the reduction commitments of the developed countries.

Moreover, the countries with per capita emissions and incomes below the global average – and this includes India – collectively would need at least as much carbon budget as the developed countries are about to take up from now until 2050, if they are to develop their infrastructure necessary for the eradication of poverty, and merely reach average GHG emissions of 4 tonne per capita by 2050 (recognised as a legitimate aspiration in the Copenhagen Accord).

Thus, the key global climate policy – or equity – issue is that without developed countries sharply reducing their emissions immediately, other countries cannot get their fair share of the carbon space for economic growth, if the global goal of limiting rise in global temperature to 2°C is to be met.

As countries review global climate policy for Cancun, the focus must shift from just considering annual emissions to the allocation of the remaining global carbon budget of cumulative emissions; national carbon budgets as the basis for developing and assessing strategies; and, a timetable for joint research, development and transfer of new technologies to meet the scale and speed of the response.

The shared vision for long-term cooperation must recognise the overuse of the atmospheric commons, and ensure patterns of resource use are common for all countries, through agreement on criteria for the equitable allocation of the remaining carbon, or development space.

Table 3: Budget under burden sharing and entitlement approach (GtCO₂)

Approach	Entitlement (2006-2050)	Burden sharing (2010-2050)
Annex I	-365	-545
Non Annex I	1,603	1,802
Brazil	59	58
India	377	266
China	381	421
S. Africa	4.3	32
ΣBASIC	821	777
Gap between two approaches	-	-44
Including LULUCF	NO	YES

Note: The two approaches have somewhat different assumptions. The 'entitlement' approach considers a global budget (2001-2050) as 1440 GtCO₂, while the Carbon budget derived from 'burden sharing' considers it at 1700 Gt.

The negotiating text for Cancun

The absence of consensus on the modalities of budget sharing is reflected in the UNFCCC's latest negotiating text as well, released in October 2010 after the Tianjin climate meeting

On the basis of equity [considering that the lack of full scientific certainty about different technologies should not be used as a reason for postponing these actions] [in accordance with the principle of common but differentiated responsibilities] [and respective capabilities] [with developed countries taking the lead] [[taking into account] [[based on] historical responsibilities and [preceded by a paradigm for] equitable access to global atmospheric space [allocating the remaining carbon budget up until 2050 according to the criteria of population and the climate emissions debt of Annex I Parties] [Annex II Parties]]] [based on per capita accumulative historical emissions, under which the leadership on emission reductions that needs to be shown by [Annex I Parties][Annex II Parties] [Parties who have listed their commitments for actions in Appendix I] must be clearly demonstrated and expressed] [taking into account special national circumstances [including those provided in Articles [4.6,] 4.8, 4.9 and 4.10 of the Convention.] and respective capabilities of Parties][acknowledging that a certain degree of flexibility shall be allowed to the Parties included in Annex I undergoing the process of transition to a market economy]. [Developed country Parties' mitigation commitments shall be consistent with the limit of the increase in global temperature agreed in Shared Vision and with the remaining global carbon budget taking into account their population and their emission debt.]

(The bracketed text indicates the areas where consensus has not yet been achieved)