

Climate Change and India- Some Major Issues and Policy Implications

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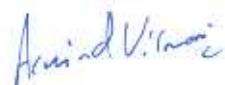
Department of Economic Affairs
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Foreword

The Economic Division in the Department of Economic Affairs has initiated a Working Paper series with the objective of improving economic analysis and promoting evidence based policy formulation in its mandated areas of work. The themes to be covered in the series include macro-economic and sectoral issues of relevance for national policy, strategy for addressing emerging global and national development concerns and the agenda for economic policy reforms. While the issues identified for the Working Papers have relevance as inputs for the flagship publication of the Department, namely Economic Survey and the Mid-Year Review, issues that are related to the larger work responsibility of the Department of Economic Affairs, including the economic aspects of financial services, revenues and expenditure are also the subject matter of this initiative. Papers prepared by the staff or commissioned by the Economic Division as well as other Divisions in the DEA will be included in the Working Paper series on suitable peer review.

The paper by Dr H.A.C. Prasad and Mr. J.S. Kochher on *Climate Change and India- Some Major Issues and Policy Implications* is the second Working Paper for 2009 and the fourth since the initiation of the series. This paper examines issues of climate change related to development and finance.

In recent years there has been a renewed global attention to the issue of climate change. The 1992 UN Framework Convention on Climate Change (UNFCCC), Kyoto Protocol along with the follow-up meetings at Bali, Bangkok and Poznan have contributed to this thinking. The Paper examines a number of related issues and helps in clarifying India's position on global warming and climate change - historically and in the current international context. While remaining alert to discriminatory international regimes for tackling climate change, the authors argue that the Indian policy makers will have to keep the principal development goal of poverty alleviation and social justice in mind in evolving the domestic policy response to this issue. The Paper outlines some suggestions on measures that could be considered by the thirteenth Finance Commission in this regard.



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*Any views expressed in the paper are those of the authors and do not necessarily reflect the views of Ministry of Finance or Government of India. This paper prepared by the authors is a revised and detailed version of concept note on the subject prepared earlier by the authors with the help of a core group on climate change in the Ministry. The authors would like to thank the former Finance Secretary, Dr. D. Subba Rao (presently Governor, Reserve Bank of India), Secretary, Economic Affairs, Shri Ashok Chawla and Chief Economic Adviser, Dr. Arvind Virmani for their encouragement. A special mention to the officers of the core group on climate change in the Department of Economic Affairs consisting of Dr. Dhiraj Bhatnagar, Shri Prashant, Shri Nagaraju, Ms. Kavitha Prasad, Shri N.K. Choudhary and Ritu Jain who under the chairmanship of Dr. H.A.C. Prasad, helped in preparing the concept note on climate change which formed the basis of this paper. They would also like to acknowledge the inputs provided by the other officers in the Department of Economic Affairs, the Ministry of Environment & Forests and Planning Commission. Further, it has been enriched by the information contained in Background Papers and discussion at G20 Seminar on Clean Energy & Global Markets held on 15-16th May, 2008 at London, U.K. and the second High Level Event of Ministers of Finance on climate change at Warsaw, Poland on 8-9 December, 2008 in which Dr. H.A.C. Prasad was the Indian representative. However, errors, if any, are the responsibility of the authors.

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Abstract

Global warming, an important aspect of climate change is primarily a consequence of accumulation of greenhouse gases in the atmosphere. Global mean temperature has increased by 0.74°C between 1906 and 2005. Global sea level has risen at the average rate of 1.8mm/yr during 1961-2003, the rate has been faster during 1993-2003 (@3.1 mm/yr). This paper in Part I examines the genesis of Climate Change which has been referred to as the defining human development issue of our generation. Also studied is the impact of this problem in the global as well as Indian context. India is not immune from the impact of global warming and climate change. Any sharp rise in sea level could have a considerable impact on India given its long coastline and important cities located on the coast as also states having large low lying areas. Broadly, this would require adjustments at the global level which as per one estimate may involve an average annual cost amounting to 1.6 percent of GDP between now and 2030. The cost of inaction could be much higher. In Part II of the paper, major international developments related to Climate Change including the UN Framework Convention on Climate Change (UNFCCC), 1992 and Kyoto Protocol are described along with significant meetings like those at Bali and Bangkok and outcomes at these international exchanges. In Part III, while comparing perspectives of developed and developing countries on Climate Change, a detailed examination is made of the issues involved and India's view point, especially the arguments for India to take up GHG abatement and our response to each of these at the international forums. India has also made several contributions in the form of proposals for international cooperation to tackle the problem of climate change which have been listed. In Part IV of the paper, the steps taken by India historically as well as in recent period, to protect the environment and tackle the urgent problem, have been listed. In Part V, future response strategies required for Climate Change, both for mitigation and adaptation in India are examined. In Part VI of the paper, several related issues like social justice, carbon trading, intellectual property rights, technology transfer, energy markets and eco-labelling are considered both from the global view point as well as the stand India has been taking and the possible beneficial options. The paper highlights that while formulating adaptive measures to Climate Change, Indian policy makers should keep the principal goal of poverty alleviation and social justice in mind. There is also a need to see how far we have achieved the Millennium Development Goals (MDGs) with respect to climate change. The role of International Financial Institutions (IFIs) in the context of Climate Change for India also needs to be examined. There are concerns that multilateral financial institutions, being largely donor-driven, would be encouraged to bring in climate-related conditionalities even for their normal lending programmes. At the same time, carbon trading could result in discrimination to developing countries who fail to get the deserved price for projects taken with the intention of carbon emission reduction while the emitters of carbon (developed countries) may get away with increased emission levels. One issue that needs to be examined is why prices of Certified Emission Reductions (CERs) for which developing countries are eligible are lower than European Emission Allowances (EUAs), which are traded on several European exchanges. India needs to monitor issues of trade competitiveness raised by developed countries carefully, especially at WTO with regard to trade in environmental goods and services. Environment has not been included in WTO negotiations and we have to guard against this making an entry through the back door in the form of climate change negotiations in international institutions. Another

challenge is to ensure that low-carbon technology is transferred from industrial countries to India and other developing countries. In spite of potential benefits of bio-fuels leading to policy support in developing countries, the linkage between food crisis and use of bio-fuels needs to be examined carefully. These and other important issues related to development, growth, trade and finance in the context of climate change have been examined in this section. Part VII gives some suggestions on internal reforms particularly for consideration of the 13th Finance Commission. Part VIII gives the conclusion.

Climate Change and India - Some Major Issues and Policy Implications

Part - I: Genesis of the problem and possible impact

Introduction

As per UNDP's Human Development Report(HDR), 2007/2008, "Climate Change is the defining human development issue of our generation". This problem is not one which a single nation or community is facing in isolation. Rather, the issue is global in nature which is a consequence of the fact that the atmosphere is common to the entire mankind. Moreover, the problem needs to be viewed in the context of growth and development in the developing countries and how the presently poor in different parts of the world will be able to break the shackles of deprivation and have adequate access to health, nutrition, education and other basic services needed for their well-being.

Genesis

2. The term 'global warming' is one aspect of the broader term 'climate change'. Global warming is the observed increase in the average temperature of the air near earth's surface and oceans in recent decades and its projected continuation. Global warming is primarily a consequence of building up of greenhouse gases in the atmosphere. Global mean temperature has increased by 0.74°C between 1906 and 2005. Global sea level has risen at the average rate of 1.8mm/yr during 1961-2003, the rate has been faster during 1993-2003 (@3.1 mm/yr).

3. In India, while the monsoon rainfall at all India level does not show any trend, surface air temperature for the period 1901-2000 indicates a significant warming of 0.4°C for 100 years. While no significant long-term trend has been observed in the frequencies of large-scale droughts or floods in the summer monsoon season and the total frequency of cyclonic storms that form over Bay of Bengal has remained almost constant over the period 1887-1997, glaciers in Himalayas are receding at a rapid pace. At the same time, it may also be admitted that as per the Geological Survey of India, glaciers worldwide are passing through a phase of recession as a natural cyclic process. There is a projected increase in rainfall by 15-40 percent by the end of the 21st century with high regional variability besides increase in mean annual temperature by 3°C to 6°C by the end of the 21st century. The warming is projected to be more pronounced over land areas, with the maximum increase over northern India. The warming is also relatively greater in winter and post-monsoon seasons.

4. The Fourth Assessment Report of 2007 of the Working Group III of the Intergovernmental Panel on Climate Change (IPCC) states that GHG emissions have grown since pre-industrial times, with an increase of 70 per cent between 1970 and 2004. The largest growth in global GHG emissions during this period has come from the energy supply sector (an increase of 145 per cent). The growth in direct emissions from transport had been 120 per cent, industry 65 per cent and land use, land use change, and forestry (LULUCF) 40 per cent.

Future Impact of Global Warming

5. Human Development Report(HDR) 2007/08 states that “Mahatma Gandhi once reflected on how many planets might be needed if India were to follow Britain’s pattern of industrialization. We are unable to answer that question. However, we estimate in this Report that if all of the world’s people generated greenhouse gases at the same rate as some developed countries, we would need nine planets. While the world’s poor walk the Earth with a light carbon footprint they are bearing the brunt of unsustainable management of our ecological interdependence”.

6. According to the IPCC, the enhanced GHG effect will result in additional warming of the Earth’s surface. The Fourth Assessment Report of IPCC has projected a serious picture of the earth’s future. The Report states that global warming may have a devastating impact on the climate of the earth. It is very likely that climate change can slow down the pace of progress towards sustainable development either directly through increased exposure to adverse impact or indirectly through erosion of the capacity to adapt. It also states that climate change-related exposures are likely to affect the health status of millions of people, particularly those with low adaptive capacity, through increases in malnutrition and consequent disorders, with implications for child growth and development; and increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts.

7. India is also not immune from the impact of global warming and climate change. Any sharp rise in sea level could have a considerable impact on India. The United Nations Environment Programme included India among the 27 countries that are most vulnerable to a sea level rise. The mega cities of Mumbai and Chennai with large and growing populations and huge investments in infrastructure are located on the coast. Low-level areas, such as those in Orissa and West Bengal, could be vulnerable to inundation. Simulations with climate models as well as observational data have indicated that droughts and spells of excessive rain like the deluge that struck Mumbai in 2005 are likely to become more frequent in India with the warming of the world. Glaciers in the Himalayas feed important rivers such as the Ganga, the Indus and the Brahmaputra that provide water for millions of people as well as for irrigation and industry. The accelerated melting which these glaciers are experiencing as a result of the earth’s warming will have a profound effect on future water availability. The Gangotri glacier, one of the largest in the Himalayas, has been melting since long and more rapidly in recent decades. As the glaciers melt, they become more fragmented and the smaller glaciers are more sensitive to global warming.

What is needed?

8. Changing this picture will require deep adjustments as per HDR, 2007/2008. If the world were a single country it would have to cut emissions of greenhouse gases by half relative to 1990 levels up to 2050, with sustained reductions to the end of the 21st Century. However, the world is not a single country. Using plausible assumptions, HDR estimates that avoiding dangerous climate change will require rich nations to cut emissions by at least 80 percent, with cuts of 30 percent by 2020. Emissions from developing countries would peak around 2020, with cuts of 20 percent by 2050. HDR’s stabilization target is stringent but affordable. Between now and 2030, the average annual cost would amount to 1.6 percent of GDP. This is not

an insignificant investment. But it represents less than two-thirds of global military spending. The costs of inaction could be much higher. According to the Stern Review (Stern, 2007), they could reach 5–20 percent of world GDP, depending upon how costs are measured. The economics of climate change can be formulated as three questions: (1) What are the economic costs of the impact of climate change? (2) What are the costs of adapting to the consequences of climate change? (3) What are the costs of mitigating climate change? The conclusions from the Stern Report address the first and third questions at a global or world level. Two very important conclusions of one of the Inter Governmental Panel on Climate Change (IPCC) reports (WG 2 2007) are: (1) Many impacts can be avoided, reduced or delayed by mitigation. (2) A portfolio of adaptation and mitigation measures can diminish the risks associated with climate change.

Part -II Major International Developments related to Climate Change

The UN Framework Convention on Climate Change (UNFCCC), 1992

9. The UNFCCC was adopted at the *Rio Earth Summit* in May 1992. The objective of the Convention was to achieve stabilization of GHG concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level is to be achieved within a time frame sufficient to allow eco-systems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. The UNFCCC recognizes the legitimate need of developing countries for sustained economic growth and poverty alleviation. Article 3.1 of the UNFCCC mentions that Parties to the Convention should protect the climate change system for the benefit of present and future generations of human kind on the basis of equity and in accordance with their “common but differentiated responsibilities” and respective capabilities. It is noted in the Preamble of the UNFCCC that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs. The UNFCCC promotes and reviews the implementation of the Convention through decisions taken at annually held meetings of the Conference of Parties (CoP). It also gave a “soft target” for industrialized countries (Annex I Parties) to return to 1990 levels of GHG emissions by 2000. All major countries, including US, EU, India, China, have ratified the Convention.

The Kyoto Protocol, 1997

10. This was adopted by the parties to the UNFCCC and is the most significant legally binding protocol. The Protocol provides for quantified emission limitation and reduction commitments for the developed countries, mechanisms to facilitate review of and compliance with these targets. It sets out targets for GHG reductions by individual industrialized countries during the “first commitment period”, 2008-2012, totaling 5.2 percent below their aggregate 1990 emissions. It also sets up a global market in carbon credits. The *Kyoto Protocol* also provides for three mechanisms that enable the developed countries with quantified emission limitation and reduction commitments to acquire greenhouse gas reduction credits from activities outside their own boundaries at relatively lesser costs. These are Joint Implementation,

Clean Development Mechanism (CDM) and Emission Trading. Developing Countries can participate only in CDM operational since 2000. Under CDM a developed country would take up greenhouse gas reduction project activities in a developing country where the cost of greenhouse gas reduction project activities is usually much lower. The CDM supports the implementation of sustainable and environment friendly technologies in developing countries and thereby, facilitating industrialized countries in meeting their emission reduction obligations in a cost-effective manner.

11. The UNFCCC thus recognises the legitimate development needs of the developing countries. As they pursue the path of development their emissions are bound to grow. On the other hand, developed countries, owing to their historical as well as current emissions, are expected to stabilize and reduce their emissions of Green House Gases. The Clean Development Mechanism (CDM) is one of the flexible arrangements under the Kyoto protocol to the UN Framework Convention on Climate Change (UNFCCC) supporting the implementation of sustainable and environment friendly technologies in developing countries and facilitating industrialised countries in meeting their emission reduction obligations in a cost-effective manner. U. S. and Australia have not ratified the protocol. EU, China, India and Brazil are parties to the protocol. There are a total of 161 Parties in the Kyoto Protocol.

Bali Climate Change Conference, 2007

12. The UNFCCC Bali Climate Change Conference(COP13) has attracted a great deal of attention because of the release of the Fourth Assessment Reports by the Inter Governmental Panel on Climate Change (IPCC) recently and also because of the fact that the year 2007 was the year immediately preceding the beginning of the first commitment period under the Kyoto Protocol, i.e., 2008-2012.

13. The principal outcomes of the Bali conference were, first, a process to determine the GHG reduction commitments of industrialized countries (Annex I) under the Kyoto Protocol, beyond 2012 and second, the commencement of a comprehensive dialogue on long-term cooperative action to address four major building blocks of climate change, i.e. GHG mitigation; adaptation to climate change impacts; technology development and cooperation; and finance.

14. The dialogue on long-term cooperative action sets out differentiated approaches for developed and developing countries in the key area of GHG mitigation. For developed countries, while the efforts for GHG mitigation should be nationally appropriate, they should at the same time, be comparable among these countries, and there should be accountability for mitigation actions, in terms of monitoring, reporting, and verification. For developing countries (non-Annex I), the mitigation actions are also to be nationally appropriate, in the context of sustainable development, and supported and enabled by technology, finance and capacity building, for which there should be accountability in terms of monitoring, reporting, and verification. These requirements ensure that the Compact between developed and developing countries entered into in 1992 under the Climate Change Convention is maintained. The precise nature of the outcomes of the dialogue would be determined in a two year negotiating time table ending in 2009, at which time the second commitment period of Annex I countries under the Kyoto Protocol would also be finalized.

15. The Bali Action Plan had been adopted to secure full, effective and sustained implementation of the Convention through long-term cooperative action now, up to and beyond 2012. The Bali Action Plan expects the Parties to evolve a shared vision for long term cooperative action and agree on specific actions for enhanced cooperation in the areas of mitigation of climate change, adaptation to climate change, and transfer of technology and provision of financial resources to support actions for mitigation and adaptation. Several other significant decisions reached at Bali include:

- (i) operationalization of the Adaptation Fund to provide assistance to developing countries to adapt to climate change.
- (ii) agreement on guidance for the further implementation and improvement of the Clean Development Mechanism (CDM).
- (iii) 'sustainable management of forests leading to conservation', a potential approach to be considered for compensation to reduce emissions from deforestation.
- (iv) transfer of technologies, including licenses to support the access to and transfer of low carbon technologies, and know how. In addition, a window for setting up a "venture capital fund" possibly located in a multilateral financial institution.

Trade Ministers meeting

16. On the sidelines of UNFCCC, while tackling the global issues of climate change, Trade Ministers felt the need to keep in mind common but differentiated responsibility with reference to capability and adaptation issues. In addition, the Trade Ministers emphasized on the WTO principles of non-discrimination, transparency, special and differentiated treatment, rule-based but not sanction-based method with science as the basis. The Trade Ministers agreed that the relationship between environment objectives with global trade needs further analysis, studies and empirical evidence. In this regard, issues which require to be kept in mind are barriers to trade in environmental goods and services, role of transfer of technology, role of IPRs, subsidies, Government procurement agreement under effective market based trade regime with developmental objectives. There is a need to minimize adverse social and economic impact with no arbitrary and unjustified discrimination. Since, climate change has influence on development, the Ministers sought to successfully conclude environment negotiations under the principles of multilateral trading system. While doing so, they agreed to focus on technology transfer on low carbon techniques, building capacity and arrange aid for trade while avoiding discrimination. They also agreed to focus in the negotiations on sustainable forestry products and bio-fuels. As a way forward, the Ministers will continue to work with commitment and trust to recognizing the mutual benefit of climate change objectives and international trading principles. They agreed to arrange to get analytics and studies conducted. The Accra Declaration, 25 April, 2008 of UNCTAD also states that Climate change adaptation and mitigation need to be urgently addressed, in accordance with the provisions and principles of the UNFCCC and adequate financing and technology will be critical to help developing countries to rise to the challenge.

Post Bali meetings of UNFCCC

17. The first post Bali meeting at Bangkok (31 March to 4 April, 2008) of the UNFCCC comprised meetings of the two Ad hoc Working Groups (AWGs) dealing with (a) Long Term Cooperative Action as a follow up to the Bali Action Plan (BAP) (AWG LCA) and (b) Commitments of developed countries post 2012 under the Kyoto

Protocol (AWG KP), which was set up in December 2005. The other meetings were held in Bonn (June 2008) and Accra (August 2008).

18. There was general agreement that the achievement of even modest GHG reduction by developing countries would require massive amounts of concessional funding. For obvious reasons, developing countries wish to have such funding mechanisms governed by the UNFCCC itself, and not placed under multilateral financial institutions such as the World Bank and the UNDP. However, during the Bangkok meeting itself, it was announced that major Western donors had agreed to finance a US\$3 billion Climate Fund under the World Bank. There are concerns that multilateral financial institutions, being largely donor-driven, would be encouraged to bring in climate-related conditionalities even for their normal lending programmes.

Stern Review

19. As per Stern review, the broad scheme set out is as follows: Anthropogenic Climate Change will result within this century in unacceptable adverse impacts globally, but especially on poor developing countries. The Stern Report estimates that “if we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5 per cent of global gross domestic product (GDP) each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20 per cent of GDP or more. This places climate change impacts in the same class as the world wars and the Great Depression. “In contrast, the costs of action – reducing GHG emissions to avoid the worst impacts of climate change – can be limited to around 1 per cent of global GDP each year”. In the light of these findings, immediate action is warranted to vigorously reduce GHG emissions, so that stabilization of GHG concentrations in the atmosphere is accomplished at a level (450ppm CO₂e, or 2 degree C mean temperature rise) under which climate change impacts would be tolerable. However, such stabilization would require a global cut in GHG emissions of 50 percent of current levels by 2025, and this cannot be accomplished by developed countries (who have caused the problem) alone, but also by developing countries, although the latter may bear a lesser burden. This would, of course reduce their growth, but the counterfactual of failure to stabilize GHG emissions at the recommended level, is unacceptable GHG impacts on them. Stern also acknowledges that adverse impacts of climate change on developing countries must be addressed through adaptation measures; that the costs of such measures are also significant (of the same order of magnitude as for GHG mitigation), and while developed countries do have a responsibility to provide the necessary resources for adaptation, it would be politically infeasible for them to go beyond the Monterrey ODA target of 0.7% GDP. Accordingly, ways must be found of “harmonizing” climate change adaptation needs with accomplishments of the Millennium Development Goals (MDGs) with the same resources.

20. The Stern recommendations however, would shatter the UNFCCC Compact, which so far, none have challenged. In each key element of the Compact, Prof. Stern suggests reversals, or at least attenuation. Specifically, ‘the stake of developing countries in growth and poverty alleviation is sacrosanct’, is abandoned by requiring them to take uncompensated GHG abatement commitments. Further, as per Stern’s recommendations ‘new and additional financial resources must be provided’ concept has been abandoned. No new financial resources are to be provided; only existing commitments for the MDGs are to be met and existing

multilateral assistance for development may be diverted through “mainstreaming” climate change actions. Developing countries would have to meet part of the costs of climate change actions themselves. Last, but not the least, the principle that ‘Developed countries, being responsible for the problem, owing to their historical as well as current emissions, are required to stabilise and reduce their emissions of GHGs is diluted. In Prof. Stern’s scheme, they may, at least in part, shift the economic cost of abatement to developing countries. Together, these demolish the principle of “common but differentiated responsibility” that is at the heart of the UNFCCC Compact.

21. While India had proposed convergence to equal per-capita even during the negotiations leading to the UNFCCC, and there has been significant academic work undertaken since then, both in India and elsewhere to give formal shape to the concept, the first time that the principle was endorsed by the industrialized countries was at Conference of Parties(CoP) at the Hague in 1999 by the President of France speaking at the Plenary as EU President. Since then, however, industrialized countries, the EU and Japan in particular, have spent considerable effort to pressurize developing countries, China and India in particular, to accept legally binding GHG abatement commitments under some variant of reductions from aggregate, not per-capita levels, i.e. by implicit acceptance that present levels represent legitimate entitlements. The refusal of China and India to do so has been characterized as environmental irresponsibility by an orchestrated and well-organized media campaign. In September 2007, however, Chancellor Angel Merkel, who is also current EU and G 8 President, indicated acceptance of some form of convergence to equal per-capita, with the rider that during convergence, per-capita GHG emissions of developing countries would not exceed that of industrialized countries.

14th Conference of Parties at Poznan, Poland

22. The 14th Conference of Parties (CoP 14) to the United Nations Framework Convention on Climate Change (UNFCCC) and 4th meeting of the Conference of Parties serving as Meeting of Parties (CoP/MoP) to the Kyoto Protocol was organised by the Government of Poland in cooperation with the UNFCCC Secretariat at Poznan, Poland from 1-12 December 2008. Besides the CoP14 and CoP/MoP4, the two permanent Subsidiary Bodies of the Convention e.g. Subsidiary Body for Scientific & Technological Advise (SBSTA) and the Subsidiary Body of Implementation (SBI) held their 29th Sessions at Poznan. The permanent Subsidiary Bodies of the Convention have the task of discussing the relevant technological, scientific and implementation issues and advising the CoP in taking suitable decisions. In addition, the two Ad-Hoc bodies of the Convention and its Protocol formed for specific purposes i.e. Ad-hoc Working Group on Long Term Cooperative Action (AWG-LCA) formed under the Convention at CoP13 (2007), and Ad-hoc Working Group on Further commitments for Annex I Parties (AWG-KP) formed under the Kyoto Protocol at CoP 11 (2005) also took place during this period. At Poznan, the 4th session of the AWG-LCA and the 2nd part of the 6th session of the AWG-KP were held. The Second High Level Event of Ministers of Finance on Climate Change at Warsaw Poland from 8-9 December, 2008 was also organized as a side event to the Poznan Conference by the Ministry of Finance, Poland.

23. The meetings at Poznan were an important half-way mark in the negotiating process leading up to Copenhagen in 2009. Poznan Conference was intended to enable the Parties to take a stock of the progress made since the adoption of the Bali Action Plan and map out in detail as to how to make a transition from the brainstorming mode of discussions to negotiating mode so that the time schedule envisaged for the agreed outcome at the Copenhagen CoP 15 scheduled from 7-18 December 2009 is met.

24. In the Poznan conference, the following important decisions/outcomes were reached:

- (i) The delegates welcomed the determination of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention to shift into full negotiating mode in 2009 and its invitation to all Parties to put forward further proposals regarding the content and form of the agreed outcome as early as possible, so that Parties might review and assess the scope and the progress of the negotiations at the sixth session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention in June 2009.
- (ii) Poznan strategic programme on technology transfer was announced as a step towards scaling up the level of investment in technology transfer in order to help developing countries address their needs for environmentally sound technologies.
- (iii) Developed country Parties were called upon and other Parties were invited to make financial contributions to the Global Environment Facility to secure a successful fifth replenishment of the Global Environment Facility and to ensure that the findings of the mid-term review of the Resource Allocation Framework are fully taken into account;
- (iv) The purpose of the Global Environment Facility was :
 - (a) To promptly initiate and expeditiously facilitate the preparation of projects for approval and implementation under the strategic programme in order to help developing countries address their needs for environmentally sound technologies;
 - (b) To collaborate with its implementing agencies in order to provide technical support to developing countries in preparing or updating, as appropriate, their technology needs assessments using the updated handbook for conducting technology needs assessments for climate change published by the United Nations Development Programme, to be made available in early 2009 in collaboration with the Expert Group on Technology Transfer, the UNFCCC secretariat and the Climate Technology Initiative;
 - (c) To consider the long-term implementation of the strategic programme, including: addressing the gaps identified in current operations of the Global Environment Facility, that relate to investment in the transfer of environmentally sound technologies; leveraging private-sector investment; and promoting innovative project development activities;
 - (d) To report on the progress made in carrying out the activities referred to in paragraph 2 (a–c) above to the Conference of the Parties at its sixteenth session, in addition to providing interim reports to the Subsidiary Body for Implementation at its thirtieth and thirty-first sessions, with a view to assessing its progress and future direction in order to help inform Parties

in their consideration of long-term needs for implementation of the strategic programme.

25. The highlights of the Chair's summary of the second High Level Event of Ministers of finance on climate change in Warsaw were as follows:

- It was observed that while a variety of financing mechanisms and instruments is needed, a review, assessment and, if necessary, a reform of existing mechanisms and instruments, notably the GEF mentioned by some participants, should be the priority. The importance of adequate, predictable, sustainable, and additional flows was also emphasised. It was stressed upon that innovative financial instruments should be assessed with respect to effectiveness and efficiency, and the sound principles of public finance. The significant contribution of the international financial institutions in terms of financing mechanisms, instruments and capacity building was recognised. These institutions help enhance financial access for low income countries, as well as sharing knowledge on financing climate change policies. It was also noted that ODA meant for development purpose and meeting the MDG's should not be diverted. Additional assistance for Climate Change is necessary. Adaptation should receive the same emphasis as mitigation.
- The need of the commitment by all parties to implement the architecture of climate change in an equitable, effective and efficient way was also emphasised.
- The following actions expected over the coming year were indicated:
 - The 3rd High Level Meeting of Finance Ministers will be held ahead of the COP-15 meeting in Copenhagen. Denmark, as the COP-15 chair, underscores the economic and financing challenge of climate change policy and the need to actively involve Finance Ministers in support of the UNFCCC process.
 - The Australian Government will co-host with the UK Government a G20 climate change workshop on 13 February 2009.
 - The World Bank on the occasion of the Annual and Spring Meetings of the International Monetary Fund and the World Bank Group continue to host the "Bali Breakfast" meetings.
 - The OECD will continue to facilitate dialogue on climate change policies with its forthcoming OECD Conference on the Economics of Climate Change – Mitigation and Adaptation, to be held in Paris on 27 March 2009.
- It was also noted that countries could benefit from additional studies on:
 - The equity, efficiency and effectiveness of existing financing mechanisms and instruments, and the role of innovative financial mechanisms.
 - The development of appropriate legal, regulatory, and governance structures facilitating climate change policies.
 - The current impact of the global financial crisis and the ensuing economic downturn on climate change financing and financial architecture.
 - Financing new technologies in an efficient and effective manner.

Part-III Perspectives of Developed and Developing countries on Climate Change

Developed Countries' perspective

26. OECD and some other developed countries are of the view that since most of the additional carbon emissions will be taking place in the developing countries, the developing countries should also accept cut in green house gas emissions. They also are of the view that in the long run, there has to be carbon equity. The permissible carbon emission per capita has to be same for humanity across the globe and the global community should work towards it. They want developing countries to slow their emission growth. USA is thinking of establishing a Clean Development Fund to facilitate adoption of clean technologies in developing countries. Some developed countries are strongly for introduction of carbon tax. The Developed countries objective is to pass the economic burden of GHG stabilization to others and retain competitive advantage in trade. They also want to gain competitive advantage in the near-term in the energy sector. International Energy Agency (IEA) estimates US\$ 20 trillion global energy investment till 2030, of which \$ 10 trillion is in China, India, Brazil. There is a feeling that developed countries aim to minimize resource transfers to developing countries for adapting to climate change, either fiscal or sourced from carbon market.

Developing Countries' perspective

27. On the other hand, developing countries aim to avoid the *commencement of any process* leading to *uncompensated* GHG constraints. They want to ensure that any apportionment of GHG emissions rights is based on equity (India and China are for equal *per-capita basis with accounting for historical responsibility*). They also look for realising their competitive advantage in trade in carbon credits (via the CDM) and to realise necessary resources for addressing adaptation to climate change.

Indian perspective as a developing country

28. India, as a developing country has reasons to be concerned about the adverse impact of climate change on its economy. A large part of its population depends on climate sensitive sectors for livelihoods which makes it highly vulnerable to climate change. Climate change can have serious impact on its crops, forests, coastal regions, etc. which can in turn affect the achievement of its important national development goals. The issue of climate change cannot however be taken up without linking it to developmental needs such as poverty, health, energy access and education. Higher energy production and consumption is a major driving force of economic development and poverty reduction. Most economic activities depend on energy. As India has a sizeable service sector (53% of GDP excluding construction and 61% of GDP including construction in 2006-07 & 2007-08 (April-Dec.) and services exports is 35% of total exports in 2007-08 (April-Dec.) and 37% in 2006-07), its economic growth may not be associated with proportionate GHG emissions, though its emissions are bound to grow in short as well as medium term with the upsurge of the manufacturing sector and need for industrialisation to meet the growing demands of its huge population.

29. India, with 17 per cent of the world's population, contributes only 4 per cent of the total global greenhouse gas emissions. In terms of per capita GHG emissions it

is about 23 per cent of the global average. Around 55 per cent of India's population still does not have access to commercial energy. India's stand as a developing country is that GHG abatement in any form involves significant economic costs and will adversely impact GDP growth as it requires a shift from cheap fossil fuels to costlier non-carbon energy. Efforts to address climate change adaptation and mitigation needs should not take resources away from the core development needs and growth objectives of the developing countries. Climate Change mitigation and poverty reduction should be addressed simultaneously.

30. India's share of global commercial energy supply in 2005 was 3.7 percent. Top 5 countries consume over 50 percent led by US at 22.2 percent and China at 14.7 percent followed by Russia, Japan and Germany. India's per capita commercial energy consumption is about 20 percent of the world average, 4 percent that of the US and 28 percent that of China. Some 600 million fellow Indians live without electricity. Over 75 percent of household energy consumption is for the basic human need of cooking. Traditional biomass is the primary cooking fuel for over 700 million Indians. 27.5 percent population is below poverty line. Lack of access to commercial energy leads to illiteracy, gender inequality/disempowerment, high IMR and MMR, Poor Health & and hence a low HDI. Over the next 25 years, India needs to lift the bottom 40 percent of her citizens to an acceptable level of economic & social well being – this will not happen without providing modern energy to these fellow Indians. There is also an important issue of uniformity in distribution of energy consumption/emission per capita argument to be tenable. According to an estimate by Greenpeace, the top 1 percent of our population in India has emissions which are 4.5 times that of the bottom 38 percent. There is need for a plan of tempering of energy consumption by the affluent and an efficient increase in energy consumption of the impoverished(see Agarwala, 2008).

31. India's primary energy supply is expected to grow by 4.3-5.1 percent to reach 1536 to 1887 MTOE by 2031-32 for GDP growth of more than 8 percent. India's share of world fossil fuel supply in 2005 at 3.7 percent could become 7.6 to 10.9 percent by 2031-32. India's incremental requirement could account for 13-21 percent of the world's incremental supply by 2031-32. India would need to tap all available energy supplies and pursue all available and emerging energy technologies. In order to achieve its target of long term growth of 8 percent, India will have to boost power generation capacity at least six fold by 2030. Over the period, its emissions are expected to increase over fourfold(Economist, 2008). Above all, India has to lower energy demand through energy conservation and higher energy efficiency. As per World Bank assessment of India's relative emission performance, India is a relatively low carbon economy. India has been offsetting its CO₂ emissions growth resulting from growth in population and high GDP growth by lowering energy intensity and improving the carbon intensity of its fuel mix. India has achieved these offsets despite a low initial emission level and against a backdrop of increasing CO₂ intensity worldwide between 1999-2004. Most independent projections indicate that India's CO₂ intensity is likely to continue to decline through 2030-2050.

32. **The arguments given for India to take up GHG abatement and India's response are as follows:**

- *India is a “major emitter” (3-4% of global emissions):*
India’s response is that its per-capita emissions are 1/4th of global, 1/25th of US, 1/12th of Japan, 1/15th of EU-15.
- *India is “inefficient” in terms of energy intensity of GDP:*
India’s Response is that its energy intensity of GDP at 0.16 kgoe/\$ GDP (year 2000 PPP), compares favourably with EU-15, and is same as Germany.
- *India’s share of global GHG emissions will increase massively over time due to economic growth:*
India’s response is that as per empirical results, under the unconstrained emissions scenario, India’s share of global GHGs emissions varies from 5% to 16% till 2100. Under the 550 ppmv scenario, it varies from 3% to 20% till 2100. Clearly, slight differences in model assumptions, besides a major part of growth due to services sector, structure, and parameter values may have large implications for numerical outputs. (Besides a major part of growth in India is due to services sector).
- *“Energy efficiency is an unalloyed good”: hence harmonize energy efficiency standards with industrialized countries :*
India’s response is that Energy efficiency in the strict engineering sense (minimize energy input for a given quantity of output) involves attempting to reach thermodynamic limits by substituting energy by capital, labour, etc. – asymptotic solutions emerge as thermo limits are approached.

33. **Essential non-negotiable elements** from India’s perspective in proposed processes regarding Climate Change can thus be summarised as under:

- GHG mitigation must be based on the principle of common but differentiated responsibilities (including historical emissions and current emissions levels) and respective capabilities and result in actual global reduction in GHG emissions
- There should be no adverse impact of GHG mitigation on GDP growth and poverty alleviation in developing countries
- No uncompensated commitments on GHG mitigation by developing countries i.e. new commitments only under Art 4.1 and 4.7 of UNFCCC.
- Adaptation needs to be treated on equal footing with mitigation with adequate resources allocated for it
- Binding commitments by developed countries to research, development, diffusion and deployment of cost effective clean technologies in developing countries with the required additional funding
- Commitments needed on sustainable production and consumption by industrialised countries in addition to GHG caps.
- The process must be contained within the UNFCCC provisions
- Industrialised countries should take deeper, long-term GHG abatement commitments and rely on Carbon market to reduce compliance costs.
- GHG abatement technologies (efficient biomass to electricity) and adaption (drought resistant high yielding crops) related technologies relevant to developing countries do not exist or are still high cost. So need to set up collaborative R&D arrangements between developed and developing countries with sharing of IPR’s.

India and the International Forums

34. India is a Party to the *United Nations Framework Convention on Climate Change*. India has established the National Clean Development Mechanism Authority on 2 December 2003. It has been India's stand not to agree to any commitments related to reducing GHGs emissions. In order to meet the demands of rising standards of living and providing access to commercial energy to those lacking it, the total emission of GHGs is bound to increase in India and also in other developing countries. Developed countries, being responsible for the problem, owing to their historical as well as current emissions, are required to stabilize and reduce their emissions of GHGs. Hence, developed countries should come forward and take further deeper commitments beyond the year 2012. This would give a clear direction for Clean Development Mechanism through which developing countries can take part in mitigation measures and sustainable development. India believes that the appropriate burden sharing formula (GHG emissions rights) is the 'equal per capita principle'.

35. In the G-8 meeting held in June, 2007, India's Prime Minister, Dr. Manmohan Singh, stated that "India's GHG emissions are among the lowest in per capita terms- only around 4% of the world's emissions. Nonetheless, we recognize wholeheartedly our responsibility as a developing country. We wish to engage constructively and productively with the international community to preserve and protect the environment. We are determined that India's per-capita GHG emissions are not going to exceed those of developed countries even while pursuing policies of development and economic growth. We must work together to find pragmatic, practical solutions, which should include mitigation and adaptation strategies with fair burden sharing and measures. The time is not ripe for developing countries to take quantitative targets, as these would be counter-productive on their development processes." Responding to Indian PM's statement on "equal per Capita principle" German Chancellor Angela Merkel accepted that threshold countries will not be able to take up immediately the same responsibility and there will be a certain point on the time axis when the same per capita emission would be reached, for the industrialized nations would have reduced their per capita emissions and the threshold countries slowly increased their emissions. Thus the German Chancellor has endorsed the equal per capita principle and the approach on climate change based on convergence of per capita emissions originating in developing countries and industrialized countries. Such ideas should be developed further into practical and pragmatic strategies within the ambit of UNFCCC in accordance with the principle of common but differentiated responsibilities and respecting capabilities and specific national circumstances. It is also important that such solutions allow for developing countries to pursue accelerated economic and social development.

36. India is a partner to the new *Asia Pacific Partnership on Clean Development and Climate* which consists of some key developed and developing countries - Australia, China, Japan, South Korea and the USA besides India. It focuses on development, diffusion and transfer of clean and more efficient technologies and is consistent with the principles of the UNFCCC and complements the efforts under the UNFCCC and will not replace the Kyoto Protocol.

37. Climate change is usually discussed from the perspective of developed countries without linking it to developmental needs such as poverty, health, energy access and education. India has also been pressing at the UN Framework Convention on Climate Change (UNFCCC) and other international conferences for collaborative development of clean technologies and immediate transfer of existing technologies which are environment friendly. Often the Intellectual Property Rights (IPR) issue gains prominence as developed countries take a stance that most of the technologies in developed countries are in private hands and they do not have any control over them. India has also been trying to impress upon developed countries to transfer environmentally sound and cleaner energy technologies into the limited public domain for use by developing countries for early adoption, diffusion and deployment accompanied with transfer of financial resources. India had also called for early operationalization of the Adaptation Fund and Special Climate Change Fund under the UNFCCC for addressing Climate Change issues in the developing countries. The transfer of low carbon technologies to developing countries is central to tackling climate change. Governments in both developed and developing countries have a key role to play in facilitating technology transfer through both national and international initiatives. There is no "one policy fits all" solution to facilitating low carbon technology transfer. Relevant policy interventions vary according to the nature of the technology, its stage of commercial development and the political and economic characteristics of both supplier and recipient countries. Due to the early stage of development of many low carbon technologies, vertical technological transfer is as much an issue as horizontal technology transfer. In order to be sustainable, technology transfer must take place as part of a wider process of technological capacity building in developing countries. Recipient firms must take a strategic approach to acquiring knowledge and expertise as part of the technology transfer process. Improving firms' capacity to absorb new technologies is essential to enabling firms to take full advantage of new low carbon technologies. IPRs may be a necessary, but not sufficient requirement for successful technology transfer. New, internationally collaborative approaches to low carbon technology research and development may have an important role to play in overcoming IPR issues in future at the same time as contributing to building technological capacity in developing countries. Specific instances of IPR related barriers to acquisition of existing proprietary technologies should be addressed through dialogue on the basis of further work analyzing how other international funds and public/private initiatives have fostered technology transfer covered by IPRs.

38. The resources, including technology R&D and transfer, required globally for Adaptation seem to be of similar order of magnitude as for GHG Mitigation. Diversion of Multilateral Financial Institution (MFI) or Official Development Assistance (ODA) resources from economic growth and poverty alleviation in developing countries for Adaptation is not the answer. India believes that the better course would be to realize these resources from the entire carbon market, as is being done on a small scale from the 2 per cent levy on the CDM proceeds.

39. No efforts at GHG mitigation will succeed if patterns of production and consumption in developed countries remain grossly unsustainable. India believes that sustainable patterns of production and consumption are fully consistent with high living standards and human well-being. There are excellent examples of such practices throughout the world, including many in developing countries which have little to do with poverty. They range from re-cycling and re-use of materials, to

healthier diets, to efficient mass transport, to reduced and more biodegradable packaging, to automobile fuel efficiency, to sustainable construction materials and home design; the list is endless. These need to be catalogued and mainstreamed in all societies.

Indian proposal to counter climate change

40. India believes that uncompensated climate change mitigation by developing countries may hamper the speed of their economic growth. Also, that the poverty reduction efforts have to be addressed simultaneously when we discuss climate change mitigation process. India has suggested following measures to combat climate change:

- (i) There is a need to reach an agreement on IPRs on technologies necessary for mitigation efforts in developing countries paralleling the successful agreement on compulsory licensing of pharmaceuticals for addressing epidemic disease.
- (ii) Many needed technologies based on resource endowments of developing countries (e.g. biomass) do not yet exist, or are too expensive. Collaborative R&D between developing and developed country R&D institutions is necessary to address this gap. This may be done by a Venture Capital Fund, located in a multilateral financial institution, with the resulting IPRs being held by the Fund, and worked at concessional cost in developing countries and on commercial basis in developed countries.
- (iii) The CDM has largely proved its potential to promote sustainable development in developing countries, while helping developed countries accomplish their GHG abatement commitments at lower cost. It has to be clearly borne in mind that the success of the carbon market is critically dependant on the level of GHG abatement commitments by the developed countries. Further, the various imperfections in the CDM which contribute to the high transaction costs involved are now well recognized, and need to be addressed.
- (iv) Carbon Capture and Storage (CCS) technologies are often referred to as a “magic bullet” for addressing mitigation concerns. However, CCS technologies are not yet fully developed, and there are concerns about their safety, and efficacy, *i.e.* permanence of CO₂ storage. Moreover, they may involve significant additional costs. India is willing to work on CCS technologies in countries that are working on these technologies.

Part- IV Steps taken by the Government of India

41. India has a very comprehensive framework of legal and institutional mechanisms in the region to respond to the tremendous challenges to the environment it is facing, owing to population growth, poverty and illiteracy augmented by urbanization and industrial development. India is one of the leading developing country in so far as having incorporated into its Constitution

the specific provisions for environmental protection. Article **48A** of the Constitution of India provides that 'the State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country'. Similarly, Article **51A (g)** makes it obligatory for every citizen of India, 'to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures.' Despite the fact that India's contributions to greenhouse gas emissions are very small, the Government of India has taken many measures to improve the situation in this regard. India has initiated several climate-friendly measures, particularly in the area of renewable energy. It has one of the most active renewable energy programmes besides having a dedicated Ministry for non-conventional energy sources. India had adopted the National Environment Policy 2006, and has also taken many other measures and policy initiatives.

National Environment Policy

42. The principal objectives of the National Environment Policy are the following:-

- i) Conservation of Critical Environmental Resources
- ii) Intra-generational Equity: Livelihood Security for the Poor
- iii) Inter-generational Equity
- iv) Integration of Environmental Concerns in Economic and Social Development
- v) Efficiency in Environmental Resource Use
- vi) Environmental Governance
- vii) Enhancement of Resources for Environmental Conservation

Abatement of Pollution

43. There is a policy for abatement of pollution, which provides multi-pronged strategies in the form of regulations, agreements, fiscal incentives and other measures. Seventeen categories of heavily polluting industries have been identified. They are: cement, thermal power plant, distilleries, sugar, fertiliser, integrated iron and steel, oil refineries, pulp and paper, petrochemicals, pesticides, tanneries, basic drugs and pharmaceuticals, dye and dye intermediates, caustic soda, zinc smelter, copper smelter and aluminium smelter. Submission of an Environmental Statement by polluting units seeking consent either under the Water (Prevention and Control of Pollution) Act, 1974 or the Air (Prevention and Control of Pollution) Act, 1981 or both and the Authorisation under the Hazardous Wastes (Management and Handling) Rules, 1989 has been made mandatory under the Environment (Protection) Act, 1986.

Ozone Cell

44. As per its commitment to implement the Montreal Protocol and its Ozone Depleting Substances (ODS) phase out programme in India, the Ministry of Environment and Forests has set up the Ozone Cell as a national unit to look after and to render necessary service. The Ministry provides custom/excise duty exemption for ODS phase-out projects and grants duty exemption for new investments with non-ODS technologies. The Reserve Bank of India has issued

directions to all financial institutions and commercial banks not to finance new establishments with ODS technology. Licensing system is there to regulate import and export of ODS.

Environment Impact Assessment

45. India has a well-devised Environmental Impact Assessment (EIA) Programme for incorporating environmental concerns in development process and also in improved decision-making. The programme of EIA was initiated with the appraisal of River Valley Projects. The scope of appraisal was subsequently enlarged to cover other sectors like industry, thermal power, hydroelectric, nuclear mining, construction projects and infrastructure. EIA was made mandatory since January 1994 for thirty-two categories of development activities. To ensure transparency, the status of forest and environmental clearance has been brought out on the official website since February 1999.

Some specific Energy Sector initiatives

46. These are as follows:

- Introduction of CNG for public and private transport in metropolitan areas;
- Improving quality of transportation fuels;
- Raising share of public transport, building Delhi Metro and Metro in other cities like Bangalore.
- A major bio-diesel programme. Five per cent blending of ethanol in petrol – to increase in the next phase;
- Increasing forest and tree cover to 25 per cent by 2007 and 33 per cent by 2012;
- Electricity for all by 2012 – decentralized power based on local resources;
- Cleaner fuels for power generation. Raising thermal efficiency of coal plants;
- National programme on coal washing, in-situ coal gasification, Integrated Gasification Combined Cycle (IGCC), Coal bed and Mine-mouth methane and Hydrogen energy;
- 50,000 MW hydropower initiatives including over 50 per cent from Run of River Operation (ROR) projects to be accomplished by 2012.

47. India has historically been vulnerable to the vagaries of natural climate variability. India has, for many years, large nationally funded programs for reducing the adverse impacts due to the natural climate variability. These programs need to be extended and enhanced to cover the additional risks of climate change, through provision of financial resources and relevant technologies. Currently, several social sector and development schemes that emphasize on livelihood security, welfare of the weaker sections, and rural infrastructure are under implementation. It is estimated that the Government spent 2.6% of its GDP during 2006-07 on adaptation related activities to the existing climate variability. Some of the major schemes/policies significantly addressing adaptation objectives are as follows:

- Swarnajayanti Gram Swarozgar Yojana (rural self-employment program)

- Sampoorna Grameen Rozgar Yojana (comprehensive rural employment scheme)
- Pradhan Mantri Gram Sadak Yojana (Prime Minister's rural roads program)
- National Rural Health Mission
- Accelerated Rural Water Supply Programme
- Desert Development Programme
- Major and Medium Irrigation
- Sustainability of Dryland/Rainfed Farming System
- Disaster Management

48. The outcomes of all these initiatives are that there has been effective delinking of energy sector growth from economic growth; currently, the primary energy sector growth rate is around 3 per cent per year, against GDP growth exceeding 8 per cent. Steel, aluminium, fertilizer, paper, cement are some of the major energy intensive sectors where India's energy efficiency has attained the global standards. Especially in the cement sector, the energy efficiency of Indian plants is among the world's highest. The share of renewable energy in total primary energy is still at 34 per cent.

Other measures

49. India has had, over the last 55 years of economic development, major programmes addressing climate variability concerns. These include cyclone warning and protection, coastal protection, floods and drought control and relief, major and minor irrigation projects, control of malaria, food security measures, research on drought resistant crops, and several others. Further, in pursuance to the announcement made by the Finance Minister while presenting the Union Budget 2007-08, the Government has set up an "*Expert Committee on Impacts of Climate Change*" on 7 May 2007 under the chairmanship of Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India, to study the impacts of anthropogenic climate change on India and to identify the measures that India may have to take in the future in relation to addressing vulnerability to anthropogenic climate change impacts.

Recent steps

50. A Council has also been set up under the Chairmanship of the Prime Minister of India on 6 June 2007 constituting eminent persons to evolve a coordinated response to issues relating to climate change at the National level and provide oversight for formulation of action plans in the area of assessment.

51. Prime Minister on June 30th, 2008 released India's **National Action Plan on Climate Change**. The National Action Plan (see GOI, 2008) has been prepared under the guidance and direction of Prime Minister's Council on Climate Change. The National Action Plan reflects the importance the Government attaches to mobilizing our national energies to meet the challenge of climate change. The National Action Plan focuses attention on 8 priority National Missions. These are:

1. Solar Energy
2. Enhanced Energy Efficiency
3. Sustainable Habitat
4. Conserving Water
5. Sustaining the Himalayan Ecosystem
6. A "Green India"
7. Sustainable agriculture
8. Strategic Knowledge Platform for Climate Change

52. The National Mission of Solar Energy occupies a pre-eminent place in the National Plan. The Prime Minister has said that its success has the potential of transforming the face of India. The global dimension of the challenge of climate change, demands a global and cooperative effort on the basis of the principle of equity. According to the Prime Minister, India was ready to play its role as a responsible member of the international community and to make its own contribution. India believed that every citizen of this planet should have an equal share of the planetary atmospheric space and therefore, long-term convergence of per capita GHG emissions was the only equitable basis for a global agreement to tackle climate change. In this context, the Prime Minister reaffirmed India's pledge that as it pursued sustainable development, its per capita GHG emissions would not exceed the per capita GHG emissions of developed countries, despite our developmental imperatives. Prime Minister also clarified that the National Action Plan would evolve and change in the light of changing circumstances and therefore invited broader interaction with civil society as a means to further improve the various elements of the Plan.

Part-V: Future Response Strategy required for Climate Change in India

53. The most effective response strategy for climate change is poverty alleviation. Here, specific areas of concern include:

- Agriculture
- Water resources
- Health
- Coastal Zones
- Forests
- Extreme weather events

Measures for mitigating climate change

54. These are as follows:

- (i) Improving energy efficiency & conservation as well setting up a Bureau of Energy Efficiency
- (ii) Power sector reforms

- (iii) Promoting hydro and renewable energy
- (iv) Promotion of clean coal technologies
- (v) Coal washing & efficient utilization of coal
- (vi) Afforestation and conservation of forests
- (vii) Reduction of gas flaring
- (viii) Cleaner and lesser carbon intensive fuel for transport
- (ix) Encouraging Mass Rapid Transport systems
- (x) Environmental quality management and improving energy efficiency

Suggested course of action for mitigation

55. These are as follows:

- Intensify Current legal regime (“Energy Conservation Act”) and promotional programmes for supply/demand side energy efficiency.
- Intensify utility initiatives to promote energy efficiency actions by end users (Demand side management) especially in agriculture, domestic & commercial sectors.
- Undertake national/collaborative research programme in Mission Mode for advanced biomass based technologies – current sustainable biomass potential is C.500 million tonnes coal equivalent per annum.
- Further promote CDM implementation in PSUs, Central and States/UT Govt./Municipalities.
- Planning and Investment for Urban mass transport.
- Intensify afforestation for carbon sequestration.

Adaptation

56. India’s expenditure on adaptation as a percentage of total expenditure has suddenly increased from 4.16% in 2004-05 to 8.23% in 2005-06 and 10.62% in 2006-07 and as a percentage of GDP, it has suddenly increased from 0.88% in 2004-05 to 1.61% in 2005-06 and 2.17% in 2006-07. Major components of adaptation include:

- i. Crop improvement & research
- ii. Drought proofing & flood control
- iii. Health improvement and prevention of disease
- iv. Risk financing
- v. Disaster management
- vi. Forest conservation
- vii. Poverty alleviation and livelihood preservation

Suggested course of action for adaptation to climate change

57. These include the following:

- Intensify poverty alleviation, especially in regions prone to high climate variability and extreme weather events
- Intensify research into high yielding heat and drought resistant crop varieties and promote irrigation (local, regional, and national)
- Promote afforestation for hydrological benefits
- Intensify programs for known climate variability in all key sectors, including coastal management/cyclone protection

- Embody climate impacts concerns in all design codes for infrastructure projects

Part-VI: Important Issues in the context of Climate Change

1. Climate Change and Social Justice

58. Climate change is an issue of social justice, particularly in developing countries. If the world is to avoid disastrous climate change while at the same time reduce poverty, then developing countries will need access to low-carbon fuels. Currently, however, these countries lack plentiful supplies of cheap, 'clean' energy. Historically, both developed and developing countries have met the vast majority of their energy needs by burning fossil fuels. The transition to a low-carbon economy can be made, but it will be costly. Estimates suggest that it might cost an additional US\$30 billion per annum to de-carbonise power supplies in countries outside the OECD (Organisation for Economic Cooperation and Development). India's economy is growing at the rate of 9 per cent per annum and needs to grow at 9% plus in the medium term to lift people above poverty line and ensure decent standard of living to its people besides providing electricity to the large section of people still not having electricity. This would naturally lead to emission of GHGs. Estimates suggest that it will cost US\$130 billion simply to ensure that all Indian households enjoy access to electricity by 2030 – a cost that would rise if this power were to come from clean fuel sources.

59. Studies suggest that around 40 per cent of emissions growth will be caused by policies promoting universal electricity provisions, while transport emissions will account for just under 30 per cent of emissions growth. Coal will continue to account for at least 40 per cent of India's total energy supply, even if the provision of renewable energy is rapidly expanded. In the best-case scenario, in which renewable energy is expanded forty-fold, CO₂ emissions could rise from 1 billion tonnes per annum to 3.9 billion tonnes per annum by 2031/2. Under energy projections that assume an even higher rate of coal use, CO₂ emissions could rise to 5.5 billion tonnes per annum by 2031/2.

60. Calculations by the Indian government suggest that investment to reduce emissions by 550 MtCO₂ in the steel, cement and power sectors might cost US\$25 billion; this sum is similar to the Government's planned expenditure to meet its social development goals.

61. Tackling Climate Change raises significant questions of social justice. First in a profoundly unequal world, how much effort should each country contribute to the protection of the global atmosphere? Will there be another case of "Unequal Exchange?" Second what policy architecture and mechanisms can be devised to reach climate goals and who will pay for these policies? Third, will not further diversion of limited national resources from development and poverty alleviation to mitigation and adaptation affect GDP growth and poverty alleviation as it will impose large incremental investments under severe capital constraints?

62. Estimating the aid financing requirements for adaptation is inherently difficult. In the absence of detailed national assessments of climate change risks and

vulnerabilities, any assessment must remain a 'guesstimate'. HDR's 'guesstimate' is that by 2015 at least US\$44 billion will be required annually for 'climate proofing' development investments (2005 prices). Building human resilience is another priority area. Investments in social protection and wider human development strategies are needed to strengthen the capacity of vulnerable people to cope with risk. HDR's ballpark estimate is that at least US\$40 billion will be needed by 2015 to strengthen national strategies for poverty reduction in the face of climate change risks. To put this figure in context, it represents around 0.5 percent of projected 2015 GDP for low income and lower middle income countries. Provision for disaster and post-disaster recovery will also have to be strengthened as droughts, floods, storms and landslides pose greater threats. Provision of an additional US\$2 billion a year is implied by this estimate.

63. Responding to climate change will require the integration of adaptation into all aspects of policy development and planning for poverty reduction. However, planning and implementation capacity is limited. Some of the suggestions given in the HDR are the following:-

- *Information.* Many of the world's poorest countries lack the capacity and the resources to assess climate risks. In sub-Saharan Africa, high levels of rural poverty and dependence on rain-fed agriculture makes meteorological information an imperative for adaptation. However, the region has the world's lowest density of meteorological stations. In France, the meteorological budget amounts to US\$388 million annually, compared with just US\$2 million in Ethiopia. The 2005 G8 summit pledged action to strengthen Africa's meteorological monitoring capacity. Follow-up has fallen far short of the commitments made.

- *Infrastructure.* In climate change adaptation, as in other areas, prevention is better than cure. Every US\$1 invested in pre-disaster risk management in developing countries can prevent losses of US\$7. In Bangladesh, research among impoverished populations living on *char* islands shows that adaptation against flooding can strengthen livelihoods, even in extreme conditions. Many countries lack the financial resources required for infrastructural adaptation. Beyond disaster prevention, the development of community based infrastructure for water harvesting can reduce vulnerability and empower people to cope with climate risks. Partnerships between communities and local governments in Indian states such as Andhra Pradesh and Gujarat provide examples of what can be achieved.

- *Insurance for social protection.* Climate change is generating incremental risks in the lives of the poor. Social protection programmes can help people cope with those risks while expanding opportunities for employment, nutrition and education. In Ethiopia the Productive Safety Net Programme is an attempt to strengthen the capacity of poor households to cope with droughts without having to sacrifice opportunities for health and education. In Latin America conditional cash transfers have been widely used to support a wide range of human development goals, including the protection of basic capabilities during a sudden crisis. In southern Africa cash transfers have been used during droughts to protect long-run productive capacity. While social protection figures only marginally in current climate change adaptation strategies, it has the potential to create large human development returns.

64. India has yet to draw up programs aimed exclusively at addressing critical vulnerabilities to climate change. In other words, India does not implement any adaptation schemes, per se, but has made substantial efforts to integrate adaptation into development schemes as stated in Part V of this paper. Currently, several social sector development schemes that emphasize livelihood security, well-being of the weaker sections of society, and rural infrastructure are under implementation. In many ways, these programs reflect the short-term and long-term goals of adaptation.

65. While formulating adaptive measures to Climate Change, Indian policy makers should keep the principal goal of poverty alleviation and social justice in mind. There is also a need to see how far have we achieved the Millennium Development Goals (MDGs) with respect to climate change. There is a need to see that the countries not fulfilling the present ODA commitment of 0.7 percent should fulfil it for development purpose besides committing a higher percentage for climate change mitigation. Existing ODA commitments for Poverty alleviation and Development should not be diverted to climate change purpose. This needs to be emphasised in international negotiations.

66. Per capita GHG emissions of countries during high growth should also be compared. Since in medium term, growth of India can be sustained and in long term it may also decline, this argument should be put forth in international negotiations on climate change.

67. There is also an important issue of uniformity in distribution of energy consumption/emission per capita argument to be tenable. According to an estimate by Greenpeace, the top 1 percent of our population in India has emissions which are 4.5 times that of the bottom 38 percent. There is need for a plan of tempering of energy consumption by the affluent and an efficient increase in energy consumption of the impoverished(see Agarwala, 2008).

2. Funding by International Financial Institutions(IFIs)

68. The World Bank is setting up the following three new investment funds/programmes as multi donor financing instruments to finance climate change initiatives in the developing countries:

- The Clean Technology Fund (about \$4-5Bn)
- The Strategic Climate Fund (about \$300-500 M), and
- The Pilot Programme for Climate Resilience (about \$300-500M)

The present initiative is to make available financing for solutions to meet the challenges of climate change and reduce poverty in the developing countries. The portfolio of funds will make available a range of new financing, credit enhancement and risk management tools such as loans, credits, guarantees, grants and other support, targeted to the needs of developing countries. This strategic response will be implemented by the Multilateral Development Banks(MDBs) in collaboration with other relevant partners and will focus on accelerating and scaling up low carbon and climate resilient investments. Over the next few months, the programmatic and operational guidelines for the portfolio of funds/programmes will be developed in consultation with donor and recipient countries and interested stakeholders. Governance of a fund/programme would be exercised through a Trust Fund

Committee. It is proposed that donor countries or groups of donor countries will be represented in the Trust Fund Committee. The recipient countries would be involved in the funds at four levels; (1) at the country level, (2) at the MDB Boards, (3) a Partnership Forum, and (4) at tailor-made governance structure (Trust Fund Committees) for each fund or programme.

69. Regional Development Banks (RDBs) like Asian Development Bank (ADB), European Bank for Reconstruction & Development (EBRD) and African Development Bank (AfDB) along with the World Bank Group (WBG) have joined forces to establish a portfolio of Climate Investment Funds (CIF) to complement, build upon and enhance the activities of other existing instruments, like the Global Environment Facility (GEF). These are a) Strategic Climate Fund and b) Clean Technology Fund. Similarly, Inter American Development Bank (IADB)'s, Sustainable Energy and Climate Change Initiative (SECCI) was launched in November 2006. Two new funds were created, the first one with US\$20 million of IADB resources initially, and a multi-donor fund. The purpose of these funds is to promote renewable energy and energy efficiency, bio-fuel development, increasing access to carbon finance and adaptation to climate change. EBRD also has the Sustainable Energy Efficiency Initiative. However, the role of IFIs in the context of Climate Change for India needs to be examined. There are concerns that multilateral financial institutions, being largely donor-driven, would be encouraged to bring in climate-related conditionalities even for their normal lending programmes. India also need to be vigilant in this regard, especially at the World Bank and other IFIs as this could affect development finance.

70. Department for International Development (DFID) with the support of the World Bank has prepared a paper on the Transformation Fund for Sustainable Development (TFSD). TFSD is the World Bank's response to the Government of UK's call for innovative ideas on how to support developing countries respond to climate change. It is stated that UK would draw on upto \$800 million of resources through their Environmental Transformation Fund – International Window which is jointly managed by DFID and Department for Environment, Food and Rural Affairs (DEFRA) to help capitalize this fund. This fund would finance development risk associated with climate change and to be able to support the transformational opportunities, particularly on mitigation. It is stated that this is a multilateral response and it is hoped that this would be supported further by a range of donors and not limited only to UK.

71. In the context of the Asian Development Bank (ADB's) Board paper on Clean Energy Financing Partnership Facility (CEFPPF), there are issues like setting up of (i) Technology Transfer Fund (TTF) to provide grant to bridge viability gap in making available clean energy technologies so that the unit cost of electricity produced from clean energy sources becomes affordable and on par with the cost of electricity from conventional sources; (ii) Utilisation of energy present in the municipal solid waste (MSW) and Grid-connected centralised power generation through solar photovoltaics (SPV) etc. ADB has approved a technical assistance (TA) of US\$100,000 for the Power Finance Corporation. The TA aims to assist state utilities in preparing CDM-eligible energy efficiency projects in the thermal and hydropower generation sector which will enhance efficiency rates and reduce GHG emission of the existing power plants and in replacing old units with more efficient new units.

72. There are also proposals for consolidating various initiatives of IFIs in India on energy efficiency, renewable energy and climate change as a new paradigm for clean energy in the context of global warming in place of getting them piece-meal. There is a need to examine the appropriateness of such proposals as it could lead to clubbing of developmental goals with climate change initiatives and diversion to Climate Change purpose of funds hitherto given for developmental purpose and meeting MDGs. A better option is probably to consolidate efforts only of those related to climate change and leave the ones where there is overlapping, as it is.

3. Carbon Trading

73. The carbon market in India has evolved quietly over the past few years to where it is now. The Ministry of Food & Civil Supplies has notified carbon credits as a commodity permissible for futures trading under the FCRA, and MCX has already started offering futures on carbon credits. Globally, carbon trading has grown rapidly from 100 million tonnes of CO₂ (valued at a bit under EURO 1 bn) in 2005 to 2,400 million tonnes, valued at over EURO 25 bn. The market is expected to continue to grow rapidly over the next few years. Carbon trading is mandated under the Kyoto Protocol that was signed in 1997 by 156 countries; of these, 25 developed countries (in Europe, Japan and Canada) agreed to reduce their aggregate carbon emissions to 5.2% below 1990 levels by 2012. Under its terms, limits are imposed on countries in terms of the GHG emissions it can generate. In turn countries impose limits on businesses. Countries (and companies within those countries) are permitted a maximum amount of carbon emissions, called European Union Allowances (EUAs) in Europe. Countries (or companies within those countries) that were unable to achieve these reductions could buy “carbon credits” from surplus companies in either developed or developing countries, or pay a penalty. Projects in developing countries can be registered under the Clean Development Mechanism (CDM), which entitles them to credits, called Certified Emission Reductions (CERs), which could be sold in the market. This has created the essential framework for trading in Carbon Credit. Prices of CERs rule substantially lower than the price of EUAs, which are traded on several European exchanges, even though each credit represents an identical amount of CO₂ emissions; nonetheless, there is a strong correlation between the prices of the two credits. The price of EUAs is subject to the iron laws of supply and demand (melted occasionally by regulatory fiat). Supply of credits is dependent on the allocation made at the start of each Phase of the Kyoto Protocol and the number of low carbon projects coming on stream. Demand is dependent on a variety of factors, notably including economic growth, weather patterns and the price of fuels. It is believed that prices of EUAs, which have recently corrected to below EUR 20 as a result of the equity meltdown, will remain well bid for the remaining period of Phase 2 (2008-2012), with volatility increasing after the US elections in 2009 (*Mecklai Financial and Commercial Services Ltd, 2008*).

74. Carbon credit trading has its own problems for the developing countries. When the main element (Carbon) associated with Climate Change is available for trading then it may not deliver the desired results. It could result in the exploitation of developing countries who fail to get the deserved price for projects taken with the intention of carbon emission reduction while the emitters of carbon (developed

countries) may get away with increased emission levels. Instead of viewing Climate Change as simply the biggest challenge that has ever confronted humanity, trading in carbon credits may amount to business as usual.

75. India's CDM potential represents a significant component of the global CDM market. As on 31 January, 2008, 309 out of 918 projects registered by the CDM Executive Board are from India, which is so far the highest from any country in the world. The vigorous project development activity in the country has propelled India to become the most favourable destination for CDM investments. The National CDM Authority has accorded Host Country Approval to more than 1000 projects. These projects are likely to facilitate an investment of more than Rs. 117,800 crore in the country. These projects are in the sectors of energy efficiency, fuel switching, industrial processes, municipal solid waste and forestry. If all these projects get registered by the CDM Executive board, they have the potential to generate 506 million CERs by 2012. At a conservative price of US \$10 per CER, it corresponds to an overall inflow of approximately US \$ 5 billion into the country by 2012. About 355 out of a total of 1133 projects registered by the CDM Executive Board are from India, which is so far the highest by any country in the world.

76. While India leads the world in terms of number of CDM projects, it has fallen to second place compared to China in CERs of the projects. This is because China has focused on large projects, whereas most Indian projects individually produce few CERs. However, the number of CERs that Indian projects could generate is still substantial. Even so, its role in the carbon market will depend on the quality of its projects and the ability of the project promoters to understand the carbon market trends and close deals quickly. Besides, the Kyoto Protocol expires in 2012, and international talks have already begun to decide the shape of a new treaty that will succeed it.

77. One issue that needs to be examined is why prices of CERs for which developing countries are eligible are lower than EUA's. One explanation given is that CERs are on non-guarantee basis, while EUA's have government backing. So the price difference. However, this may not be the complete answer.

4. Carbon Tax and Emissions Trading

78. Under carbon tax, all fuel consumed would be taxed at a rate proportionate to the carbon content of the fuel. This would encourage use of solar energy and low-carbon fuels, and discourage the use of coal and other high carbon fuels. If the tax were set at the right level, the appropriate reductions of CO₂ emissions from fuel combustion would be achieved. There are also suggestions that for climate change what matters is the stock of GHG and not just flow. So the concept of carbon tax should be applied to the stock and not just the flow. All countries developed and developing should agree to pay a service charge on their carbon debt and those funds should be used for carbon saving wherever the most efficient opportunities are available. Since developed countries are responsible for about 70% of the stock of greenhouse gases, most of the contributions will have to come from the developed countries. India has not been supporting carbon tax as it is not considered as an appropriate instrument to address the issue of Climate Change since it does not

consider India's national endowment, adverse impact on development programmes and poverty alleviation efforts due to high fuel prices, etc.

79. We also need to beware of attempts like the recent initiative by US Government to pressurize countries like India to adopt emission reductions. For example, the bill to set up a cap-and-trade system to limit climate-warming carbon emissions aimed at cutting total US global warming emissions by 66 per cent by 2050. For India it could be dangerous to accept any limits through Carbon Tax (as it would push gas prices and oil prices to record levels, and this would have a domino effect and push up the cost of everything we buy, sell, or trade. The cost of food, services and even goods we export would also rise) or through Cap-trade mechanism (which has already failed in EU) as India's growth rate of CO2 emissions is low compared to Developed Countries and any such acceptance will jeopardise the growth of the country. There is also a need to examine whether carbon tax is a better option than Emissions Trading for developed countries and the latter for developing countries like India.

5. Dedicated Global Fund and Domestic Venture Capital Fund

80. India has proposed a dedicated global fund at the G8 Outreach Summit on 6th June 2007 at Berlin to finance the development of clean energy technologies based on the resources available with the developing world. Technologies to tap energy resources like biomass can be financed by a venture capital fund located with multilateral financing institutions, which will also have the right to intellectual property. The technologies so developed may then be given to developing countries at cost, while the rich nations can access them on a commercial basis. The Asia-Pacific Partnership on Clean Development and Climate has numerous examples on this approach. Countries like US are also keen to establish a Clean Development Fund. India has recently proposed to set up an India-ASEAN Green Fund with an initial contribution of US\$ 5 million for pilot projects to promote adaptation and mitigation technologies, in addition to the setting up of an India-ASEAN Network on Climate Change that would pool and share expertise, exchange best practices and submit recommendations for common positions taking into account national priorities. There is a need to ensure that these initiatives do not lead to imposition of additional burden on the developing countries both in terms of initial investment cost and recurring costs of service.

81. The other issue that needs to be addressed is the treatment of Carbon credits under Clean Development Mechanism for projects supported under this Fund. Other financial institutions and banks are also considering similar carbon funds, on the expectation that the carbon market will witness a huge upside in terms of valuations.

82. Venture capital firms are making a beeline to set up exclusive carbon funds for clean development projects (CDM) which have the potential to generate carbon credits. Kick-starting the process is IFCI Venture Capital Fund, which is planning to float Green India Venture Fund with a corpus of around euro 50 million, to begin with. The fund could be raised to euro 100 million once a partner is roped in. The

fund will scout for viable CDM projects which could generate a good amount of carbon credits.

83. While a Global Fund is important to address this global problem, countries should also set up domestic funds for this purpose. It is in the above backdrop that Prime Minister's Council on Climate Change in its meeting held on 13th July 2007 suggested setting up a domestic venture capital fund to study the impact of climate change and suggest mitigation models and promote green technologies. It will be pooled from different stakeholders in the fields of agriculture, science and technology and environment including contribution from the private sector that could gain from climate change mitigation methods. The fund is proposed probably because the government feels research on climate change impact in India is not adequate. All estimates of climate change impact are based on models and lack scientific assessment. Through this fund it may be possible to create a pool of scientists to do specific studies on impact of climate change in agriculture and food security, water availability, coastal regions and disaster preparedness. In the meeting of the council held in October 2007, it was decided that the fund will be created with small contribution by the Government and major part of funding by private funds through organisations such as FICCI, CII, ASSOCHAM etc. There is a need for early take off of the proposed domestic venture capital fund and its effective utilisation.

6. Reforming Energy Sector

84. Energy sector reforms can help in addressing climate change impact in a big way. Some suggestions in this context for India are as follows:

- Remove entry barriers and raise competition in exploration, extraction, conversion, transmission & distribution of primary and secondary energy including coal mining.
- Institute price reform with full competition at point of sale
- Augment and diversify energy option, sources and energy infrastructure along with tax reforms to promote optimal fuel choices.
- Strengthen or introduce independent regulation.
- Force conservation & restrict demand growth through high energy taxes.
- Promote hydro, nuclear and renewable energy and have an appropriate energy mix. Nuclear energy which is clean energy is the best possible solution. In fact, in countries like U.S. and France, this is the major source of energy.
- Promote clean coal technologies.
- Improve highways, build mass transit & freight corridors for energy efficiency.
- Promote less carbon intensive fuel for transport.
- Standards, labelling & bench marking for energy efficiency and enforcing environmental quality management.
- Removal of energy subsidies, suggested by some is a larger issue for which growth and developmental needs have to be taken into account.

7. Trade and Investment and Climate Change

85. HDR states that international trade could play a much larger role in expanding markets for alternative fuels. Brazil is more efficient than either the European Union or the United States in producing ethanol. Moreover, sugar-based ethanol is more

efficient at cutting carbon emissions. The problem is that imports of Brazilian ethanol are restricted by high import tariffs in countries like the U.S. Removing these tariffs would generate gains not just for Brazil, but for climate change mitigation. However, there is a need to see whether this is also causing food shortage as some western countries are also using corn and edible oilseeds for bio-fuel production. There is also a need to explore the potential for trade in environmental goods and services and FDI in such ventures as studies show that the global environment industry has been growing at 14% since 1996 and estimated to reach US\$60 billion by 2010 with 90% of market share in developed countries. In the case of nuclear energy more than any provisions in the treaty, if some amount of foreign investment is involved, there are greater chances of assured and continuous nuclear supply.

86. Many Non Tariff Barriers (NTBs) are environment related. Removal of tariff barriers can be done for clean technologies and pollution abatement techniques as is being done by India. While examining the possibility of higher tariffs for polluting items the growth and development angle should be taken note of. Some developed countries have raised the issue of trade competitiveness in the context of sectoral approach. India needs to monitor these trends carefully, especially at WTO with regard to trade in environmental goods and services. Environment has not been included in WTO negotiations at present and we have to guard against this making an entry through the back door in the form of climate change negotiations in international institutions.

8. Climate Change and Intellectual Property Rights

87. Another challenge is to ensure that low-carbon technology is transferred from industrial countries to India and other developing countries. Restrictive intellectual property rights (IPR) arrangements can prevent the transfer of low-carbon technologies. So there is a need to seek a regime that permits access to available low carbon technologies and IPRs on concessional terms. Collaborative research could also help in this respect.

88. International collaborative research and development programmes would have the benefit of transferring intellectual property in terms of knowledge and technological capacity. A global research alliance could be established as a way of linking development objectives with the current, commercially driven IPR framework. A strong precedent for international collaboration on R&D was set by the Consultative Group on International Agricultural research. Created in 1971, by the UN and the World Bank, it now has more than 8500 scientists working in more than 100 countries, drawing together the work of national, international and private sector organisations.

9. Eco-labeling

89. Eco-labelling is one of the important policy tools available for environment protection. The practice of supplying information on the environmental characteristics of a commodity to the consumers is called eco-labelling. Eco-labelling schemes tries to inform consumers 'fully' about the product they purchase, not only with regard to the commodities' direct impact on the consumers' lives, but also with regard to the impact of production process on the environment in general. The International Organisation for Standardisation (ISO) has identified three broad types of voluntary labels, with eco-labelling falling under the Type I category. These

are voluntary labels awarded by third parties (not the producers or industry associations) based on life-cycle-considerations. They are awarded to inform the consumer the overall environmental friendliness of a product. Most of the environment labels in operation at the moment are Type I labels. The awarding agency may be an impartial, private or government organization. Type II labels are informative self-declaration claims by producers about the environmental friendliness of the products. The labels may announce that the product is energy-efficient or it does not use ozone-depleting substances, and so on. Type III labels provide quantified information, using an agreed set of parameters. The label gives selected data about the environmental impacts of the product, based on a life-cycle-analysis, without making any judgement about the desirability of one impact relative to another. Such schemes are developed and managed by third parties.

90. As part of an effort to improve environmental quality and to increase environmental awareness among the industries and consumers, the Indian Parliament initiated a voluntary eco-labelling programme known as the EcoMark in February 1991. The EcoMark is a government operated seal-of-approval programme for environmentally preferable consumer products. The Ministry of Environment and Forests (MoEF), with the technical advice of the Central Pollution Control Board (CPCB), manages the programme. Unlike many other international eco-labelling programmes that are independent, India's EcoMark is tied with product quality standards of the Bureau of Indian Standards (BIS). In order to be EcoMark certified, products must meet these product quality standards, as well as product-specific environmental criteria set by the EcoMark programme. In meeting EcoMark requirements, manufacturers will also have the BIS quality standards label on their products.

91. Effective implementation and encouragement to eco-labelling is needed as this can help in easily marketing many of the Indian products in foreign markets. It can also help in avoiding the NTBs due to Environmental factors which are on the rise in recent years.

10. Bio fuels and Climate Change

92. There are a wide range of different types of bio-fuels, but the most common products are bio-ethanol and biodiesel, made from crops including corn, sugar-cane and rapeseed. Bio-ethanol is made by using yeast fermentation to produce ethanol from crops such as sugar-cane and corn, while biodiesel is made by chemically processing oilseeds. Both products can be used either neat or mixed with petrol/diesel.

93. Global production of bio-fuels has grown very rapidly in the last few years, reaching 51 billion litres of bio-ethanol and 6 billion litres of biodiesel in 2006. Many countries are involved in bio-fuels production, with the US and Brazil accounting for the vast majority of total world ethanol production, and Germany and the US leading biodiesel production. It is likely that production will continue to grow quickly in years to come if current policies continue. For example, the IEA estimates that current bio-fuels policies could lead to an increase in the share of bio-fuels in global transport, from just over 1% today to 3% by 2030.

94. In view of the potential benefits, many countries are providing strong policy support to bio-fuels. A number of countries have established guaranteed markets by setting national targets, although the reasons for these targets vary greatly. For example, the EU has a target for 5.75% bio-fuels as a share of overall EU petrol and diesel consumption by 2010, and 10% by 2020 subject to effective sustainability criteria and the commercial availability of second generation bio-fuels. The US has mandated the use of 28.4 billion litres of bio-fuels by 2012 to ensure fuel security and similarly Brazil has a target of 5% for the proportion of biodiesel in diesel by 2013. Other policy mechanisms to promote bio-fuels include taxes, direct support (such as grants, loan guarantees and subsidies) and R&D.

95. Indian Government has directed that 5 percent ethanol blended with petrol, as per Bureau of Indian Standards specifications, shall be sold in 10 States and 3 Union Territories if the price of sourcing indigenous ethanol for supply of ethanol-blended petrol is comparable to the price of indigenous ethanol for alternative uses, and the delivery price of ethanol at the location is comparable to the import parity price of petrol at that location and the indigenous ethanol industry is able to maintain the availability of ethanol for ethanol-blended petrol programme at such prices. A recent amendment to sugarcane control order, 1966 allows production of ethanol directly from sugarcane juice or from molasses. Final decision has not been taken on enhancing mandatory ethanol blending with petrol from 5 percent to 10 percent.

96. There is an important issue of food security vs. energy security. Food security could be linked to bio-fuels development because bio-fuels compete with food crops for land. International organizations such as the World Bank, the IMF and the Global Bio-energy Partnership believe that bio-fuels have contributed to food price rises (particularly of grains). An alternative perspective is that increased demand for bio-fuels has only contributed marginally to higher food prices, as food items used for bio-fuel production still constitute only a negligible percentage of total food production worldwide. For instance, sugar cane cultivation accounts for 20 million hectares or 1.3 percent of the world's 1.5 billion hectares of current agricultural land. In the future, increased bio-fuel production need not lead to food price increases, as many countries have land suitable for bio-fuels development.

97. The linkage between food crisis and use of bio-fuels needs to be examined carefully. Use of corn and oil seeds for ethanol can cause food shortage. However, India can think of using sugarcane for bio-fuels. Brazil has the technology to produce ethanol from sugarcane without increasing the cultivated land for sugar and without affecting sugar production. We need to examine this possibility given the sugarcane cycles of India with excess in some years and shortage in some others. While efforts should be made to use uncultivated land for bio fuel production, the cheap land available in foreign countries like Latin American and African countries can be purchased or obtained under long term lease for cultivation of bio-fuel items. Inflation due to higher energy prices caused by adopting cleaner fuels(including non-biofuels) and other technology for climate change purpose also needs to be considered while taking policy decisions on bio-fuels. There is also need for clarity in the definition of wasteland and who controls it in view of the possibility of Government promoting cultivation of biofuel crops on such land. This is in view of the fact that there is no land grabbing by corporate under the garb of bio-fuel plantation(Dey,2008).

Part-VII: Some Internal Reforms including some Suggestions for 13th Finance Commission

98. Some suggestions in this context are the following:

- The transfer of low carbon technologies for use in different States after adapting to local needs and conditions is central to tackling climate change. Central/State Governments have a role to play in facilitating such technology transfer. This aspect could also be taken into account while deciding horizontal and vertical distribution of financial resources. In other words, those States which acquire low carbon technologies through foreign collaborations or in-house R&D and where industry based upon such technologies are located should be provided additional resources as an incentive to continue these efforts and set precedent for other States to emulate. An index could be developed to grade the States on this account and aggregate resources distributed on that basis. The inclusion of this indicator in the formula for devolution can give the right signal of the intent of the Government. GHG abatement technologies and adaption related technologies relevant to developing countries do not exist or are still high cost. So public private partnership could be explored for R&D effort in this area.
- Sustainable patterns of production and consumption are fully consistent with high living standards and human well-being. There are excellent examples of such practices throughout the world, ranging from re-cycling and re-use of materials, to healthier diets, to efficient mass transport, to reduced and more biodegradable packaging, to automobile fuel efficiency, to sustainable construction materials and home design; the list is endless. These need to be catalogued and mainstreamed in all States. Moreover, incentives in the form of additional resources can be given to States for use of more sustainable patterns of production/consumption. For this purpose, a system of ranking states could be thought of. This could also include afforestation efforts made in States.
- Utilisation of energy present in the municipal solid waste (MSW) and Grid-connected centralised power generation through solar photovoltaics (SPV) needs to be explored. Harnessing clean energy potential of the country with a view to make an impact on clean energy program of the country needs to be explored with proper incentive system.
- Financing challenges of climate change need to be addressed also by judicious balancing of growth and environment objectives with a mix of fiscal policies both incentives and disincentives and public policy formulation covering the sectors that are major emitters. Both public and private finance are essential for adaptation, for technology transfer and to implement successfully any comprehensive and long-term strategy to combat climate change. States can also be motivated in this direction.
- India has taken significant steps to meet the challenge which includes several adaptation oriented strategies such as breeding new plant species and crops which are more tolerant to changed climate, afforestation, effective disaster management, livelihood preservation through income diversification,

provision of risk financing/ insurance that provides extension of credit to farmers especially in instances of crop failure due to climate variability. The incremental cost of adaptation measures could be raised from the same sector or State/region that is causing GHGs, provided growth and development is not greatly affected by it.

- Similarly, for mitigation measures, since it is difficult to expect voluntary compliance of standards even if set, penal provisions for violation of emissions standards has to be provided. Old and inefficient technologies has to be phased out. A fund collected through taxation could be set up to meet the cost of mitigation and unmet incremental cost of adaptation. The sectors with highest contribution of emission levels are power, transport, buildings etc. CO₂ Emissions reduction potential is about 550 million tonnes during 2012-17 and the highest emissions reduction potential is in the power sector (309 MT). India's cement and steel sectors are closer to international emission norms as reflected by their lower reduction potential. While sectors with higher contribution to emission have to be targeted, care should be taken to see that this does not impose undue costs on core sectors with forward linkages. Motivation of State Governments in this direction is necessary.
- Grants maybe provided to States for promoting solar and other renewable energy sources. These grants could also cover areas like management of municipal solid waste as also water resources, both surface and groundwater. A system of ranking of the States on these indicators could be formulated and grants could be linked to this ranking as an incentive scheme. Grants could also be thought of for States to empower local communities to suitably manage ecological resources, forestation and conservation of bio-diversity.
- A uniformly high tax needs to be imposed on vehicles with low fuel efficiency so that they are gradually phased out. Such tax should be progressively lowered with increase in fuel efficiency. States need to be directed/incentivised to impose such taxes. Public transport system should be promoted and States having better system (and as a corollary, lesser dependence on private transport) should be rewarded. Vehicles beyond 15 years cause greater pollution and need to be banned. Suitable environment friendly technologies for appropriate disposal of such vehicles need to be developed and put in place in States. States not cooperating in these areas should be penalised.
- Companies/industries whose carbon emissions are high should be penalised and those with energy savings as certified by a market mechanism need to be rewarded. In consumption activity, use of cement, brick, iron and steel etc. with high carbon emissions need to be replaced with alternate materials providing similar strength through appropriate R& D and system of incentives.
- Proper pricing of water and power to its consumers by States, including farmers needs to be rewarded. Both, technical and non-technical T&D losses need to be reduced.
- Grants need also to be provided to States for building bicycle tracks/lanes in metro cities/ towns in order to decongest them of cars which will help in fuel savings and also reduce carbon emission. At the same time, bio-fuels particularly through sugarcane waste should be incentivised, though not at the cost of food security. Similarly, use of compact fluorescent lamps (CFLs) should be incentivised.
- The PM's council on climate change has also recognized the importance of

solar energy. Use of solar energy in States can be promoted by giving grant-in aid for development of this source for energy requirements.

- Cultivation of trees for commercial purpose even in farms/estates should be encouraged and archaic laws related to felling of specific types of tree and the related permit raj which are disincentives for cultivation of trees should be removed. Some State Governments have allowed the Backward classes/tribes to cultivate coconut trees on specific Government land on the banks of canals and the produce of this cultivation can be taken by cultivators though they do not own the land. Similar schemes can be devised to make Van-Mahotsava a reality.
- India's Service sector is dominant in GDP. So effect of GHG emissions is relatively less unlike China with higher manufactures in its GDP. Hence, there is a need to see how the calculations are done of future emissions. Services led growth is also environment friendly growth. This needs to be considered while making internal reforms related to climate change. This can be used as a powerful argument in our negotiations regarding GHG emissions.
- Regarding financial aspects, judicious use of international funds for climate change should be made as suggested earlier. Insurance against risks is another method. Insurance pools the burden of climate risks. We can examine developing public/private risk transfer programmes, e.g., Mongolia Index-Based Livestock Insurance, Mexico Catastrophe Bond, Caribbean Catastrophe Risk Insurance Facility.
- There are also many financial instruments which can be made use of Carbon pricing allows financial institutions to evolve next generation of carbon-related products for investors. Some of these are as follows:
 - Carbon Markets: Structured emission products, carbon funds, emission price indexes, EUA/CER swaps, voluntary credits, avoided deforestation/REDD, synthetic portfolios, carbon securitization
 - Equities: Portfolio screening, SRI (Socially Responsible Investment) funds, Low-carbon technology stocks, index products
 - Bonds: Portfolio screening, forestry bonds
 - Private Equity/Venture Capital: Carbon venture capital, carbon-driven principal investing
 - Real Estate: Energy efficiency/green building real estate investment trusts
 - Hedging Instruments: Weather derivative products, catastrophe bonds, insurance products.
- Since the role of the Finance Ministry in climate change negotiations will be important in the future, the Ministries of Finance of Developing countries should participate in meetings and conferences on climate change related to Finance and Economic Development. Non-participation could tilt the balance of discussions and outcomes. It can also help the Finance Ministries in fine-tuning their views, positions and negotiating skills. It can also help in coalition building and looking at climate change from the economic and financial angle including revenue & expenditure implications.
- There is also need to examine further and fine-tune our strategy like equating per capita emissions, using the relatively more clean 'service sector' argument in our negotiations.

Part –VIII: Conclusion

99. In conclusion, it is important for us to stick to the principle of common but differentiated responsibility in our negotiations and to take forward the concept of equalising per capita emissions of countries proposed by the Prime Minister of India. At the same time, we should be tactfully showcasing our efforts to conserve use of fossil fuels and reducing GHG emissions. We should clearly show that India cannot be clubbed with three big polluters including China. While all possible mitigation and adaptation measures should be considered by us, there is also a need to see that the climate change issue is not overplayed as cautioned by UNDP. The HDR Report 2007/2008 of UNDP has also warned that “climate change will undermine international efforts to combat poverty..... Climate change is hampering efforts to deliver the MDG promise.Looking to the future, the danger is that it may stall and then reverse progress built up over generations not just in cutting extreme poverty but also in health, nutrition, education and other areas”. This danger needs to be guarded against with full commitment and zeal.

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