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RESEARCH & INFORMATION DIVISION

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CLIMATE CHANGE

Climate change is a serious global environmental concern. It is primarily caused by the building up of Greenhouse Gases (GHGs), such as carbon dioxide, nitrous oxide and methane, in the atmosphere. The global increases in carbon dioxide concentration are primarily due to fossil fuel use and land use change while those of methane and nitrous oxide are primarily due to agriculture.

Global warming is one of the ramifications of 'climate change' and refers to the observed increase in the average temperature of the air near earth's surface and oceans in the recent decades. Scientific studies have shown that the global atmospheric concentrations of carbon dioxide, methane and nitrous oxide, which are the main greenhouse gases, have increased markedly as a result of human activities since 1750.

The Intergovernmental Panel on Climate Change (IPCC) in its 4th Assessment Report (2007) concluded on the basis of direct observations of changes in temperature, sea level, and snow cover in the northern hemisphere during 1850 to the present that the warming of the earth's climate system is unequivocal. The temperature changes between 2090-2099 relative to 1980-1999 may range from 1.1 to 6.4°C and the sea level rise from 0.18 to 0.59 meters. The best estimates indicate that the Earth could be warmer by 3°C by 2100. These changes could lead to direct impact on fresh water availability, oceanic acidifications and food production, flooding of coastal areas and increased burden of vector borne and water borne diseases associated with extreme weather events, etc.

The Working Group of the IPCC states that GHGs emissions have grown by 70 per cent between 1970 and 2004. The largest growth in global GHGs 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, and land use change, and forestry 40 per cent** (LULUCF).

Future Scenario

- There would be enlargement and increased number of glacial lakes and increasing ground instability in permafrost regions, and rock avalanches in mountain regions.
- 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, together, may contribute to losses of coastal wetlands and mangroves. Coastal areas 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.
- Increases in the frequency of droughts and floods are projected to affect local production negatively, especially in subsistence sectors at low latitudes.
- Effects of temperature increase have also been documented in some aspects of human health, such as heat-related mortality in Europe, infectious diseases vectors in some areas, and allergenic pollen in Northern Hemisphere high and mid-latitudes.
- Climate change-related exposures are likely to affect the health 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.

Implications for India

It is projected that by the end of the 21st century, rainfall in India may increase by 15 to 40 per cent with high regional variability. Warming may be more pronounced over land areas with northern India experiencing the maximum increase. The warming could be relatively greater in winter and post-monsoon seasons. The annual mean temperature could increase by 3°C to 6°C over the century and wheat yields could decrease by 5-10 per cent with the rise of each degree of temperature in India.

Gangotri Glacier

It has been noticed that the Gangotri glacier, one of the largest in the Himalayas, has been retreating rapidly in the recent decades. The accelerated melting which this glacier is experiencing as a result of the earth's warming may have a profound effect on the future availability of water.

Global Measures to address Climate Change

The *United Nations Framework Convention on Climate Change* (UNFCCC), adopted at the Rio Earth Summit in June 1992 sets an overall framework for inter-governmental efforts to tackle the challenges posed by climate change. The objective of the Convention is to achieve stabilization of greenhouse gases concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. In this context, the UNFCCC recognizes the legitimate needs of the developing countries for sustained economic growth and poverty alleviation. The UNFCCC mentions that Parties to the Convention should protect the climate change system for the benefit of the present and future generations of mankind on the basis of equity and in accordance with their **common but differentiated responsibilities and respective capabilities**.

The Preamble of the UNFCCC

The largest share of historical and current global emissions of greenhouse gases has originated in the developed countries; per capita emissions in developing countries are still relatively low; and the share of global emissions originating in the developing countries will grow to meet their social and developmental needs.

Kyoto Protocol

In 1997, Parties to the UNFCCC adopted the Kyoto Protocol in recognition of the necessity for strengthening developed countries' commitment in furtherance of the objectives of the Convention. The Protocol provides for quantified emission limitation and reduction commitments for the developed countries, mechanisms to facilitate review of and compliance with these targets. The Convention divided countries into three main groups according to differing commitments: (i) **Annex I Parties** include those industrialized countries which were members of the Organization for Economic Co-operation and Development (OECD) in 1992, plus countries with Economies In Transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and East European nations; (ii) **Annex II Parties** consist of the OECD members of Annex I, excluding the EIT Parties; and (iii) **Non-Annex I Parties** consist mostly of developing countries. Of these, there are 48 Least Developed Countries (LDCs), which are given special consideration under the UNFCCC on account of their limited capacity to respond to climate change and adapt to its adverse effects.

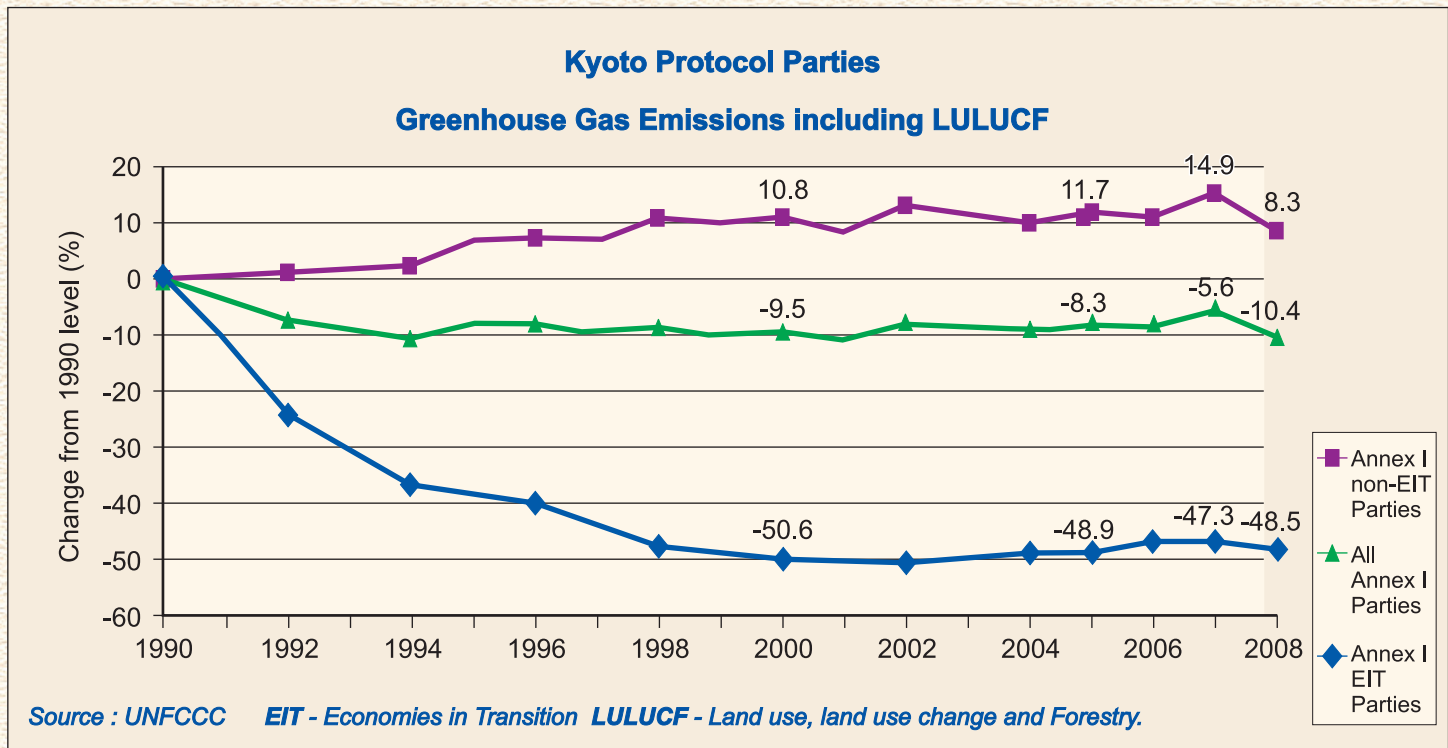
Annex I Parties of the Convention have specific emissions reduction targets laid out for them under the Kyoto Protocol. These countries have to reduce their GHG emissions by a collective average of 5.2 per cent below their 1990 levels by the end of 2012, which is the first commitment period agreed in the Protocol.

Besides reducing the emissions, the Annex II Parties are also required to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention and to help them adapt to adverse effects of climate change.

Annex I Parties are expected to **take all practicable steps** to promote the development and transfer of environmentally friendly technologies to EIT Parties and developing countries and provide resources through the Convention's financial mechanism.

Bali Conference

The 13th Conference of Parties of the UNFCCC was held at Bali, Indonesia in December 2007 to decide the future course of action regarding the fulfilment of Parties' obligations under the Convention/Protocol. The principal outcomes of the Bali Action Plan were, first, a process to determine the greenhouse gas reduction commitments of industrialized countries (*Annex I*) under the Kyoto Protocol, beyond 2012. Second, it marked the commencement of a comprehensive dialogue on Long-term Cooperative Action to address four major pillars



of climate change, *i.e.* GHGs mitigation; adaptation to climate change impacts; technology development and cooperation; and finance.

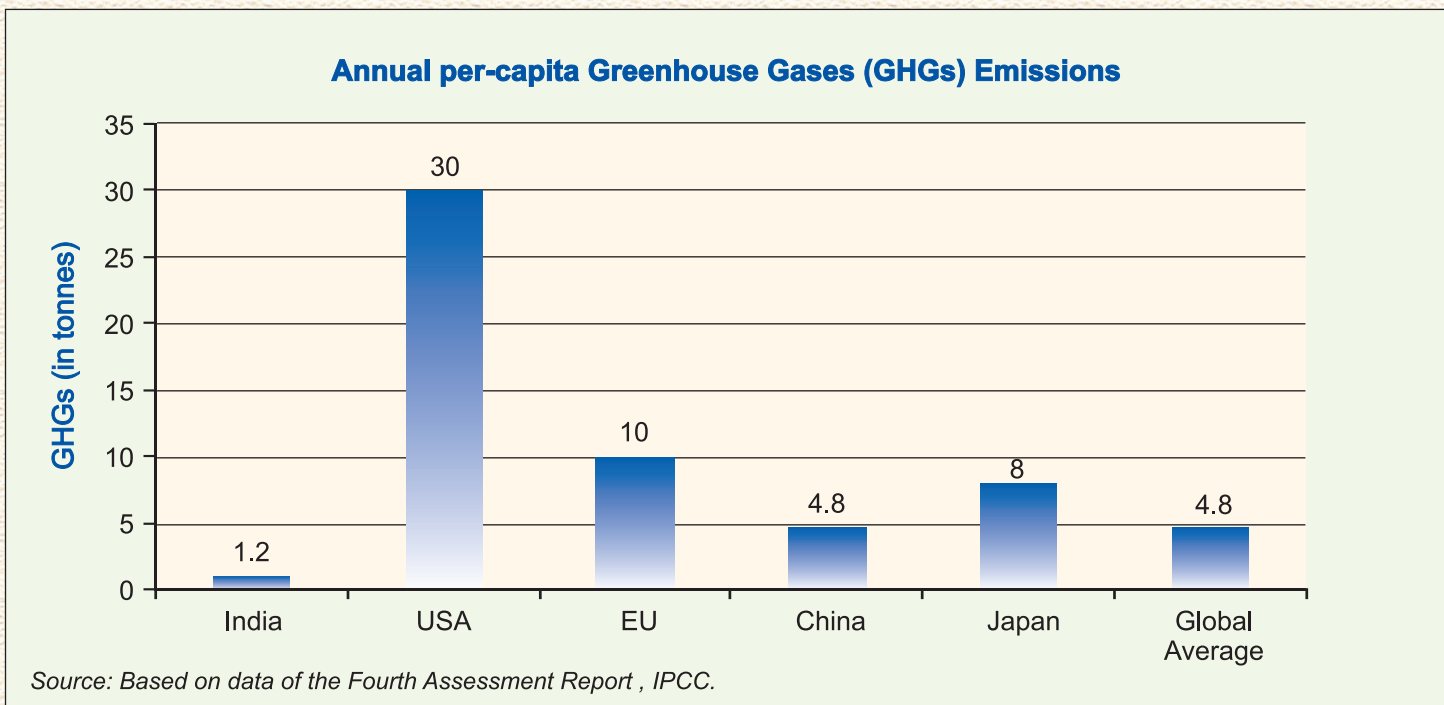
Copenhagen Conference

At Copenhagen summit, held in December 2009, the parties negotiated on various issues relating to the Bali Action Plan and the Kyoto Protocol but the negotiations remained inconclusive. Among various other issues, the Copenhagen Accord envisages compilation/inscription of the commitments/pledges of developed countries and the voluntary actions of the developing countries in a common appendix. It is widely agreed that the

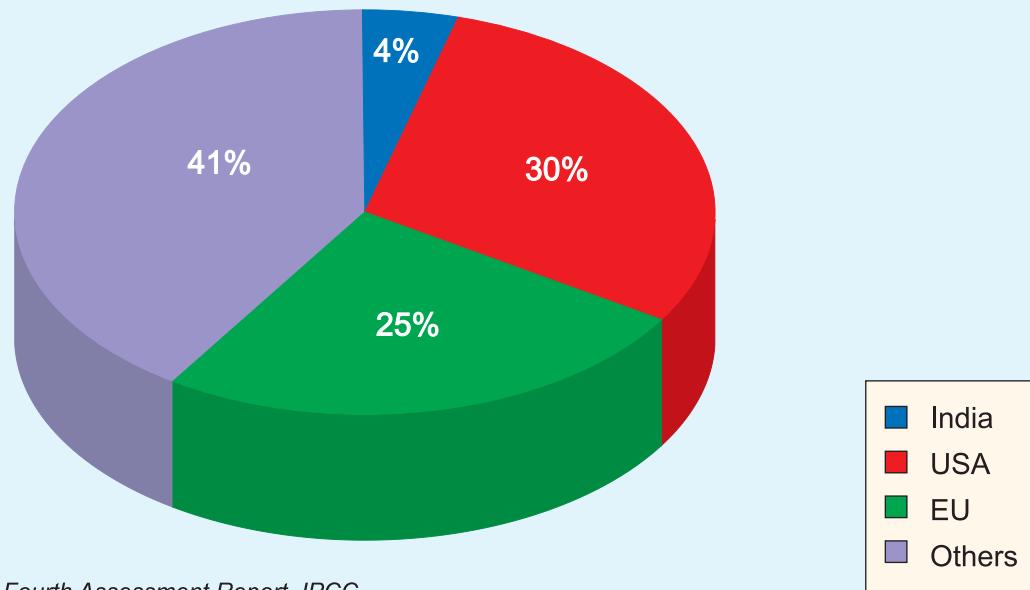
Copenhagen Accord is not a legal document but a document that reflects political understanding amongst a set of countries on certain issues. The developed countries had also given a call at the Copenhagen for a legally binding agreement for all parties with a view to establishing a global goal for emission reduction.

Cancun Conference

The Cancun Conference restored the faith in the multilateral process that had suffered at the Copenhagen Conference. It has reaffirmed the importance of an inclusive, transparent and consensus based multilateral regime for climate change deliberations. In the recent



Percentage of Greenhouse Gases (GHGs) Emissions in the World



Source: Based on data of the Fourth Assessment Report, IPCC.

decisions taken at Cancun in November-December 2010, all developed and developing countries have agreed to compilation of their emission reduction targets and domestic mitigation goals as appropriate, in an international document and have also agreed to an international regime of measurement, report and verification. The parties have also agreed to an adaptation framework, while agreeing to set up a Green Fund for climate and a technology mechanism.

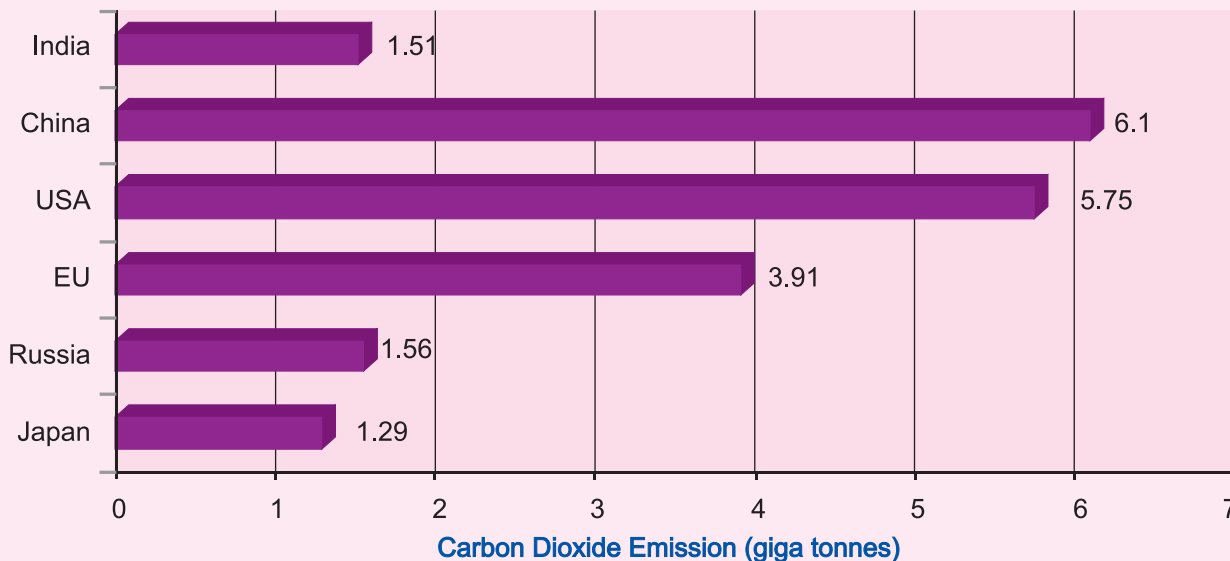
The key highlights of the Cancun Conference are:

- Industrialised country targets are officially recognised under the multilateral process and these countries are to develop low-carbon development plans and strategies and assess how best

to meet them, including through market mechanisms, and to report their inventories annually.

- Developing country actions to reduce emissions are officially recognised under the multilateral process. A registry is to be set up to record and match developing country mitigation actions to finance and support technology from industrialised countries. Developing countries are to publish progress reports every two years.
- Parties meeting under the Kyoto Protocol agreed to continue negotiations with the aim of completing their work and ensuring there is no gap between the first and second commitment periods of the treaty.

Annual Carbon Dioxide Emission of major Countries



Source: Based on data of Fourth Assessment Report, IPCC.

- A total of \$30 billion in '**fast start finance**' from industrialised countries to support climate action in the developing world up to 2012 and the intention to raise \$100 billion in '**long-term funds**' by 2020 is included in the decisions.
- In the field of climate finance, a process to design a Green Climate Fund under the Conference of the Parties, with a board with equal representation from developed and developing countries, is established.
- A new Cancún Adaptation Framework is established to allow better planning and implementation of adaptation projects in developing countries through increased financial and technical support, including a clear process for continuing work on loss and damage.
- Governments agree to boost action to curb emissions from deforestation and forest degradation in developing countries with technological and financial support.

Emissions Trading: Emissions Trading or Carbon Trading, involves trading of carbon emission credits within nations. This mechanism will bring in private corporations and with that will come market pressures driving for efficiency, innovation and better results.

Clean Development Mechanism: It is one of the flexible arrangements under the Kyoto Protocol to the UNFCCC supporting the implementation of sustainable and environmentally-friendly technologies in developing countries and thereby, facilitating industrialized countries in meeting their emission reduction obligations in a cost-effective manner.

Carbon Footprint: A carbon footprint is the total set of GHGs emissions caused by an organization, event, product or a person. For simplicity of reporting, it is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs, emitted. The Convention and its Kyoto protocol do not promote the concept of carbon footprint of a country, nation or a person as it obfuscates the issue of equity and common but differentiated responsibility in actions for reducing or moderating the stock of GHG gases. The developed countries often use this idea to measure carbon footprint of a State/country (in place of per capita principle). They advocate a strategy to reduce carbon or GHG emissions through technological developments, better process and product management, changed Green Public or Private Procurement (GPP), carbon capture, consumption strategies, and others, without addressing the questions of finance, technology, and capacity building support.

The mitigation of carbon footprints through the development of alternative projects, such as solar or wind energy or reforestation, represents one way of reducing a carbon footprint and is often known as *Carbon offsetting*.

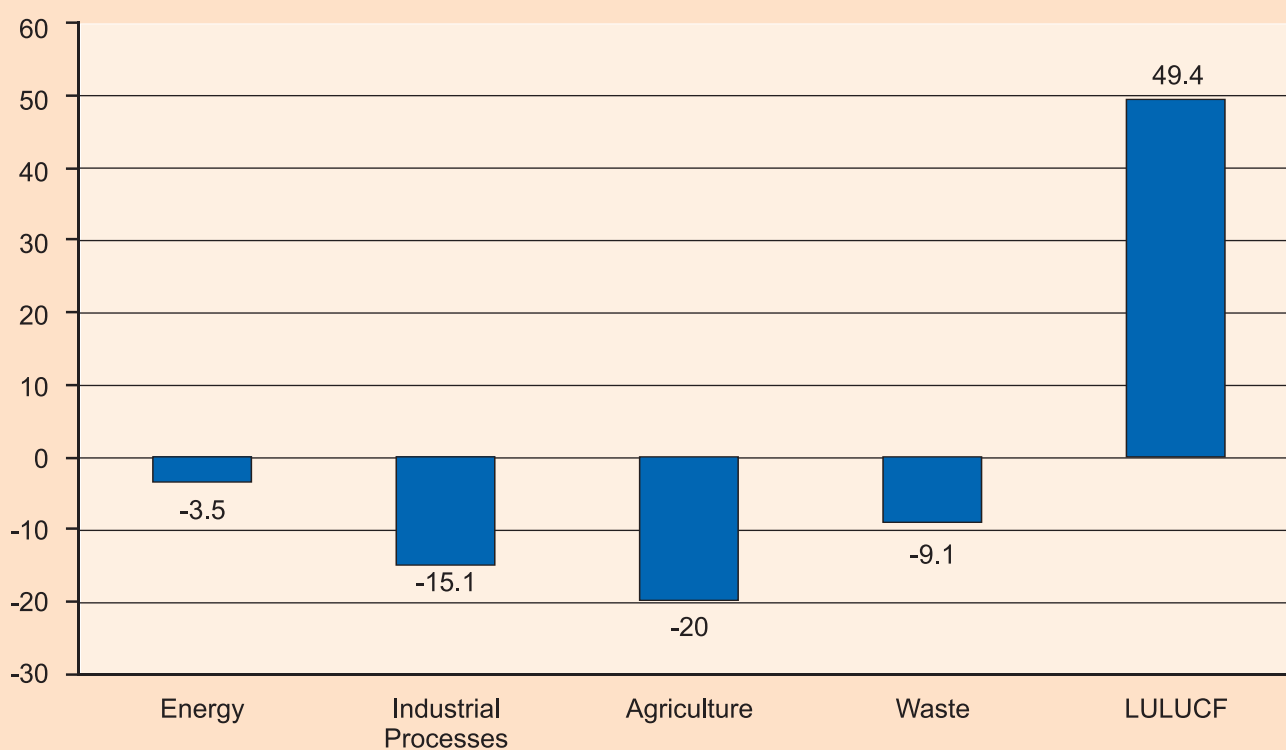
Total aggregate anthropogenic emissions of CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ including emissions/removals from land-use, land-use change and forestry of the major countries (Annex I, Kyoto Protocol)

Party	Gg CO ₂ equivalent (2008)	Change from 1990 to 2008 (%)
Australia	618 058	33.1
Canada	721 740	33.6
European Union	4 529 841	-13.3
France	464 442	-12.6
Germany	988 246	-18.4
Italy	454 187	0.4
Japan	1 203 076	-0.2
New Zealand	48 943	62.4
Russian Federation	1 690 974	-50.8
Spain	353 969	43.7
Switzerland	53 436	6.9
United Kingdom	629 791	-19.0
USA	6 016 408	15.3

1 Gg (gigagram) = 1000 tonnes.

Source: National GHG Inventory Submissions, UNFCCC, 2010.

Greenhouse Gases emissions/removals from Annex I Parties by sector Change 1990-2008 (%)



Source : UNFCCC.

LULUCF: Land-use, Land-use change and Forestry.

Total aggregate GHGs emissions of Kyoto Protocol Parties (including LULUCF)

Parties	Year 2010 (thousands of Tg CO₂)	Change from 1990 to the latest available year (%)
Annex I	17.52	-10.4
Annex I EIT	5.79	-48.5
Annex I non-EIT	11.73	8.3

Source: National GHGs inventory submissions, UNFCCC, 2010.

1 Tg (teragram) = 1 million tonnes.

EIT = Economies in Transition, GHG = Greenhouse Gas, LULUCF = Land use, Land-use change and forestry.

“...the rapid pace of economic growth is imposing new challenges. A developing country like ours must find ways to strike an appropriate balance between environmental imperatives and developmental needs...Government has constituted a Group of Ministers to look into all issues relating to the reconciliation of environmental concerns arising out of different kinds of developmental activities, without in any way diluting our pursuit of ecologically sustainable growth paths...”

**Hon’ble President of India, Smt. Pratibha Devisingh Patil
while addressing the Members of Parliament,
21 February 2011**

“... even if India were able to eliminate all its greenhouse gas emissions, we will not make a significant difference to our climate since our emissions account for only 4 per cent of the global total. The solution for this particular problem clearly lies in coordinated global action. ...our view has been that those who have been primarily responsible for the build up of greenhouse gases and who also have the greatest capacity to act should bear the brunt of the responsibility. Developing nations are obviously much less culpable, and have a much greater need for continued growth. These countries should be helped to achieve sustainable development paths.”

**Prime Minister, Dr. Manmohan Singh,
at the Delhi Sustainable Development Summit,
3 February 2011 New Delhi**

“Ecological preservation and celebration of biodiversity is embedded in Indian culture in myriad ways. India will not only be amongst the fastest growing economies in the world as measured by GDP—Gross Domestic Product but will also be amongst the most responsible in ensuring a high rate of growth of the real GDP—Green Domestic Product. That is my solemn assurance to the world community today on behalf of the Government of India. Environmental stewardship demands responsive leadership. That is India’s calling.”

**Shri Jairam Ramesh, Minister of State,
Environment and Forests, Cancun,
8 December 2010**

“Copenhagen is not a destination but the beginning of a long process. There are indeed many risks, many hazards, many threats. We have to be extraordinarily vigilant and watchful, negotiating tough but always from a position of strength. For the moment I believe that India has come out quite well at Copenhagen and we have been recognized for our constructive approach. We will continue to play such a role. We have to deepen our capacity to pursue proactive climate diplomacy internationally.”

**Shri Jairam Ramesh, Minister of State,
Environment and Forests, Rajya Sabha,
22 December 2009**

India and Climate Change

The Constitution of India under articles 48A and 51A (g) provides for making efforts to protect and improve the environment. India's development plans are also crafted with a balanced emphasis on economic development and environment. The planning process, while targeting an accelerated economic growth, is guided by the principles of sustainable development with a commitment to a cleaner and greener environment. The past few years have witnessed the introduction of landmark environmental 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 realigning new investments.

The National Forest Policy, 1988 envisages active measures for expanding carbon sinks through increase in forest and tree cover to 25 per cent by 2007 and 33 per cent by 2012.

The National Environment Policy of 2006 provides for several measures and policy initiatives to create awareness about climate change and help capacity building for taking adaptation measures. Several major programmes addressing climate variability concerns have been undertaken. 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

Energy Sector

In the energy sector, following specific initiatives have been taken:

- introduction of CNG for public and private transport in metropolitan areas;
- improving quality of transportation fuels, raising share of public transport, building Delhi Metro–Bangalore, Hyderabad and others to follow subject to resource availability;
- launch of a major bio-diesel programme with the objective of achieving 5 per cent blending of ethanol in petrol;
- electricity for all by 2012 through 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, Coal bed and Mine-mouth Methane and Hydrogen energy; and
- 50,000 MW hydropower initiatives including over 50 per cent from Run of River Operation projects to be accomplished by 2012.

crops and several others. Several other climate-friendly measures that have a direct bearing on mitigating climate change have been taken. Some such measures are those aimed at improving energy efficiency and conservation measures (including setting up of Bureau of Energy Efficiency), power sector reforms, promoting hydro and renewable energy, reduction of gas flaring, and environmental quality management.

Recent Initiatives

- **National Action Plan on Climate Change (NAPCC)** of June 2008 identifies measures that promote our development objective while also yielding co-benefits for addressing climate change effectively. Eight national missions (solar, energy efficiency, sustainable habitat, water, Himalayan eco-system, Green India, eco-green agriculture, and knowledge) have been specifically outlined to simultaneously advance India's development and climate change related objectives of adaptation and GHG mitigation.
- **India's Five Year Plans:** India has announced that it will endeavour to reduce emission intensity of its GDP by 20 to 25 per cent by 2020 in comparison to the 2005 level without reckoning emission from the agriculture sector. This will be achieved through actions in specific sectors with necessary provision of financial and technological resources including the domestic and international support. India has a large segment of poor population that is vulnerable to climate change. Ensuring the sustainability of their livelihoods and protecting them for additional burden of climate change is of primary concern to India. India spends almost 2 per cent of its GDP on measures that facilitate adaptation to climate change.
- **Prime Minister's Council** consisting of representatives from Government, industry, civil society, NGOs, media and eminent persons has been set up under the Chairmanship of the Prime Minister in 2007 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.
- **National Clean Development Mechanism Authority** was set up in 2003 for the purpose of protecting and improving the strategy of environment. The Authority registers projects for assessment and evaluation as per the guidelines of the UNFCCC. India has the second highest number of projects registered for any country. If all projects of India are registered, this will offset almost ten per cent of India's total emission per year by 2012.
- **Expert Group on Low Carbon Strategy for Inclusive Growth** has been set up with representation from industry, leading think tanks, research institutions, civil society and Government. The Group has been given the mandate to develop a roadmap for India for low carbon development. The Group's recommendations will become a central part of India's Twelfth Five Year Plan.
- **National Mission on Enhanced Energy Efficiency** includes several new initiatives—the most important being the Perform, Achieve and Trade (PAT) mechanism, which will cover facilities that account for more than 50 per cent of the fossil fuel used in India, and help reduce CO₂ emissions by 25 million tonnes per year by 2014-15. About 700 of the most energy intensive industrial units and power stations in India would be mandated to reduce their energy consumption by a specified percentage. Energy efficiency ratings have been made mandatory for four key appliances—refrigerators, air conditioners, tubelights and transformers from 7 January 2010.

- **Jawaharlal Nehru National Solar Mission** was launched recently as an ambitious mission to make India a global leader in solar energy. The National Solar Mission aims at generating 20,000 MW of solar power by 2022. The Mission also has other targets: 2000 MW of off-grid solar plants, and 20 million sq. metres of solar collectors to be installed. In addition, 20 million solar lighting systems will be created/ distributed in rural areas, saving about 1 billion litres of kerosene every year.
- **Green India Mission** is being launched with an overarching target to double the area to be taken up for afforestation/eco-restoration in India in the next 10 years, taking the total area to be afforested or eco-restored to 20 million ha.
- **Indian Network for Climate Change Assessment (INCCA)** has been established to undertake a major “4X4” assessment of the impacts of climate change on four sectors – water resources, agriculture, forests and human health – in four critical regions of India—the Himalayan region, North East, Western Ghats and the Coastal India.
- **A National Clean Energy Fund** with potential of generating about ₹ 3000 crores of revenue annually has been set up with effect from July 2010 with levy of a cess of ₹ 50 per tonne on production of domestic and imported coal. The Fund will be used for supporting initiatives for clean energy and environmental management.

In the Parliament

The issue of climate change has garnered the attention of the parliamentarians in the recent past and it was duly reflected when the subject was extensively taken up in the House under various parliamentary devices during the years 2009 and 2010.

Questions: As many as 24 Starred Questions and 106 Unstarred Questions were taken in the Lok Sabha and the Rajya Sabha during the period 2009-2010 indicating the keen awareness of the members on this serious issue.

Short Duration Discussion: On 3 December 2009, the Lok Sabha had a meaningful Short Duration Discussion under Rule 193 on ‘Climate Change’ which was raised by Dr. Murli Manohar Joshi. As many as 26 members participated in the five hour long debate. The debate ended with a reply from the Minister of Environment and Forests.

Statements: The Minister of Environment and Forests has been making statements in the Parliament reflecting Government’s stand on the issue of climate change at the international forums.

Calling Attention/Special Mentions/Submissions: The issue of climate change was debated extensively under the procedural devices of Calling Attention/Special Mentions/Submissions by members in both the Houses of Parliament.

The National Green Tribunal Act: The National Green Tribunal Bill was passed by both the Houses of Parliament and assented to by the President on 2 June 2010. The Act seeks to establish a Green National Tribunal for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources, including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property.

Reference: The Speaker, Lok Sabha made a reference on the occasion of the World Environment Day on 5 June 2009 and said “let us re-dedicate ourselves, on this day, to combat the challenges of climate change and to ensure a cleaner and greener environment”.

Parliamentary Committee: The Departmentally Related Standing Committee (DRSC) on Science and Technology, Environment and Forests in its 210th Report had recommended that the Ministry must have a programme of climate change with sufficient budgetary allocations.

Pursuant to the recommendations, the Ministry of Environment and Forests, under the aegis of INCCA, has taken the initiative of advancing the science programme on climate change to establish appropriate institutional set-up and scientific/technical programmes in addition to the existing activities in the Ministry. The scientific programme on climate change will encompass the basic, applied and analytical research activities to generate information and data. This will include various modelling studies as well as collection and collation of data/scientific information with a view to help the government evolve appropriate policy measures to prevent/ combat impact of climate change. The research activities will be carried out through national, scientific, academic and autonomous research organizations.

Parliamentary Forum on Global Warming and Climate Change: The Forum was constituted for the first time in 2008 and since then has been aggressively involving parliamentarians to interact with specialists working on global warming and climate change. The Forum had organized on 3 May 2010 a presentation on “*The Road map for reduction in emission intensity of Indian GDP by 20-25% by 2022*”.

This Information Bulletin has been prepared by the Legal and Constitutional Affairs Wing of the Research and Information Division for the use of Members of Parliament in support of their parliamentary work. This is based on published sources and is intended to serve only as a background aid. Feedback is welcome and may be sent to [***lca-iss@sansad.nic.in***](mailto:lca-iss@sansad.nic.in).