CLIMATE CHANGE—NATIONAL AND INTERNATIONAL SCENARIO

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Climate change has emerged as one of the most serious challenges. Large dimensions of the problem and the seriousness of its impact have shaken the entire humanity. Global warming, rising of sea levels, high level of pollution, erratic rainfall patterns are just a few manifestations of climate change. Attempts have been made both at the national and international levels to restrict the ill-effects of climate change. The United Nations Framework Connection on Climate Change in 1992, the Kyoto Protocol of 1997 and the Bali Action Plan of 2007 are significant steps in this direction.

India's per capita GHG emission (2.33t CO_{2e}) is 1/3 of the world average (6.76) and is very low compared to developed countries, as well as, many of the devoloping countries.

Around 55 per cent of India's population still does not have access to commercial energy. In the energy sector, some of the specific initiatives taken by India include introduction of Compressed Natural Gas (CNG) for public and private transport in metropolitan areas. A great emphasis has also been laid on the development of alternate fuel, namely hydrogen and biofuel. Recently, a decision has been taken to promote desert as a hub for renewable energy by establishing a Solar City in the Thar desert area. Besides, steel, aluminium, fertilisers, paper, cement are some of the major energy-intensive sectors where India's energy efficiency has attained the global standards.

India formulated the National Action Plan on Climate Change in 2008. India introduced specific policies that target at conservation of rivers, improvement of urban air quality, enhanced afforestation and a significant increase in the installed capacity of renewable energy technologies. India has enacted the Energy Conservation Act and notified the Energy Efficiency Code for new commercial buildings. India has also launched the 'Green India' project that will be the world's largest afforestation project covering six million hectares of degraded forestland. Latest Green Index taken out by the 'National Geographic' puts India as the No. 1 country in the world on a Green Index.

Climate change a global environmental problem, is primarily caused by the building up of green house gases (GHG), eg., carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2) and others in the atmosphere. Climate change is one of the all-encompassing global environmental changes having deleterious effects on natural and human systems, economies and infrastructure. The risks associated with it call for a broad spectrum of policy responses and strategies at all levels — local, regional, national and global.

Climate change is a serious global environmental phenomenon, which has been viewed with concern in international academic and scientific circles for many decades, particularly because of the adverse impacts that anthropogenic climate change may have on various sectors of society, ecosystem and economy. Of late, it has received high degree of attention at political levels because of its

implications for energy security and ecologically sustainable development.

Climate change is primarily caused by the building up of greenhouse gases in the atmosphere. According to the Intergovernmental Panel on Climate Change (IPCC), the global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750, and have now far exceeded the pre-industrial values. The global increase in carbon dioxide concentration is primarily due to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture.

According to the Intergovernmental Panel on Climate Change (IPCC), the enhanced greenhouse effect will result in additional warming of the Earth's surface. The Fourth Assessment Report of 2007 of the Working Group III of the IPCC states that Global Greenhouse Gas (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.

Impact of Global Warming

The Fourth Assessment Report of the IPCC submitted in 2007 has stated 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. The Report predicts that there would be enlargement and increased number of glacial lakes and increasing ground instability in permafrost regions, and rock avalanches in mountain regions. Effects of temperature increase have also been documented in some aspects of human health, such as heat-related mortality in Europe, infectious disease vectors in some areas, and allergenic pollen in Northern Hemisphere high and mid-latitudes. Settlements in the mountain regions are at enhanced risk to glacier lake outburst floods caused by the melting glaciers. Sea-level rise and human development are together contributing to losses of coastal wetlands and mangroves and increasing damage from coastal flooding in many areas. Increases in the frequency of droughts and floods are projected to affect local production negatively, especially in subsistence sectors at low latitudes. Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea-level rise and the effect will be exacerbated by increasing human-induced pressures on coastal areas. The Report projected 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

Figure 1. Increase in temperature causes global warming: Child's perception

growth and development; and increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts.

Regarding the Asian region, the Report points out that glacier melt in the Himalayas is projected to increase flooding, rock avalanches from destabilised slopes, and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede. The Report further predicts an adverse impact of climate change on human health as endemic morbidity and mortality due to diarrhoeal diseases primarily associated with floods and droughts, are expected to rise in East, South and Southeast Asia due to projected changes in hydrological cycle associated with global warming. Increases in coastal water temperature would exacerbate the abundance and/or toxicity of cholera in South Asia.

In April 2009, the IPCC decided that much greater consideration was required to improve the treatment of regional matters in Fifth Assessment Report (AR5). The fifth Assessment Report of IPCC comprises three Working Groups and a Synthesis Report. It stated that reducing emissions is critical if global warming is to be limited to 2°C — a target recognised in 2009 as the threshold of dangerous climate change. The report suggested that the renewables will have to grow from their current 30 per cent share to 80 per cent of the power sector by the year 2050. It also stated that fossil fuel power generation without carbon capture and storage (CCS) technology would require to be phased out almost entirely by the year 2100.

Impact on India

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.

Figure 2. Melting of glacier as ice-cream: Child's perception

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 an adverse effect on future water availability. The Gangotri glacier, one of the largest in the Himalayas, has been retreating since long and more rapidly in the recent decades. As the glaciers retreat, they become more fragmented and the smaller glaciers are more sensitive to global warming.

International Scenario

The international community set up the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, which seeks to address the challenge of climate change on the basis of the principle of 'common but differentiated responsibilities and respective capabilities' of the member parties. The objective of UNFCCC is to stabilise the concentration of greenhouse gases in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system.

The UNFCCC recognises 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 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 also noted in the Preamble of the UNFCCC, that the largest share of historical and current global emissions of greenhouse gases has originated in the 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 implementation of the Convention is promoted and reviewed through the decisions taken at the annual meetings of the Conference of Parties (CoP).

In the year 1997, Parties adopted the Kyoto Protocol, which set legally binding targets for GHG reductions by industrialised countries during the 'first commitment period', i.e., 2008–12. The developed country parties were expected to reduce, by 2012, their GHG emissions by an order of 5.2 per cent below their aggregate 1990 emissions. The Kyoto Protocol is the most significant agreement till date to combat climate change. The Protocol provides for quantified emission limitation and reduction commitments for the developed countries while presenting/ suggesting mechanisms to facilitate review of, and compliance with these targets. India is a party to the United Nations Framework Convention on Climate Change and its Kyoto Protocol.

The 21st Conference of Parties (CoP-21) under UNFCCC was held in Paris from 30 November to 12 December 2015. India's Honourable Minister of Environment, Forests and Climate Change lead an inter-ministerial delegation and advocated ambitious actions based on the principles of equity and common but differentiated responsibilities (CBDR).

Paris Agreement on Climate Change, 2015

A historic agreement to combat climate change and unleash actions and investment towards a low carbon, resilient and sustainable future was agreed by 195 nations in Paris on 12 December 2015. The Paris Agreement for the first time brought all nations into a common cause based on their historic, current and future responsibilities. The universal agreement's main aim is to keep a global temperature rise for this century well below 2°C and to drive efforts to limit the temperature increase even further to 1.5 °C above pre-industrial levels. The 1.5 °C limit is a significantly safer defense line against the worst impacts of a changing climate. Additionally, the agreement aims to strengthen the ability to deal with the impacts of climate change. To reach these ambitious and important goals, appropriate financial flows will be put in place, thus making stronger action by developing countries and the most vulnerable possible, in line with their own national objectives. Future generations will mark the 12 December 2015 as a date when cooperation, vision, responsibility, a shared humanity and a care for world took centrestage to protect the planet.

Salient features of the Paris Agreement are as follows:

- The purpose of the Agreement is not only achieving the objective of UNFCCC but also enhancing the implementation of UNFCCC.

- The ideas of Climate Justice, Sustainable Lifestyles and Right to Development, which were specifically raised by India were explicitly recognised in the preamble of the Agreement.
- Equity and the principle of 'Common but Differentiated Responsibilities and Respective Capabilities' were mentioned in the Agreement, capturing the notion of historical responsibility of the developed countries.
- Differentiated obligations based on Annexes as mentioned in UNFCCC were not reflected in the Agreement. However, differentiation across all elements was maintained for developed and developing country parties.
- Developed Country Parties will undertake absolute emission reduction targets while Developing Country Parties will continue to enhance their mitigation efforts.
- The Agreement not only includes NDCs (Nationally Determined Contributions) on mitigation but also has elements of adaptation, finance, technology transfer and capacity building. NDCs will be furnished every five years. Harmonisation of the timeframes of NDCs (currently 5 or 10 years) will be considered at the first meeting of the Parties to the Paris Agreement. At any time, a Party may adjust its existing NDCs with a view to enhance its level of ambition.
- Developed Country Parties shall provide financial resources to assist Developing Country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under UNFCCC. Developed Country Parties would continue to take the lead in mobilising climate finance and also provide information on financial, technology transfer and capacity building support to Developing Country Parties.
- An enhanced transparency framework for action and support, building on the arrangements under UNFCCC, has been established. India's proposal to link transparency with capacity building initiative was agreed to.
- Article 2(1) (c) of the Agreement refers to making finance flows consistent with a pathway towards low greenhouse gas emissions and climate resilient development. This was included despite opposition from India and other developing countries, and could possibly be interpreted as a 'green conditionality' on international finance flows.

India's Response

India has probably the most 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 explosion, poverty and illiteracy augmented by urbanisation and industrial development. India is probably the first developing country which has 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 wildlife 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 wildlife, and to have compassion for living creatures'.

As a developing nation, India, in its endeavour to bring millions of people out of poverty cannot accept binding commitments for cutting emission of greenhouse gases. The total emission of greenhouse gases is bound to

increase in India in the course of meeting the demands for raising the standards of living and providing access to commercial energy to all. Around 55 per cent of India's population still does not have access to commercial energy.

India and the International Organisations

India is a Party to the United Nations Framework Convention on Climate Change. India has established the National Clean Development Mechanism Authority (NCDMA) on 2 December 2003.

India's CDM potential represents a significant component of the global CDM market. As of April 2009, 420 out of total 1,593 projects registered by the CDM Executive Board are from India, which so far is the second highest by any country in the world. Also, as on 31 March 2009, the National CDM Authority has accorded Host Country Approval to 1,230 projects facilitating an investment of more than ₹1,51,650 crore. These projects are in the sectors of energy efficiency, fuel switching, industrial processes, municipal solid waste and renewable energy. If all these projects get registered by the CDM Executive Board, they have the potential to generate 574 million Certified Emission Reductions (CERs) by the year 2012.

It has been India's stand not to agree to any commitments related to reducing greenhouse gas 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 greenhouse gases 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 stabilise and reduce their emissions of GHGs. Hence, developed countries should come forward and take further deeper commitments beyond the year 2012.

Climate-friendly Measures taken by India

India is conscious of the challenge of climate change, and the urgency of actions needed to counter its possible adverse impacts. The past few years have witnessed the introduction of environmental measures in India that have targeted conservation of rivers, improvement of urban air quality, enhanced afforestation and a significant increase in the installed capacity of renewable energy technologies. These deliberate actions, by consciously factoring in India's commitment to the UNFCCC, have realigned the economic development to a more climate-friendly and sustainable path.

India believes that adaptation is critical for the developing countries that are most vulnerable to the climate change. India has implemented,in pursuit of this objective, several major programmes addressing the 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, etc.

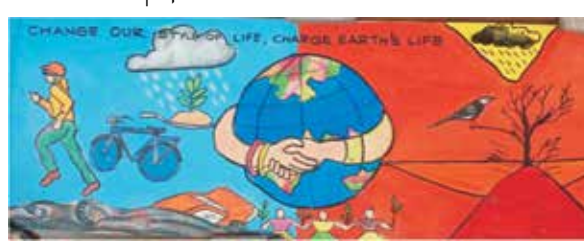

Figure 3. Change of Life style Changes Earth: Child's Perception

The goal of India's climate change related actions is to ensure sustainable development, which is inclusive in nature. The policy does not compromise on the developmental imperatives including energy security and poverty alleviation. India's National Environment Policy, 2006 underlines that 'while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependant on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource'.

Figure 4. Save Water for Future Generation: Child's Perception

As India endeavours to increase energy consumption to empower its people, the national policies are designed to ensure that the means are also sustainable. This includes use of market mechanisms and the relevant technology along with the promotion of energy efficiency, conservation and renewable energy. As a part of such policy, measures have been taken to promote the use of CNG for public transport, introduce Metro rail in two cities, enact the Energy Conservation Act, 2001, and notify an Energy Efficiency Code for the new commercial buildings.

India's per capita consumption of energy is 530 kgoe (Kilogram of Oil Equivalent) of primary energy compared to the world average of 1770 kgoe. India's per capita emission of CO_2 is among the lowest in the world: it is approximately 1 tonne per annum as against a world average of 4.2 tonnes per annum, while the average for industrialised countries ranges between 10–20 tonnes per capita. The fossil fuel CO_2 intensity in India is the same as in Japan, and better than in Germany. This is owing to the fact that, at the national level, an effective regime of policies, regulations and programmes has been set up to address energy efficiency and energy security concerns. This has had a positive effect on India's development process.

The Government of India has set up an elaborate institutional mechanism to consider and address issues relating to climate change. A Council chaired by the Prime Minister, called Prime Minister's Council on Climate Change, was constituted in June 2007, to coordinate national action for assessment, adaptation and mitigation of climate change. The Council provides the overall guidance to climate change related actions taken by various ministries in the Government and other agencies. An expert committee set up in 2007, under the chairmanship of the Principal Scientific Adviser to Government of India, is also looking into the impacts of climate change. The committee is studying the impact of anthropogenic climate change on India and is engaged in identifying the measures that may have to be taken to address the adverse impacts.

Further, a Policy Guidance Group for International Negotiations headed by the Prime Minister and consisting of ministers concerned and a Core Negotiating Team of officials and technical experts for assisting the international negotiations, has also been set up.

National Action Plan on Climate Change

As a part of national voluntary actions to address climate change related concerns, India released its National Action Plan on Climate Change

(NAPCC) on 30 June 2008. The National Action Plan advocates a strategy that promotes, firstly, the adaptation to climate change and secondly, further enhancement of the ecological sustainability of India's development path. It recognises that climate change is a global challenge and that it should be successfully overcome through a globally collaborative and cooperative effort based on the basis of the principle of equity. The Action Plan suggests that the long-term convergence of per capita GHG emissions is the only equitable basis for a global agreement to tackle climate change. The Action Plan assures the international community that India's per capita GHG emissions would not exceed the per capita GHG emissions of developed countries, despite India's developmental imperatives.

India's National Action Plan stresses that maintaining a high growth rate is essential for increasing living standards of the vast majority of people of India and reducing their vulnerability to the impacts of climate change. Accordingly, the Action Plan identifies measures that promote the objectives of sustainable development of India while also yielding co-benefits for addressing climate change. It also outlines a national strategy that aims at enabling the country to adapt to climate change and enhances the ecological sustainability of India's development path.

Eight National Missions (National Solar Mission*, National Mission on Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a Green India, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change), which form the core of the National Action Plan represent multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. Besides the national missions, several other initiatives that are critical to achieve the objective of the NAPCC are to be implemented as a part of agreed national strategy for development and which will have significant co-benefits for climate. The national missions are to be institutionalised by the respective ministries and will be organised through inter-sectoral groups. Comprehensive Mission documents detailing objectives, strategies, plan of action, timelines and monitoring and evaluation criteria are being evolved.

International Negotiations

Efforts to counter climate change at the international level are currently focused on the negotiations that are taking place amongst the member countries of the UNFCCC, in pursuance of Bali Action Plan (BAP) adopted at the thirteenth Conference of Parties (CoP-13), held at Bali, Indonesia in December 2007. The Bali Action Plan calls for full, effective and sustained implementation of the UNFCCC through long-term cooperative action, now, up to and beyond 2012. It is a comprehensive dialogue to address the four major building blocks of climate change, i.e., GHG mitigation, adaptation to climate change impacts, technology development

* In a step forward, Gujarat has decided to promote the deserts as a hub for renewable energy by establishing solar power plants in the Rann of Kutch. The state government has decided to allocate 1,500 hectares of land to build Solar City in the desert. The incentives offered in the new Solar Power Policy include exemption from electricity duty and demand cut of 50 per cent of the installed capacity. The expected cost of the project is ₹61,019 crore.

and cooperation, and finance. This is a particularly significant development as it sets out differentiated approaches for the developed and developing countries in the key area of GHG mitigation on the basis of UN Framework Convention on Climate Change and underscores the importance of its principles and provisions, especially the 'common but differentiated responsibilities and respective capabilities'.

Several meetings of the Parties to UNFCCC were held since the adoption of Bali Action Plan in December 2007, viz. the UN Climate Change Talks were held at Bangkok from 31 March–4 April 2008, at Bonn, Germany from 2–13 June 2008, at Accra, Ghana during 21–27 August 2008 and the 14th Conference of Parties was held at Poznan, Poland during 1–12 December 2008. Poznan Conference was intended to enable the Parties to take a stock of the progress made since the adoption of Bali Action Plan. The CoP-14 agreed on a timetable for the negotiations to commence and also the modalities for the preparation of a negotiating text that would form the basis of the negotiations. In June 2009, a meeting was held in Bonn to provide a basis for the group to intensify negotiations on further emission reduction commitments.

Accordingly, pre-sessional meetings of the Ad-hoc Working Groups of the Convention and the Kyoto Protocol (AWG-LCA 5 and AWG-KP 6) were held in Bonn from 29 March – 8 April 2009. The pre-sessional meetings discussed areas of convergence and divergence in the ideas submitted by the Parties for inclusion in the text for negotiations. A meeting was held in Bonn from 26 May – 12 June 2009 in which a negotiation text was prepared by the Chair of the Ad-hoc Working Group on Long-term Cooperative Action (AWG-LCA) to facilitate the negotiations among Parties on the fulfillment of Bali Action Plan. India has been able to project its views adequately and effectively in various meetings.

The UNFCCC talks are crucial for developing countries which are increasingly being subjected to pressures from the developed countries to agree to an emissions pathway in future and a set of internationally monitored, nationally appropriate actions for mitigation (NAMAs). While Bali Action Plan does call for NAMAs for Annex I* and non-Annex I** countries, the actions of developing countries is dependent on the support in terms of finance and technology received by such countries from the developed countries. Moreover, the burden of achieving the global goal of stabilisation of climate is to be shared equitably on the basis of the principle of the Convention which clearly differentiates between the countries on the basis of their responsibility and respective capability. While EU and most of the other Annex. I countries including US (which is not a signatory to Kyoto

* **Annex. I**: Parties include the industrialised countries that were members of the OECD (Organisation for Economic co-operation and Development) in 1992, plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.

** **Non-Annex. I**: Parties are mostly developing countries. Certain groups of developing countries are recognised by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought. Others (such as countries that rely heavily on income from fossil fuel production and commerce) feel more vulnerable to the potential economic impacts of climate change response measures. The Convention emphasises activities that promise to answer the special needs and concerns of these vulnerable countries, such as investment, insurance and technology transfer.

Protocol) have increased their emissions in recent years and failed to achieve the Kyoto targets, they are insisting that countries like India and China should come on board for a new deal to be forged in Copenhagen. While their own declaration of targets for their second commitment period under Kyoto Protocol are totally inadequate (EU — 20 per cent reduction in emissions over 1990 levels by 2020, US — 14 per cent reduction over 2005 levels by 2020, Australia — 5–25 per cent over 1990 by 2020, Japan — 6–25 per cent over 1990 by 2020 against 40–45 per cent over 1990 by 2020 as recommended by IPCC), they have asked the developing countries also to deviate by 15–30 per cent from their Business As Usual (BAU), in order to support the actions of the Annex I countries. India is opposed to such approaches and has argued that an agreement in Copenhagen has to be premised on the principles of the Convention.

As the subject of climate change has gained increasing significance and prominence, it is being discussed in various international groupings, such as Major Economies Meeting (MEM), G-8, etc. An initiative comprising the major economies, viz. Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, South Korea, South Africa, United Kingdom and the EU was launched in May 2007, to develop and contribute to discussions on energy security and climate change. The MEM seeks to complement the existing national, bilateral, regional and international programmes to address the long-term challenges of global climate change and to achieve agreement on the actions necessary to counter climate change. In the G-8 and Outreach Countries Summit held in July 2008, where India and other major economies were invited, the developing countries stressed their position regarding GHG mitigation as per the differentiated responsibilities and respective capabilities as envisaged in the UNFCCC and called for support in terms of technology and finance.

In the Major Economies Meeting on Climate Change held on the sidelines of G-8 Summit in Japan, the Prime Minister, emphasised the importance of enhanced implementation of the UNFCCC decisions through long-term cooperative action in accordance with the provisions and principles of the Convention, especially 'common but differentiated responsibilities and respective capabilities' are respected in these negotiations and their outcomes in letter and spirit.

India has been consistently raising the voice in all world fora that global warming is taking place everywhere and its adverse consequences will impact most heavily on developing countries like India. The reference at the above meeting to a two degree centigrade increase as a threshold reflects a prevalent scientific opinion internationally and only reinforces what India has been saying about the dangers from global warming. This is for the first time that India has accepted a reference to two degree centigrade in a document, as a possible threshold guiding global action, but this is entirely in line with our stated position on global warming.

India is a partner in the Asia Pacific Partnership on Clean Development and Climate (APP). The partnership consists of key developed and developing countries in Asia and North America across the Pacific — Australia, China, Japan, South Korea, Canada and the USA, besides India. It focusses 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. Under APP, eight (8) Task Forces in

the area of aluminum, buildings and appliances, cement, use of fossil energy, coal mining, power generation and transmission, renewable energy and distributed generation, and steel have been set up to facilitate collaboration in technology development and diffusion.

India engages bilaterally with several countries in the field of climate change. An MoU for cooperation in the field of Clean Development Mechanism under the Kyoto Protocol was signed in New Delhi between India and Denmark on 27 October 2008. The Third Meeting of the Indo-UK Structured Dialogue on Climate Change was held in September 2008, at New Delhi wherein important issues such as Bali Action Plan, Technology Transfer, Forestry, National Action Plan, etc., were discussed.

Policy Measures taken by India to Mitigate Climate Change

The past few years have witnessed the introduction of landmark environmental policy measures in India that have targeted conservation of rivers, improvement of urban air, enhanced forestation and a significant increase in the installed capacity of renewable energy technologies. These and similar measures, affirmed by the democratic and legislative processes, have been implemented by committing additional resource, as well as by re-aligning new investments. Besides, several other climate-friendly measures have been taken in recent years that have a direct bearing on mitigating climate change.

India is the fourth largest GHG emitter in absolute terms after China, US and EU-28 but its share of global emissions is only around 6 per cent of the world's total GHG emissions. The percentage emissions of the world's total and absolute emissions in Gigatons of CO_2 equivalent of the top 4 emitters are: China (22.5 per cent, 10.7 Gt CO_2e); US (12.2 per cent, 5.8 Gt CO_2e); EU-28 (8.6 per cent, 4.1 Gt CO_2e); India (6 per cent, 2.9 Gt CO_2e). They are followed by Russia; Indonesia, Brazil (7th largest emitter, 1.8 Gt CO_2e), Japan, Canada, Germany and Mexico. South Africa, another BASIC country is the 18th largest emitter with emissions of 0.4 Gt CO_2e. India's per capita GHG emission (2.33 Gt CO_2e) is 1/3 of the world average (6.76) and is very low compared to developed countries as well as many of the developing countries. The per capita GHG emissions measured in terms of tonnes of CO_2 equivalent per capita of some of the countries are China (7.91); US (18.55); EU-28 (8.22); Russia (15.75); Japan (9.46); Brazil (9.18); South Africa (8.86); Saudi Arabia (18.63). Among the top 10 absolute emitters only two (India, Mexico) have per capita emissions that are below the world average.

India's environment policy has been driven by the imperatives of sustainable development, and has, as a co-benefit, led to a decline in the intensity of energy use and carbon dioxide emissions as well. The high ratio of recycling in India, compared to that of other major economies has also limited the growth in energy use, and GHG emissions, because of the lower demand for virgin material such as steel, aluminum and copper.

The Electricity Act, 2003, requires States Electricity Regulatory Commissions to specify a percentage of electricity that the electricity distribution companies must procure from renewable sources. Several commissions have already operationalised this mandate, and also notified preferential prices for electricity from renewable sources. This has contributed to an acceleration in renewable-electricity capacity addition, and over the past three years, about

2,000 MW of renewable electricity capacity has been added in India every year, bringing the total installed renewable capacity to over 11,000 MW. Of this, a little over 7,000 MW is based on wind power. India now has the fourth largest installed wind capacity in the world. The National Hydro Energy Policy has resulted in the accelerated addition of hydropower in India, which is now over 35,000 MW.

Currently, the primary energy sector growth rate is around 3 per cent per year, against GDP growth exceeding 8 per cent. Steel, aluminium, fertiliser, 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.

An Energy Conservation Building Code (ECBC) was launched in May, 2007, which addresses the design of new, large commercial buildings to optimise the building's energy demand. Commercial buildings are one of the fastest growing sectors of the Indian economy, reflecting the increasing share of the services sector in the economy. Nearly 100 buildings are already following the Code, and compliance with it has also been incorporated into the Environmental Impact Assessment requirements for large buildings.

In the area of off-grid and rural applications, biogas and solar-lighting have reached four million and one million households, respectively, while in the area of solar water heating systems, around 2 million sq. m collector area has been deployed. Besides, Village Electrification Programme is also being implemented to electrify 10,000 villages through renewable energy resources by 2012.

The Government of India has also launched the 'Green India' project that will be the world's largest afforestation project covering six million hectares of degraded forestland.

Lastly, the latest Green Index taken out by National Geographic puts India as the No.1 country in the world on a Green Index. The Greendex is a comprehensive measure of consumer behaviour in 65 areas relating to housing, transportation, food and consumer goods. Greendex 2009 ranks average consumers in 17 countries—up from 14 in 2008, for which changes are tracked—according to the environmental impact of their discretionary and non-discretionary consumption patterns within these four major categories. Environmental concern and engagement among the public has increased, and many programmes and initiatives by governments and companies were put in place as a result. Overall, environmental concerns have remained strong, and awareness of the issues at hand has increased.

Conclusion

Risks emanating from climate change, caused by anthropogenic greenhouse gas emissions are now widely perceived to be real. Unless addressed expeditiously, these can have adverse consequences upon those least able to cope, that is, the poor and disadvantaged across the globe, but particularly those residing in the developing countries. The issue of climate change needs to be addressed within the framework of sustainable development, without halting the process of development. The importance accorded to the subject of climate change in various international forums addressed, many times at the State of Head level itself, shows the recognition of the problem.

This, in turn, results in paving the way for taking appropriate policy measures at national and international level. There are several means to check the threat which includes exchange of information by all nations, international cooperation in developing environment friendly innovative technologies, technology transfer from developed to developing countries and access to environmentally sound services. India's participation in different global environmental negotiations and several domestic initiatives to counter global warming and climate change underlines its commitment and seriousness towards the problem.