Climate Change Conferences – Objectives and Impacts

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INTRODUCTION

Word “climate change” itself shows unpleasant environment to human beings but it has been created by human beings. Change of economy face from traditional economy to industrialized economy, growth in population level and energy security for huge population increased the emissions level many times than it was in the three centuries before and it caused for global warming. Increased emissions resulted in drought, floods, extinction of species, rise in sea level and change in monsoon. The impact of climate change have been started to realise by human society and now trying to remove the footprint of human beings in recent climate changes. So they came up with world conferences for immediate action and it led to creation of treaties and protocols. This paper analysis about international response for climate change, its objectives and challenges faced by the available mechanism.

First world climate conference is the first world response towards climate change.

First World Climate Conference:

First world climate conference was held on Feb 1979 in Geneva which was organized by World Meteorological Organization. It was one of the major international conferences on climate change. The conference organized four working groups to look into climate scientific data, identification of climate issues, study on impact created by human, research on climate viability and change. The conference led to establishment of world climate programme and climate research programme and also led to the creation of Intergovernmental Panel on Climate Change (IPCC) by WMO and UNEP in 1988.It urged world’s government to forecast the climate change and it mostly focused on how climate change might affect human activities. It examined the possible impacts on special activities such as agriculture, fishing, forestry, hydrology and urban planning. The conclusions were summarized in the Declaration of the world climate conference which highlighted the international community’s perception of climate as an essential resource. The Declaration also identified cause of global warming as increased atmospheric concentration of carbon dioxide resulting from the burning of fossil fuels, deforestation, and changes in land use.

Impacts:

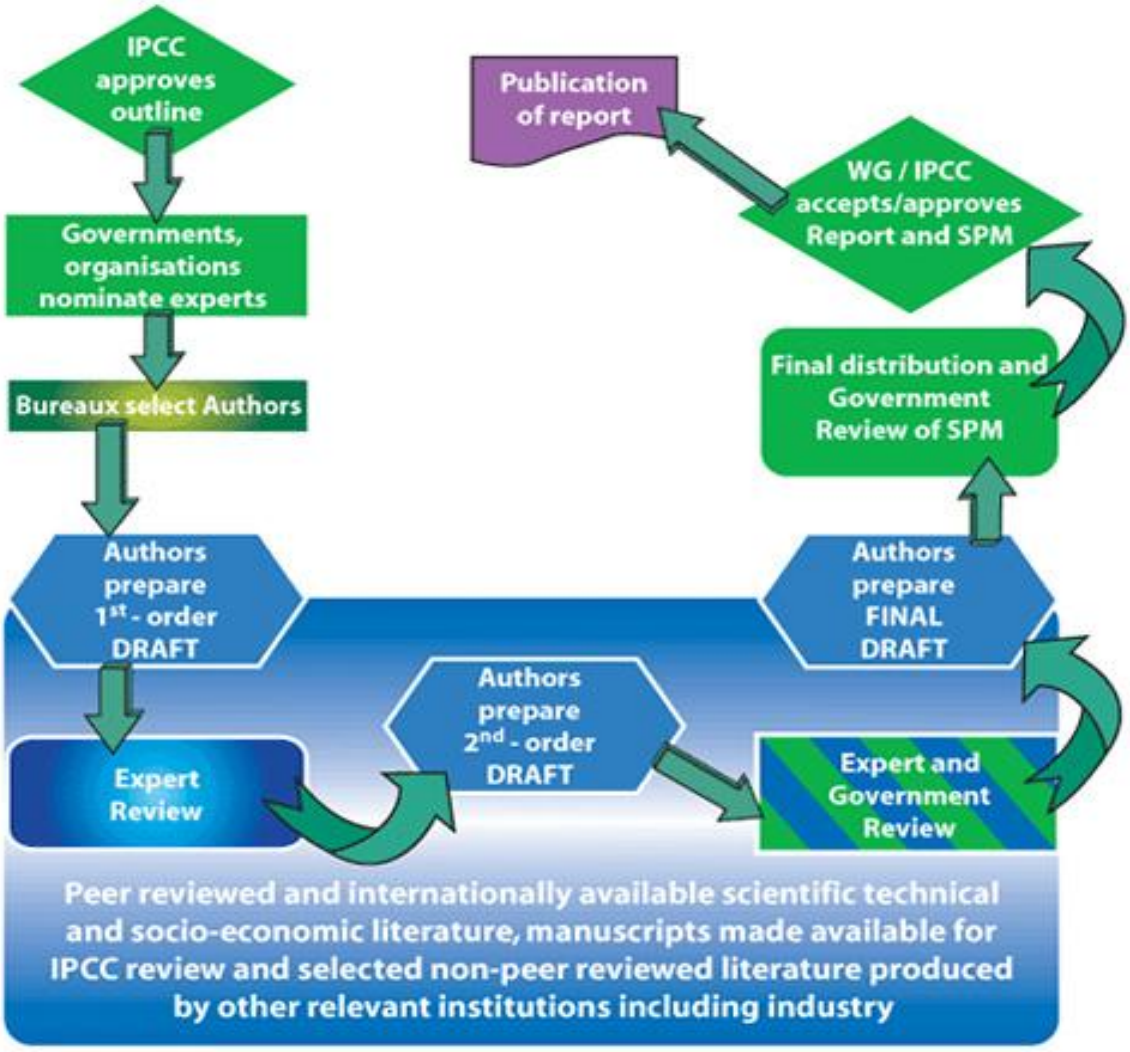
This first world climate conference led to signing of convention on Long range transboundary air pollution by 34 governments and EU and this led to commitment towards reduction of reducing sulphur emissions (1985) and reducing nitrogen oxide (1988)

Intergovernmental Panel on Climate Change (IPCC):

IPCC is a scientific intergovernmental body was established in 1988 by World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP). The IPCC is tasked with reviewing and assessing the most recent scientific, technical and socio-economic information and provides world with a clear scientific view on the current state of climate change and its potential environmental and socio economical consequences. The IPCC does not carry out any of its own research work. Main activity of IPCC is publishing special reports on topics relevant to the implementation of the UNFCCC.

Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis as authors, contributors and reviewers. None of them is paid by the IPCC. IPCC is only open to member states of the WMO and UNEP. The IPCC reports are cited in almost any debate related to climate change. IPCC is currently organized in 3 working groups and task force. They are assisted by Technical support units (TSU), which are hosted and financially supported by Government of the developed countries. The IPCC work is supported by a central secretariat, whose role is to plan, coordinate and oversee all IPCC activities. The IPCC Bureau comprises the IPCC Chair, the IPCC Vice-Chairs, the Co-Chairs and Vice-Chairs of the Working Groups and the Co-chairs of the Task Force. The Panel meets in Plenary Sessions at the level of Government Representatives for all member countries. Major decisions are taken by the Panel during the Plenary Session.

IPCC working structure is given below



Source-IPCC official site

Second World Climate Conference:

The world climate conference was held on 29th October to 7th November 1990 in Geneva. IPCC first assessment report was completed for this conference and this conference was more political than first world climate conference. The main task of this conference was to review the world climate programme set up by the first conference such that to review the world climate programme, IPCC first assessment report. The scientist and experts emphasized on risk of climate change but ministerial declaration was not showing the high level commitment and disappointed the participated scientists. The conference statement emphasized on additional international observational and research efforts would be necessary to strengthen the knowledge base of climate process and human interactions.

SWCC encouraged these streams international activities

- Future structure of the world climate programme
- Requirement of developing countries to meet the energy security and build up their capability
- Cooperation in International Research through the WCRP, IGBP and other related international programmes

IPCC First assessment report

The IPCC First Assessment Report was completed in 1990 and served as basis of the UNFCCC.

Highlights of First Assessment Report:

- Emissions resulting from human activities increase CO2, methane, CFC and nitrous oxide. This enhances green house effect and results to global warming
- Long living gases requires immediate reduction in emissions from human activities to reduce the concentration 60% at present level
- Based on current model, estimated increase in global mean temperature would be 0.3 ^{o}C per decade
- Average rate of global mean sea level rise of about 6cm per decade due to thermal expansion of the oceans and melting of some land ice

United Nations Framework Convention on Climate Change (UNFCCC)

UNFCC is an international environmental treaty submitted at the United Nations Conference on Environment and Development (UNCED) and also it known as earth summit held in Rio de Janeiro from June 3 to 14, 1992. Its objective is to stabilize the greenhouse gas concentrations in the atmosphere at the level of prevent dangerous and reduce anthropogenic (man-made changes) with climate system. Kyoto protocol is part of the UNFCCC. The UNFCCC opened for signature on May 9, 1992 but it came to force on March 21, 1994. At

June 1992 UNFCCC treaty signed by 152 countries including voluntary countries and December 2009 it had 192 parties. The UNFCC first task is removal of green house gas inventories which were used to create bench mark level for level1 countries and for the commitment of those countries green house gas reductions.

UNFCCC classified countries into three categories

- **Annex1- industrialized countries and economies in transition**

  There are 40 Annex 1 countries and European Union also a member. These countries are classified as classified and economies in transition. These countries have committed to reduce emission level of green house gases (GHG) to below the 1990 specified level i.e. benchmarking set by UNFCCC according to 1990 emission level which has to be quantified value to achieve the below 1990 emission level. They may implement through allocating the reduced allowances according to emission level for major players. They can exceed their allocations by buying emission allowances or offset their exceeded quantity through accepted mechanism by all the UNFCCC countries.

  Annex1 countries:

  Some of the countries-US, UK, Australia, Canada, France, Germany, Italy, Japan, Newzland, Denmark

- **Annex2-Developed countries which pay for costs of developing countries**

  There are 23 Annex 2 countries and European Union. It is a subgroup of Annex1 countries and it comprises OECD countries but it excluded the transition in economy countries.

  Annex-2 countries:

  Some of the countries-US, UK, Australia, Canada, France, Germany, Italy, Japan

- **Developing countries:**

  Developing countries not required to reduce the emission levels unless they are getting fund and technology from developed countries

  Reasons for no restriction on emissions level:

  1. Emission control adverse link with development of country.
  2. Developed nations have contributed for more for the present level concentration
  3. Developing countries per capita income is still very low
  4. Share of developing countries in emission level likely to increase in future
  5. They can sell carbon credit to emission reduction committed countries
  6. They can get funds and technology from Annex2 countries

Developing countries may volunteer to become Annex1 country when they have sufficient economy level.

Conferences of the Parties (COP):

Since UNFCCC came in to force, there has been annual meeting for their parties called Conference of the Parties (COP) to assess the climate change activities progress of those countries. From 2005 onwards COP meeting held along with Meetings of Parties of the Kyoto Protocol (MOP), and parties to the Convention that are not parties to the Protocol can participate in protocol related meetings as observer.

IPCC Second Assessment Report:

Working group I,II&III committed itself to completing its Second Assessment in 1995, not only updating the information on the same range of topics as in the First Assessment, but also including the new subject area of technical issues related to the socio-economic aspects of climate change. The IPCC Second Assessment Report was completed in on time and WGI reported on the science of climate change, WGII reported on the scientific-technical analyses of impacts, adaptations, and mitigation and WGIII reported on the economic and social dimensions.

Major conclusions of working group I:

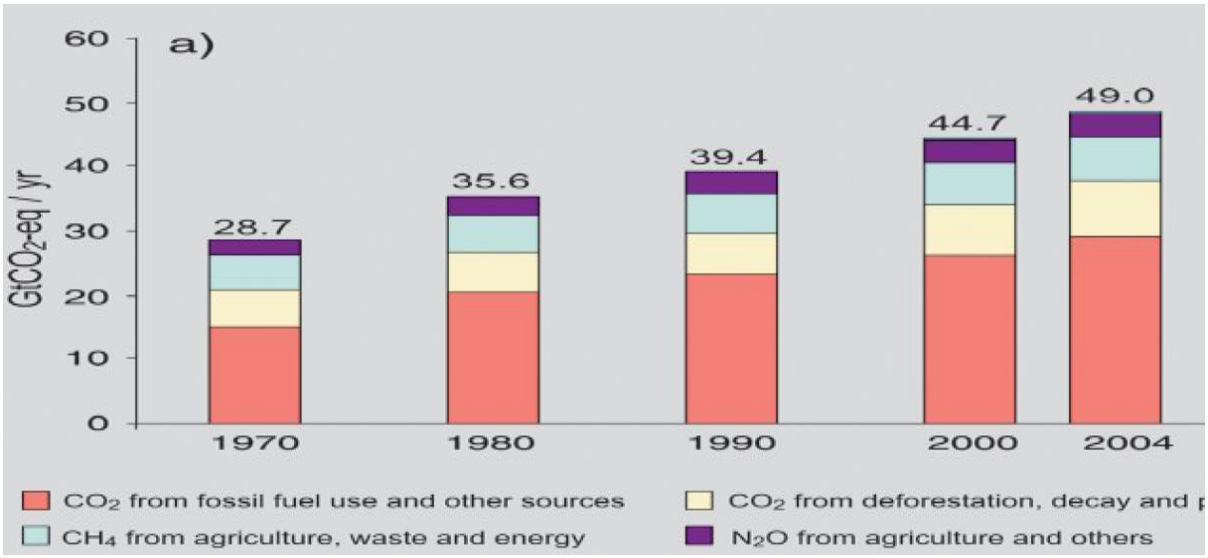
- Greenhouse gas concentrations have continued to increase
- Anthropogenic aerosols (tiny particles that are major contributors to smog and haze) tend to produce negative radiative forcing
- Climate has changed over the past century
- The balance of evidence suggests a discernible human influence on global climate
- Climate is expected to continue to change in the future
- There are still many uncertainties

There is evidence of an emerging pattern of climate response to forcings by greenhouse gases and sulphate aerosols in the observed climate record.

WGII provided several conclusions:

- Models project that a substantial fraction of the existing forested areas will undergo major changes in broad vegetation types and deserts are likely to become more extreme
- Productivity of agriculture and forestry will increase in some areas and decrease in others
- Developing countries will be more seriously affected and may have fewer adaptation options.

WGIII found that a sensible way to deal with climate change is through a portfolio of actions, which will differ according to country



Source: UNEP

Impacts:

First and second world climate conferences were tried to prepare scientific data, impact assessment, and preparing treaties to the countries. So there were no considerable action taken place towards reduce the emissions. Kyoto protocol was the first successful protocol for emission reduction. Fig shows apparently that there were no symptoms of controlling the emissions even Kyoto protocol came into force in 2005 due unsolved issues between countries.

Kyoto Protocol:

Kyoto protocol is a protocol, part of the UNFCCC treaty aimed to reduce the green house gas emissions caused by humans to fight against global warming. The protocol initially was adopted by COP3 parties on 11th December 1997 in Kyoto, Japan and came to force on 16th December 2005. The protocol has been signed by 191 countries among these 39 Annex1 countries committed to reduce the green house gas emissions (GHG) and two group gases hydro fluorocarbons, perflurocarbons by specified level and chlorofluorocarbon to avoid depletion ozone layer. The Kyoto protocol came into force on 16th February 2005

Principle concepts of Kyoto protocol:

- Legal commitment for Annex1 countries to reduce the GHG emission reduction
- In order to reduce GHG emissions, Annex1 countries required to prepare polices and measure for the reduction of GHG for that they are required to utilise all the available mechanisms such as joint implementation, clean development mechanism(CDM) and emissions trading by carbon credits
- Reduced impacts on developing countries by adaption fund for climate change
- Accounting, review of process and reporting of integrity of Kyoto protocol

Mechanisms for Emission reduction:

1. International Emissions Trading(IET)
2. Clean Development Mechanism(CDM)
3. Joint Implementation(JI)

CDM and JI are called project based mechanisms because emission reduction can be achieved by implementing projects. It is based on idea of "production" of emission reductions and it is formulized to encourage reduction on GHG in non-Annex-1 countries. IET based on setting up of quantitative restriction on emission reduction and JI encourages emission reduction in developed countries.

The emission reductions achieved by CDM are called certified emission reductions (CERs) and reductions achieved by JI called emission reduction units (ERUs). These reductions are called in credits.

Commitments towards reduction:

- Industrialized countries committed to reduce their collective emissions by 5.2%
- EU committed to reduce by 8%
- US-7%, Japan-6%, Russia-0% committed reduce the emissions

COP6 attempted to solve the issues between EU(wanted stronger agreement) and US, Canada, Japan, Australia (wanted less demanding agreement) but it was unable to reach the solution.COP7 was held on 2001 to establish the final details of the protocol.

The first meeting of the parties to the Kyoto protocol (MOP1) was held in 2005 along with COP11 of UNFCCC.

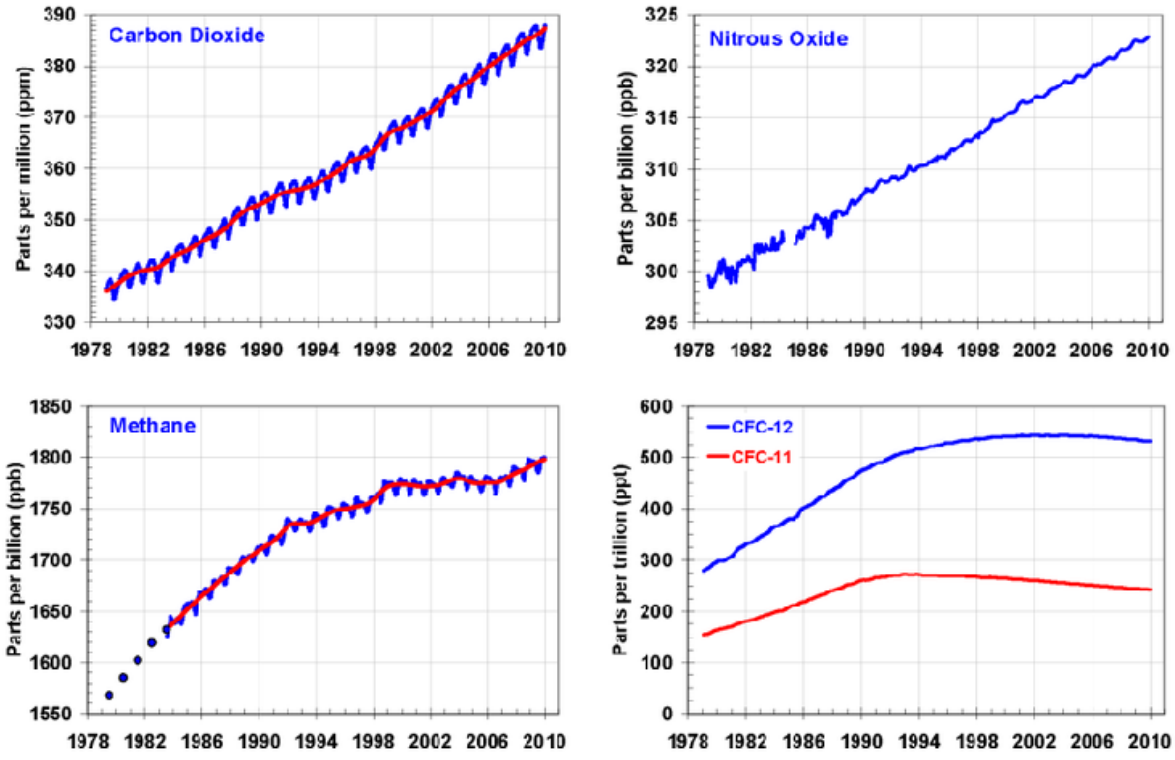
Impacts:

Kyoto protocol is major initiative taken by UNFCCC to reduce the emissions, even though it was created on 1997 but it came to force on 2005 due to dissolved disputes between countries. Around 190 countries have signed for emission reduction and the Kyoto protocol provided various mechanisms to reduce the emissions. It came up with carbon credits and trading those credits between countries. It has created awareness among industries and society and derived considerable investment to energy conservation and energy efficiency.

But emission reduction lies only in the paper and it does not provided any quantitative production. It has shown clearly in below figure. Carbon dioxide, nitrous oxide and methane are increasing at same rate which had before 1990. Only CFC has come down due to restriction from governments to save ozone layer from depletion.

High rate economic growth of developing countries (China, India, and Brazil) and increase in per capita consumption of those countries are the reasons for increase in emissions of those countries and expected to be major contributors for emissions in future.

Lack of solid mechanism to emission control from deforestation.



Source - Wikipedia

IPCC Third Assessment report (TAR):

IPCC third assessment report was completed on 2001 and it focuses on environmental, social, economic consequences of climate change and potential adoption responses. It consists of sensitivity, adaptive capacity, vulnerability of natural and human systems to climate change and the potential impacts.

Major conclusions of TAR:

- Average global temperature have increased 0.6°C over 20th century and temperature have risen over past 4 decades in lower 8KM circle and resulted in decrease of snow cover and ice extent.
- Emissions due to human activities continue to alter atmosphere and produces negative radiative forcing.

- Ability of simulation models to project the future has increased due to demonstrated performance on a range of space and time scales.
- There is new and stronger evidence of global warming for last 50years derived by human activities
- Human contribution towards climate change will continue throughout the 21st century
- Special report on emission scenarios, the projected concentration on CO2 in the year 2100 will be in the range of 540-970 ppm, compared to 280ppm in pre industrial era and 368 ppm in year 2000
- Projections using SERS models results in increase of global temperature from 1.4 to 5.8°C
- Global sea level projected to rise by 0.09 to 0.88m between years 1990 and 2100.
- Climate change projected to increase threats to human health especially for low income people who are living in tropical/subtropical countries

Bali climate conference (COP13):

COP13 held on December 2007 in Bali, Indonesia, it is famously known as Bali conference. The meeting had 10000 participants including 180 countries representatives and observers from intergovernmental and nongovernmental organizations. The COP13 conference led to final agreement known as Bali road map. This Bali conference outlined a new negotiation process for path of post Kyoto protocol (after 2012). This included adaptation fund for developing countries, technology import from industrialised countries, emission reduction to achieve specified level and solution for deforestation.

But there were more controversy between countries especially between U.S and India, China

- U.S position was not aligned with other countries
- Restriction on developing countries (china, India) while developed countries was not able to reduce the emissions below specified level

There were uncertainty in U.S position and developing countries expressed their dissatisfaction in the conference itself.

IPCC Fourth Assessment report:

IPCC fourth assessment was completed on 2nd February 2007. Three working groups compiled reports on physical science, impacts, adaptation, vulnerability and mitigation of climate change

Working group I: The physical science basis

Changes in atmosphere:

- Carbon dioxide, methane, and nitrous oxide are long lived gases increased rapidly due to human activities

- Amount of CO2 in atmosphere in 2005(379ppm) reached the highest mark in 650000years
- Amount of methane in atmosphere in 2005(1774ppb) reached the highest mark in 650000years
- Primary source of increase in CO2 due to fossil fuels
- Primary source of increase in methane is combination human agricultural activities and fossil fuels

Warming of the planet:

- Global average temperature increased about 0.74°C for last 100years (which is 0.6°C in third assessment report)
- Ocean has been absorbing more than 80% of the heat added to the climate system
- Average arctic temperature increase in almost double the global average rate in the past 100 years

Ice, snow, rain and the oceans

- Mountain glaciers and snow cover have declined on average in both hemispheres
- Greenland and Antarctica land based ice sheets melting have mostly contributed (>90%) for sea level rise
- No clear trend in number of hurricanes i.e. increase in hurricanes
- For increase in hurricane intensity above caused by the human activities

Factors for warm or cool the planet:

- Sulphate aerosols from fossil fuels combustion have a cooling impact on climate and which partially counteracts the global warming caused by CO2
- Radiative forcing from the sun from all human activities is about +1.6watts/sq.mt
- Radiative forcing from increase in solar intensity is about +0.12watts/sq.mt
- Radiative forcing from CO2, methane and nitrous oxide increasing at faster rate than past 10000years
- Projections using SERS models results in increase of global temperature from 2 to 4.5°C and best estimate about 3°C

Radiative forcing is altering the incoming and outgoing energy in atmosphere. Positive index shows the negative impact on climate and vice versa

Working group II: Impacts, Adaptation and Vulnerability

Major conclusions of working group II

- Changes in arctic and Antarctic eco systems
- Increase in rock avalanches in mountain regions
- Changes in spring events unfolding leaves, laying eggs, migration, etc
- More and larger glacier lakes
- Increasing ground instability in permafrost region

- Increase in water temperature affects algae, fish, etc and leads change in water circulation, oxygen, ice cover

Working group III: Mitigation of climate change

Mitigation in the short term and medium term:

Sector	**Key mitigation technologies and practices currently available**	**Key mitigation technologies and practices projected to be commercialized before 2030**
Energy supply	Improved supply and fuel efficiency-fuel switching from coal to gas, nuclear and renewable power	Carbon capture and storage(CCS) for coal, gas and biomass based electricity and advanced nuclear, tidal and renewable energy
Transport	Fuel efficient vehicles-hybrid vehicles, cleaner diesel vehicles, usage of public transport, usage of cycles and transport planning	Advanced electric and hybrid vehicles, efficient aircrafts and second generation bio fuels
Buildings	Efficient lighting, usage of day lighting, efficient electrical appliances, promoting green building, alternative refrigeration fluids	Integrated design of commercial buildings such as intelligent meters and solar PV integrated in buildings
Industry	More efficient electrical equipment usage, heat and power recovery, material recycling and control of non-CO2 gas emissions	Advanced energy efficiency, CCS for cement, ammonia and iron manufacture
Agriculture	• Improved cropping system • Improved rice cultivation techniques • Management to reduce methane emission • Improved nitrogen fertiliser	Improved crop yields
Forestry	Reduced deforestation, forest management, reforestation and use of forestry products for bio-energy to replace fossil fuels	Improved remote sensing technologies for analysis of vegetation/soil carbon sequestration and land usage. Tree species improvement to increase biomass productivity and biomass sequestration
Waste	Land fill methane recovery, controlled waste treatment, recycling and waste minimization	Biocovers and biofilters to optimize CH4 oxidization

IPCC estimates

- Stabilizing green house gases between 445-535ppm CO2 equivalent would result in reduction of 0.12% annual GDP
- Stabilizing green house gases between 535-590ppm CO2 equivalent would result in reduction of 0.1% annual GDP
- Stabilizing green house gases between 590-710ppm CO2 equivalent would result in reduction of 0.06% annual GDP

Copenhagen climate conference:

Copenhagen is a global collaboration between international business and science founded in 2007 by leading independent think tank in Scandinavia, Denmark. The Copenhagen climate meet (COP15) was to provide technical, public support and assistance to the decision makers about creating new treaty to replace Kyoto protocol (after 2012). The Bali conference provided the road map for post Kyoto protocol treaty. The Copenhagen council comprises 30 global leaders classified as business leaders, scientists and policy makers.

Key points of the Accord:

- Politics – acknowledgement of seriousness of problem and need for immediate emergency action by all the parties
- Science – global average temperature increase kept below 2°C
- Developed countries need to provide financial, technical and support for capacity build up.
- Developed countries will commit to quantified emission reduction by 2020
- Developing countries will implement emission reduction that are monitored, reported and verified
- Financial – developed countries committed to provide $30billion between 2010 to 2012 and $100billion per annum by 2020. This will be from both public and private participation and this fund will be used to provide financial, technical and support for capacity build up
- REDD plus – provide funds to reduce emissions from deforestation and degradation

Positive bits:

- US, china, India and other developing countries signed agreement for first time
- All the countries are committed to reduce the emissions
- Limiting global average temperature increase below 2°C
- Monitoring, reporting and verification for developing country emission reduction
- Developed countries committed to provide $100billion per annum

Missing bits:

- No clarity over CDM and other market based mechanisms
- Lack of long term reduction goal such as 2050
- No timetable for legally binding agreement

Copenhagen climate summit criticised by many experts and scientists and considered as failure by many countries but its failed to replace Kyoto protocol and controversial in emission reduction commitment between US and developing countries (India & china).

UK calculated its carbon footprint as 1.2billion tonnes of green house gas

Annual CO2 emissions for top 5 countries:

Country	**Annual CO2 emissions(metric tonnes)**	**% of global total**
China	6538367	22.30%
United states	5838381	19.91%
European union	4177817	14.04%
India	1612362	5.50%
Russia	1537357	5.24%
World	29321302	100%

Two Asian developing countries listed in the top5 emitters, so consensus of developing countries will lead to effective implementation.

Commitments of countries:

India has committed to reduce carbon emissions intensity by 20-25% below 2005 levels by 2020

China has committed to reduce carbon emissions intensity by 40-45% below 2005 levels by 2020

Japan has committed to reduce green house gas emissions by 25% below 1990 levels by 2020

US has committed to reduce green house gas emissions by 25% below 1990 levels by 2020

COP16 to be hosted by Cancun, Mexico and COP17 expected to be held in Durban, South Africa. These two conferences believed to provide a suitable protocol to cut down the emissions while having consensus of all the countries.

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