

Paper 1

MOVING GHG TARGETS, ADJUSTING THE SCALES

Suruchi Bhadwal and Sanjay Vashist¹
TERI, India

Executive Summary

The IPCC (Intergovernmental Panel on Climate Change) AR4 has further increased our understanding, through its findings in 2007, on the magnitude of climate change, its consequences, and measures that will be required for adaptation and mitigation. The UNFCCC (United Nations Framework Convention on Climate Change), formulated in 1992, recognizes the strong need for action that would help address these concerns. Thus, the Kyoto Protocol came into being in 1997. Targets for GHG (greenhouse gas) reductions were assigned to developed country parties. This was done keeping in mind the principle of common but differentiated responsibilities, with a realization that the per capita emissions from most developing countries fall far below the world average.

Since the Kyoto targets are to conclude over the time period 2008–12, there are discussions on the structure that a future framework should entail. The European Union has defined 2 °C as the limit beyond which huge consequences are likely. Any framework being developed will have to involve ambitious targets to be set to be able to operationalize the objectives of Article 2 of preventing any dangerous anthropogenic interference with the atmosphere. The challenge is, therefore, to fix a target that is accepted universally.

It is possible to assign relative responsibilities to the ensemble of Annex I countries and non-Annex I countries according to their respective contributions to climate change, as measured by the induced change in climate. However, given the concerns highlighted above, there is a strong and urgent need to make sure that developing countries are engaged in the process to contain GHG emissions and, thereby, promote clean technologies. Action by the industrialized countries on their own can significantly slow the rate and magnitude of climatic change, but because of the growing needs for social and economic development in developing countries, their participation in any global regime is crucial for the stabilization of GHG emissions. However, sharper reductions in GHGs will be required by developed countries as has also been recommended by the IPCC that industrialized countries need to reduce 10%–40% of their GHG emissions by 2020 and 40%–95% by 2050 to achieve stabilization levels of 450–550 PPM (parts per million) CO₂ (carbon dioxide) eq.²

While Annex I parties are assigned targets that are fixed based on their historical shares following the principle of contraction, developing countries can be involved to converge. Developing countries are thus also required to move towards decarbonized growth, with technology and financial assistance from developed countries. All other measures of engaging the non-Annex I Parties do fall short of imparting a moral and ethical value to the global debate. These include proposals on GHG intensities, carbon taxes, unilateral actions, lifestyle versus per capita GHG emissions, regional treaties, and promotion of sustainable policies and measures.

Introduction

The IPCC (Intergovernmental Panel on Climate Change) AR4 has further increased our understanding, through its findings in 2007, on the magnitude of climate change, its consequences, and measures that will be required for adaptation and mitigation. With the growing concern that climate change shall result in grave consequences for both developed and developing countries, the UNFCCC (United Nations Framework Convention on Climate Change) was formulated in 1992. The Convention states the need for necessary action to mitigate climate change by controlling GHG (greenhouse gas) emissions, which otherwise are responsible for warming the earth's surface. Its ultimate objective is: 'stabilization of GHG concentrations at levels that prevent dangerous anthropogenic interference with the climate system'.

This was followed by the defining of a Protocol in 1997, acknowledging the fact that the largest share of historical and current global emissions of GHGs has originated in the developed countries, and assigning targets to them for GHG reductions, with 1990 taken as the base year. This was done keeping in mind the principle of common but differentiated responsibilities, with a realization that the per capita emissions from most developing countries fall far below the world average. Targets were negotiated over a two-year time period beginning 1995, with the formation of an ad hoc working group led by Ambassador Estrada.

The compounded target set for reductions by all developed countries was agreed at 5.2%, with differential targets assigned to countries individually. These targets were decided on common consensus and agreement of political parties and their willingness and abilities to take on such reductions rather than the scientific validity of these targets. The targets assigned though do not reflect the scale of response required to address climate change, which serves to indicate a common global consensus on the realization of the issue and the need to deal with it.

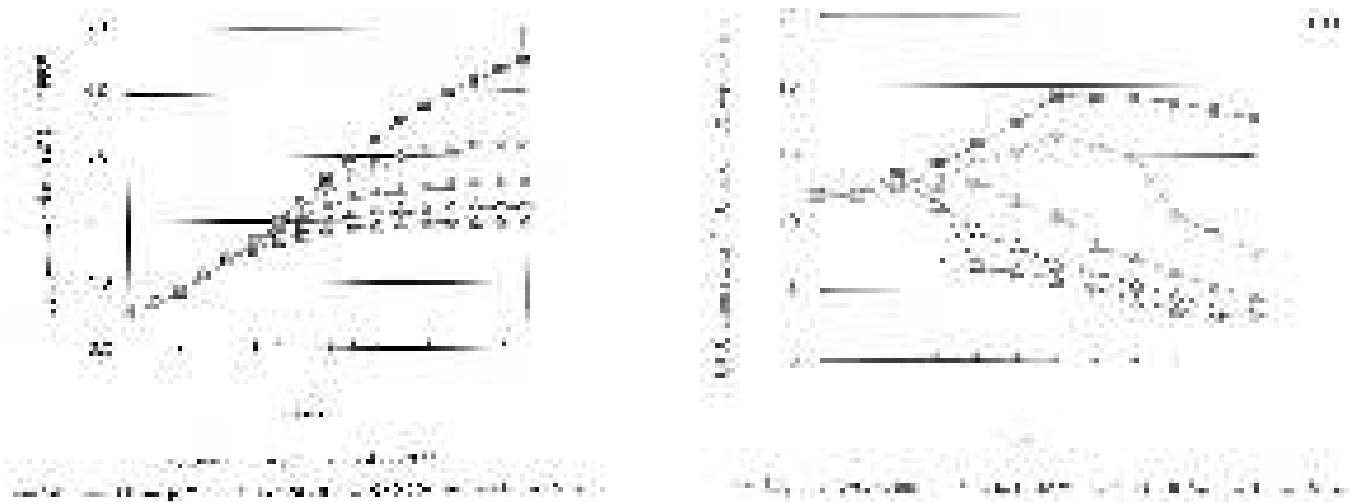
Since the Kyoto targets are to conclude over the time period 2008–12, there have been discussions on the structure that a future framework should entail. The European Union has set an objective to maintain rise in global mean temperature below 2 °C, compared to pre-industrial levels, otherwise the impacts can be translated into sea level rise, food insecurity, health hazards, frequent and intense disasters, and so on. Many studies have tried to assess the level of risks with the rising concentrations of GHGs (greenhouse gases). The approach has been to link the concentration of GHGs with the extent of change in temperature by 2100. Stabilization levels and its consequent implications have been studied widely. Concentration levels greater than 450 PPMV (parts per million by volume) would lead to a 2 °C and above rise in temperatures. In case the GHG concentrations are to be contained within the 2 °C mark, serious measures have to be employed. Any framework that is being developed will have to involve ambitious targets to be set to be able to operationalize the objectives of Article 2 of preventing any dangerous anthropogenic interference with the atmosphere.

The effects of climate change are already visible and scientific findings indicate that precautionary and prompt action is necessary. It is also realized that delayed action to address climate change would require greater efforts later in a shorter time span. The challenge is, therefore, to decide GHG reduction target based on findings of science, which is accepted universally. This paper provides an overview of the various ways in which targets can be assigned and the means that can be used to achieve them.

Stabilization scenarios and climate change

Several assessments have been made to study the impact of various atmospheric GHG concentration stabilization scenarios on the earth's system, including assessments made in IPCC WGIII AR4 Report and the Stern Review. A mean annual temperature increase of 2.5 °C or above will cause increase in food price due to reduced global food production and relative growth in demand; similarly, with a 3 °C rise, it is estimated that the West Antarctic Ice sheet will collapse. Thus stabilization at 550 PPMV is discussed as the feasible scenario that may still surpass the critical 'threshold' level of 2 °C rise supported by the European Union.

Figure 1; Estimates rise in average mean temperature with respect to stabilisation levels of GHGs, source MoEJ, 2005



Global assessments available from the Ministry of Environment, Japan, indicate that 475 PPMV concentration levels coincide with a 2 °C rise in temperature. The corresponding figure indicates that to be able to achieve 2 °C goal, GHG emissions should be contained up to 3 GtC/year by 2100. The probabilities to remain below 2 °C are unlikely as the concentration levels rise (Meinhausen 2005³).

The Garnaut Assessment⁴ presents an analysis of the scale of reductions required and it assesses the contributions required by both Annex I and non Annex I Parties to keep the concentration levels within 450 or 550 PPM. It is only worth considering the results that show the top-of-the-range level of cuts for Annex I countries: 30% for the 550 stabilization path and 40% for the 450 one. Even then, the 450 path will require a 33% cut from the non-Annex-I baseline by 2020, which allows for an annual growth of only 0.7% between 2005 and 2020. The 550 path, and its 2020 target, will require a 26% cut from baseline for non-Annex-I countries, which limits annual average emissions growth in these countries to 1.4%. This would imply no growth in per capita emissions in the developing world.

Approaches, differentiating responsibilities, GHG targets, and scale adjustments

Various approaches are being followed to engage wider stakeholders than only developed countries based on common but differentiated responsibilities principle. Two approaches as a possible way forward to strengthen post-2012 climate change architecture are as follows.

- a) Pledge and review approach. This is a voluntary initiative in which targets are 'pledged' by countries based on their capability and resources, following that the compliance of pledge can be monitored/reviewed by an International Regime or group of countries. The process was initiated in 2007 after G8 Summit in Germany, from where on it is being steered by the US (non-Kyoto party), involving 16 countries that are the source of 80% of global emissions to discuss various options through which major emitting countries can take on GHG reduction targets in long term.
- b) Trade and cap approach. All Kyoto parties have already undertaken the approach with legally binding emission reduction targets as agreed at the international platform for industrialized countries, and it is being followed through domestic reductions or carbon trade based on three flexible mechanisms in Kyoto Protocol vis-à-vis Joint Implementation; emission trading scheme; and Clean Development Mechanism. The institutional system has also set up a compliance mechanism to monitor the progress of achieving the targets by Annex 1 and failure to its compliance can lead to penalty.

While both these approaches have been discussed in various negotiating fora, the cap and trade mode would be a more stringent way of addressing the issue with countries bound by a certain target limiting GHG emissions. The pledge and review approach, however, has the potential to dilute efforts in addressing the problem with many countries expressing their inability to be able to contribute towards GHG reductions. Also based on past experiences, voluntary initiatives have not yielded desired results, that too with less ambitious targets as prescribed by science.

Far-fetched issues than just economic development related to fuel mix and resource endowment still remains. The question of universality with all countries agreeing and accepting the targets being fixed has remained unanswered. In the Kyoto Protocol, though all countries were Parties to the Framework Convention, in accepting targets and binding themselves to meet them, many countries showed their inability to meet these targets, and the US as the largest GHG emitter and contributor to the problem has chosen to stay away from such a consortium.

The basis for climate protection must be equity and common but differentiated responsibilities. What is needed is to raise the bar on both sides of the historical divides. The climate regime after 2012 will have to see sharper cuts in emissions in the North and emissions would have to be reduced in absolute terms.⁵ Assigning of targets is complex in nature as they will raise issues of responsibility, international equity, monitoring, and incentives for compliance (Grubb 1989).⁶ A number of alternative approaches have been discussed in the literature for the fixing of targets. Literature is also available on the implications for implementation of these approaches.

The targets can be fixed based on the way the problem is being looked at, as discussed in the following paragraphs.

The *atmosphere as a common resource*, have to address issues of international equity based on historical/current contributions, associated costs for mitigating as well as adapting to the consequent changes that will vary amongst countries. Countries with different stages of development will have to be involved where the links to economic development is to be made clear in context with opportunities been created through environmental conservation.

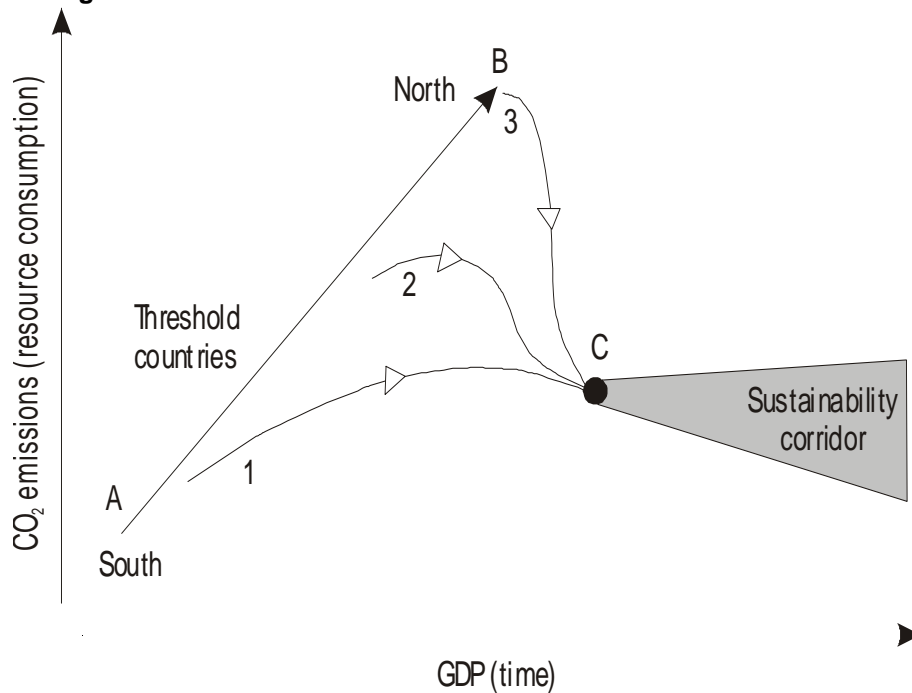
The issue revolves around the theory of the tragedy of commons wherein common resources have been exploited by few, who have been benefited in long term from utilisation of such resources. Assistance to developing countries in this context will be critical, and there is a strong practical basis in addition to the moral aspect of compensation that is involved here. These balances will be key to incentivizing a developing country to raise the bar on climate action, which is needed together with greater levels of ambition from developed countries.⁷

Target setting has been proposed through the use of various means including per capita emission entitlement, GHG intensities, carbon tax, policies, and measures. The most valid of all targets has been based on the 'Princeton Protocol', which proposes for targets to be set on an equal per capita emission entitlement basis with targets revised on a decadal time frame to account for population variations and other changes. The only drawback being that the targets have to be renegotiated every few years and may add the risk of political deadlock, weakening the impact of initial targets. It is further explained in detail.

- a) The *equal per capita entitlements* support the moral principle that every human being has an equal right to use the atmospheric resource. The economic principle then states that those who exceed their entitlement should pay for doing so. However by doing so, there are certain limitations of rewarding countries with large populations to continue to expand and consume further, but since countries with the highest per capita emissions have been the main polluters and also have the maximum access to these resources, the per capita entitlements does seem to be a good approach. Alternatives to avoid the rewarding countries with a large populace include basing the entitlements on adult population and their rights to the atmospheric resource.
- b) *Action targets* is based on the country's actual emissions during the compliance period. This differs from Kyoto-style or dynamic targets, which define a level of emissions (or emissions per unit of GDP [gross domestic product]) to be achieved during a particular period. This illustration demonstrates that action targets would have the effect of bending the emissions trajectory of a country downward. For action targets, the level of abatement effort varies rather little between scenarios. This is due to the fact that the reduction requirement is based on actual rather than projected emissions.
- c) *Dynamic targets* allow the amount of emissions for a country to adjust according to a variable, presumably GDP. These kinds of targets can take the simple form of *intensity targets*, which typically frame the commitment in terms of a ratio (for example, emissions per unit of GDP). It is an attempt to fix targets near economic reality.⁸

It is possible to assign relative responsibilities to the ensemble of Annex I countries and non-Annex I countries according to their respective contributions to climate change, as measured by the induced change in climate. Though the annual emissions of non-Annex I countries are estimated to grow to be equal to those of Annex I countries by 2037, the resulting induced changes in temperature from non-Annex I countries are estimated to be equal to that of Annex I countries only in 2162.⁹ While Annex I parties are assigned targets that are fixed based on their historical shares, developing countries can be involved based on the concept of contraction and convergence, which is the most ideal approach. At the point where developing countries converge towards a trajectory that is equivalent to the per capita emission trajectory of developed countries, targets could be enforced on developing countries to take initiatives to reduce carbon emissions (refer Figure 2).

Figure 2: Growth of Emissions in Developed and developing countries with respect to their GDP growth



However, given the concerns highlighted above, there is a strong and urgent need to see how developing countries can be engaged in the process to contain GHG emissions and, thereby, promote clean technologies. Action by the industrialized countries on their own can significantly reduce the rate and magnitude of climatic change, but because of the growing needs for social and economic development in developing countries, their participation in any global regime is crucial for the stabilization of GHG emissions.

All other measures of engaging the non-Annex I Parties do fall short of imparting a moral and ethical value to the global debate.

Alternatives include promoting concepts of introducing and strengthening the following (Grubb 1989).¹⁰

- a) *Carbon taxes* These can be used as an effective channel to fund programmes that alleviate emissions. The notion is to discourage emissions and encourage means for a low carbon development path. Examples of some applications, say a fixed tax on use of fossil fuels worldwide, could generate resources over millions and billions of dollars each year. Also, its role as an economic tool in effecting fuel choice and triggering fuel efficiency is a major concern. There are other examples related to taxation at the national policy level where there is the risk of unilateral application of the tax to a particular sector, like industry. However, the international agreements on domestic carbon taxation policies have their own advantages and disadvantages associated with their implementation. Any other mode of its implementation would be accompanied by associated complexities relating to the operation of domestic taxation policies as a wide range of policies exist and there are social and political implications of their harmonization. An agreement on carbon taxes might raise issues on a social and political front.
- b) *Fixing production quotas* To provide production permits/quotas as part of an international system can be another means to explore. Tradeable permits over time could capture the price fluctuations with escalation as targets are tightened.

- c) *Emissions trading* Marketable carbon emission permits can be traded between the various parties. All tradeable permits in principle carry the benefits of a market-based approach in enabling the least cost ways of reaching given targets in a decentralized mode. The greater the flexibility provided in the system, the more the potential would be for it to contribute towards achieving its goal of reductions. There are, however, issues relating to defining the permits, their management, and so on.
- d) *Unilateral measures* This can be in the national interest and effective in the formulation of an international emissions abatement agreement. Unilateral measures can be used to steer international interest and action towards limiting the emissions.
- e) *Regional and other group agreements* The impact will be greater but not at the same scales of a global agreement. These are likely to be much easier to achieve and fix targets. The countries involved might have a common goal both politically and economically. Most common examples are the action taken by the European Community, the Asia Pacific Partnership on Clean Development and Climate to accelerate the development and deployment of clean energy technologies (consortium of seven countries including the US, Japan, Canada, China, India, Korea, and Australia). These initiatives would help contribute towards GHG reductions. Though the incentives may not be that large, they would help mitigate the fears of certain countries on the possible disadvantages for global action.
- f) *Promotion of sustainable policies and measures* This brings climate change co-benefits while aiming for accelerated sustainable development.
- g) *Compliance issues and enforcement* Incentives to comply with targets should be provided but these would not ensure enforcement. Measures to include recalcitrant countries are largely through the imposition of a carbon trade tax to non-participants. This would require interventions through other multilateral agreements like the WTO (World Trade Organization).

Conclusion

There are widespread concerns on the nature of changes in the climate system. The European Union has proposed that a 2 °C and above would have serious fallouts. To address the issue, both developed and developing country parties would have to be engaged in the process. The nature of the issue calls for a shared vision for long-term cooperative action on emissions reductions in accordance with the provisions and principles of the Convention and in meeting its ultimate objective.

The developed countries, as per their greater historical responsibility and abilities, need to push the frontiers of technology and establish the trend for a less resource intensive lifestyle. Whereas the developing countries need to adopt sustainable development place policies and measures that will, ensure technology deployment, to achieve higher resource efficiencies. In order to limit warming to 2 °C, it is important that the actions of Annex I countries should aim for peak before 2020, reduce from this peak to 30% below 1990 levels in 2020, and be more than 80% below 1990 levels in 2050.¹¹

Concerns on the involvement of developing country Parties in the emissions reduction process have remained as it is realized that these countries are growing at faster rates. Reduced technological and financial capacities and other over-riding concerns related to poor economic growth and development limit the roles these countries can play in terms of participation in mitigating and adapting under the defined framework of action of the Convention and the Protocol. Meaningful ways are thus required to be explored, which would address and involve developing country Parties in the whole process. Productive and participative ways of engaging all countries towards taking efforts to mitigate climate change

impacts should be explored. Options to meet sustainable development goals can be investigated and their effectiveness evaluated in addressing the requirements of the climate change convention. Keeping this in mind, some of the other alternatives to engage in the global process have been discussed. These include exploring role of carbon taxes, regional agreements, and promotion of sustainable policies and measures.

Endnotes

¹ Fellow, TERI

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¹¹ Bill Hare, Potsdam, Germany