

UNIT-4 (ENERGY ENVIRONMENT CLIMATE CHANGE)

An overview of bureau of energy efficiency (BEE)

- BEE was established on 1st March 2002, under the provisions of the Energy Conservation Act, 2001, under the Ministry of Power.
- The mission of BEE is to assist in developing policies and strategies for energy efficiency with the primary objective of reducing the energy intensity of the Indian economy.
- Functions: It is responsible for regulatory and promotional functions outlined in the Energy Conservation Act, 2001.
- BEE has helped India reduce its energy consumption by around 3.5%.
- The **22nd Foundation Day of the Bureau of Energy Efficiency** was recently celebrated with the theme "**Energy Transition through Electrification and Decarbonization in India**" and the **State Energy Efficiency Index 2023** was released.
- The Bureau of Energy Efficiency is an agency of the Government of India, under the Ministry of Power created in March 2002 under the provisions of the nation's 2001 Energy Conservation Act. The agency's function is to develop programs which will increase the conservation and efficient use of energy in India. The government has proposed to make it mandatory for certain appliances in India to have ratings by the BEE starting in January 2010.
- The Bureau of Energy Efficiency is a statutory agency under the Ministry of Power.
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- It mandatory for certain appliances in India to have BEE ratings.

Standards & Labelling Program (BEE star label)

- The Objectives of Standards & Labelling Program is to provide the consumer an informed choice about the energy saving.
- The scheme targets display of energy performance labels on high-energy end-use equipment & appliances and lays down minimum energy performance standards.

The Major Promotional Functions of BEE include:

- Create awareness and disseminate information on energy efficiency and conservation.
- Arrange and organize training of personnel and specialists in the techniques for efficient use of energy and its conservation.
- Strengthen consultancy services in the field of energy conservation.
- Promote research and development.
- Develop testing and certification procedures and promote testing facilities.
- Promote use of energy efficient processes, equipment, devices and systems.
- Take steps to encourage preferential treatment for use of energy efficient equipment or appliances.
- Promote innovative financing of energy efficiency projects.
- Give financial assistance to institutions for promoting efficient use of energy and its conservation.

- On this occasion, BEE expanded the coverage of its star labelling programme by including energy efficient Deep freezer and Light Commercial Air Conditioners (LCAC).
- With this inclusion BEE will cover 26 appliances.
- Deep freezer and Light Commercial Air Conditioners (LCAC) are major energy guzzlers in commercial space.
- The program will be initially launched in voluntary mode from 2nd March, 2020 to 31st December, 2021. Thereafter, it will be made mandatory after reviewing the degree of market transformation in this particular segment of appliances.
- Through this initiative, it is expected to save around 2.8 billion Units by FY2030, which is equivalent to Green House Gas (GHG) reduction of 2.4-million-ton Carbon Dioxide.

National Action Plan on Climate Change (NAPCC)

The National Action Plan on Climate Change (NAPCC) was released by the Prime Minister on 30th June 2008.

It outlines a national strategy that aims to enable the country to adapt to climate change and enhance the ecological sustainability of India 's development path. It 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.

There are eight National Missions on climate change:

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Eco-system
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

The Principles of NAPCC are:

- Protecting the poor through an inclusive and sustainable development strategy, sensitive to climate change
- Achieving national growth and poverty alleviation objectives while ensuring ecological sustainability
- Efficient and cost-effective strategies for end-use demand-side management
- Extensive and accelerated deployment of appropriate technologies for adaptation and mitigation
- New and innovative market, regulatory, and voluntary mechanisms for sustainable development
- Effective implementation through unique linkages – with civil society, LGUs, and public-private partnerships

Challenges faced by NAPCC

1. The policy was formulated in haste. There was a lot of delay in the approval of ministries.
2. There was a change in government at the centre.
3. The monitoring system was ineffective.
4. Budgetary support was very limited.

National Mission for Enhanced Energy Efficiency

National Action Plan on Climate Change wanted to tackle the energy aspect, which resulted in the formulation of the National Mission for Enhanced Energy Efficiency. It was introduced with an objective to promote the market for energy efficiency by encouraging innovation.

The National Mission for Enhanced Energy Efficiency (NMEEE) is one of the eight national missions under the National Action Plan on Climate Change (NAPCC).

NMEEE aims to strengthen the market for energy efficiency by creating conducive regulatory and policy regime and has envisaged fostering innovative and sustainable business models to the energy efficiency sector. The Mission is implemented since 2011.

NMEEE consist of four initiatives to enhance energy efficiency in energy intensive industries which are as follows:

Schemes under NMEEE

1. **Perform Achieve and Trade Scheme (PAT)**
2. **Market Transformation for Energy Efficiency (MTEE)**
3. **Energy Efficiency Financing Platform (EEFP)**
4. **Framework for Energy Efficient Economic Development (FEEED)**

Perform Achieve and Trade Scheme

This is applicable for large scale energy-intensive industries. It is a market-based mechanism to improve on the cost-effectiveness of energy efficiency and certification of energy savings that could be traded.

The energy savings achieved by notified industries is converted into tradable instruments called Energy Saving Certificates (ESCerts). The ESCerts after issuance by Bureau of Energy Efficiency are traded at Power Exchanges.

PAT is a cyclic scheme where certain notified energy intensive units having threshold energy consumption are given Specific Energy Consumption (SEC) reduction targets over a cycle of three years. PAT Scheme or the Perform, Achieve and Trade Scheme was launched by the Bureau of Energy Efficiency (BEE) in July 2012.

- The chief goal of the scheme is to make India's industrial sector energy efficient.
- The scheme sets energy efficiency targets for industries with those failing to achieve the targets having to pay a penalty. The penalty is based on what remains to be achieved in terms of the target.

Market Transformation for Energy Efficiency

Give more thrust to innovations to produce appliances that are completely affordable and energy-efficient.

Two programmes have been developed i.e. Bachat Lamp Yojana (BLY) and Super-Efficient Equipment Programme (SEEP)

Energy Efficiency Financing Platform

Energy Efficiency Financing Platform (EEFP) was launched as one of the initiatives under National Mission for Enhanced Energy Efficiency to provide a platform to interact with Financial Institutions (FIs) and project developers for implementation of energy efficiency projects.

Framework for Energy Efficient Economic Development (FEEED)

Developing fiscal instruments to leverage financing for Energy Efficiency through risk mitigation:

BEE started 2 different types of funds with the objective of boosting the confidence of investors and banks thereby avoiding the risk of projects getting stalled due to lack of funds. The 2 types of funds are

- 1) Partial Risk Guarantee Fund for Energy Efficiency
- 2) Venture Capital Fund for Energy Efficiency.

Energy Conservation Building Code

The Energy Conservation Building Code (ECBC) set minimum energy performance standards for commercial buildings.

Under section 14 (p) of the Energy Conservation Act, 2001, Central Government has powers to prescribe ECBC for non-residential buildings, having connected load of 100 KW and above or a contract demand of 120 KVA and above or recommended built-up area of 1000 sqm and above. or building complex for efficient use of energy and its conservation. The state governments have the flexibility to modify ECBC to suit local or regional needs. Energy performance standards for the following building systems will be included in the ECBC:

1. Building Envelope
2. Heating Ventilation and Air Conditioning
3. Lighting
4. Service Water Heating
5. Electric Power and Distribution

In existing building, we could save upto 30 percent of electricity by applying ecbc code. For this we could do retrofitting in the existing building and can make building close to ECBC compliant building.

Purpose

The purpose of this code is to provide minimum requirements for energy efficient design and construction of buildings.

- Building sector -33%
- Commercial sector -8%
- Residential sector-25%
- ECBC compliance building –can save 40 to 60% electricity
- Nation wide mandatory compliance- 1.7 billion KWH
- Its a first step towards Energy conservation
- Developed after extensive research work
- Considered comfort conditions
- Helpful for persons involved in design and construction of ECBC compliant buiding

Applicable to buildings

- Minimum energy performance standards for design and construction be prescribed.
- Applies to new construction and major renovation.
- Building components included
 - ❖ Building Envelope (Walls, Roofs, Windows)
 - ❖ Interior and exterior Lighting
 - ❖ HVAC system
 - ❖ Service water heating and pumping
 - ❖ Electrical Systems (Power factor, Transformer)

Exemptions to buildings

- Buildings that do not use electricity or fossil fuels
- Equipment and portion of the building systems that use energy primarily for manufacturing processes
- When this code is in conflict to safety, health
- Environment codes shall prevail.

Impact of ECBC – Energy Savings

- Average energy use: For light and HVAC a typical class A office building consumes 200kWh/sq m/Yr.
- Mandatory enforcement of ECBC is likely to reduce the energy use by 30-40% to 120 – 160 200kWh/sq m/Yr.
- Energy saving as per BEE estimate – Saving of 1.7 billion kWh, with national mandatory enforcement, in the first year it self.

Bio diversity and its conservations

Biodiversity refers to a variety of plant and animal life on Earth. Biodiversity is of three types:

- **Genetic diversity** – It refers to the total number of genes in the genetic makeup of a species. For e.g., the genetic variation shown by Rauwolfia vomitoria (medicinal plant).
- **Species diversity** – It represents the number of species found in an ecological community. For example – The Western ghat has a greater number of amphibian species compared to the Eastern ghats.
- **Ecological diversity** – Greater diversity observed at the ecosystem level in a particular area with its deserts, mangroves, rain forests, etc.

Loss of Biodiversity

- Deterioration in plant production,
- Decreased resistance to environmental issues such as drought, global warming, etc., and
- High variability in certain ecosystem processes such as plant productivity, water use and pest and disease cycles.

Causes of Biodiversity Loss

The following are the causes of the loss of biodiversity.

- Habitat loss and fragmentation
- Over-exploitation
- Co-extinctions

Biodiversity Conservation

Biodiversity conservation is the protection, upliftment and management of biodiversity to derive sustainable benefits for present and future generations.

The enormous value of biodiversity due to their genetic, commercial, medical, aesthetic, ecological and optional importance emphasizes the need to conserve biodiversity. Gradually we are coming to realize that wildlife is not just a game to be hunted, rather it is a gift of nature to be nurtured and enjoyed. A number of measures are now being taken the world over to conserve biodiversity including plants and wildlife. There are two approaches of biodiversity conservation:

- **In situ conservation** (within habitat) – It involves the protection and conservation of a variety of animals and plant species in its natural habitat. It includes biosphere reserves, hot spots, national parks and sanctuaries, wild forests etc.

At present we have 7 major Biosphere reserves, 80 National Parks, 420 wild-life sanctuaries and 120 Botanical gardens in our country covering 4% of the geographic area. The Biosphere Reserves conserve some representative ecosystems as a whole for long-term in situ conservation.

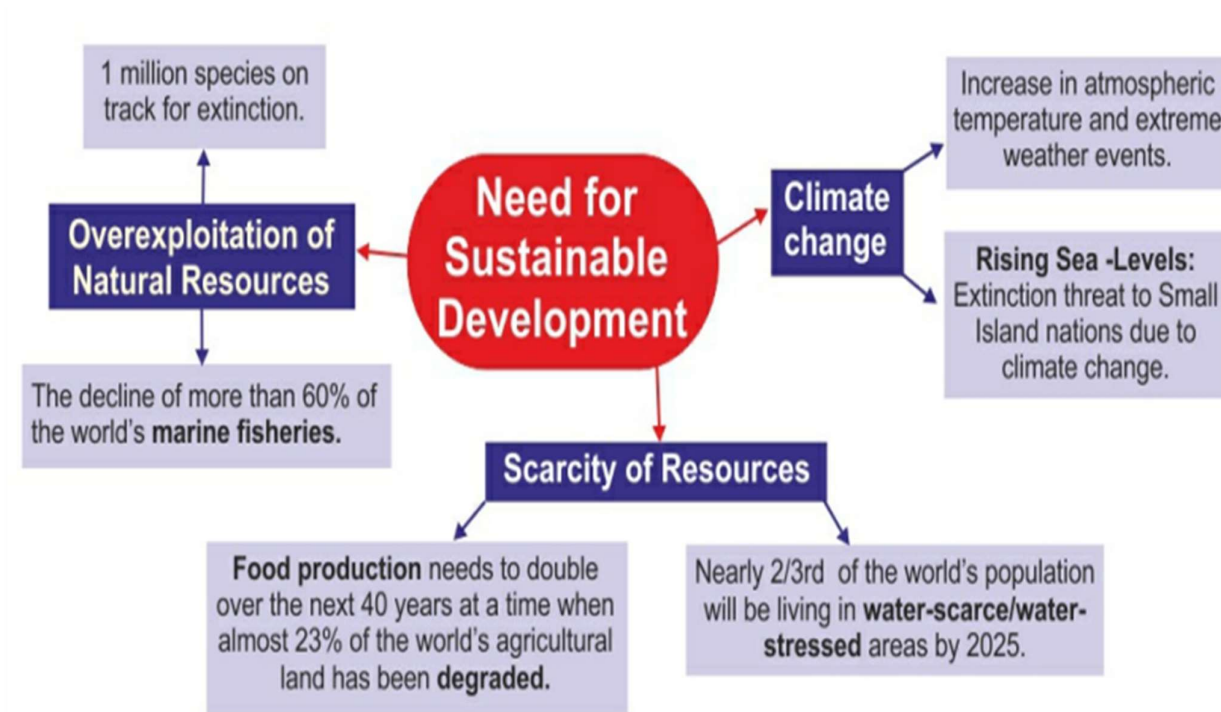
In India we have Nanda Devi (U.P.), Nokrek (Meghalaya), Manas (Assam), Sunderbans (West Bengal), Gulf of Mannar (Tamil Nadu), Nilgiri (Karnataka, Kerala, Tamil Nadu), Great Nicobars and Simlipal (Orissa) biosphere Reserves. Within the Biosphere reserves we may have one or more National Parks. For example, Nilgiri Biosphere Reserve has two National Parks viz. Bandipur and Nagarhole National Park. A National Park is an area dedicated for the conservation of wildlife along with its environment. It is also meant for enjoyment through tourism but without impairing the environment. Grazing of domestic animals, all private rights and forestry activities are prohibited within a National Park. Each National Park usually aims at conservation specifically of some particular species of wildlife along with others.

- **Ex-situ conservation** (outside habitats) – It involves the protection and conservation of rare species of animals and plants outside their natural habitats. These include zoos, aquariums, botanical gardens, gene banks, etc.

- (i) **National Bureau of Plant Genetic Resources (NBPGR)** is located in New Delhi. Here agricultural and horticultural crops and their wild relatives are preserved by cryo-preservation of seeds, pollen etc. by using liquid nitrogen at a temperature as low as -196°C . Varieties of rice, pearl millet, Brassica, turnip, radish, tomato, onion, carrot, chilli, tobacco, poppy etc. have been preserved successfully in liquid nitrogen for several years without losing seed viability.
- (ii) **National Bureau of Animal Genetic Resources (NBAGR)** located at Karnal, Haryana. It preserves the semen of domesticated bovine animals.
- (iii) **National Facility for Plant Tissue Culture Repository (NFPTCR)** for the development of a facility of conservation of varieties of crop plants/trees by tissue culture. This facility has been created within the NBPGR.

Sustainable development

Development which meets the needs of the present without compromising the ability of future generations to meet their own needs



Core Elements of Sustainable Development

Three core elements of sustainable development are **economic growth, social inclusion and environmental protection**.

Sustainable **economic growth**, achieving sustainable livelihood, living in harmony with nature and appropriate technology are important for sustainable development.

Environmental Sustainability: It prevents nature from being used as an inexhaustible source of resources and ensures its protection and rational use. Aspects such as environmental conservation, investment in renewable energy, saving water, supporting sustainable mobility, and innovation in sustainable construction and architecture, contribute to achieving environmental sustainability on several fronts.

Social Sustainability: It can foster gender equality, development of people, communities and cultures to help achieve a reasonable and fairly-distributed quality of life, healthcare and education across the Globe. **Economic Sustainability:** Focuses on equal economic growth that generates wealth for all, without harming the environment. **Investment and equal distribution of economic resources.** Eradicating poverty in all its forms and dimensions.



Kyoto Protocol

The Kyoto Protocol was an international treaty which extended the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions, based on the scientific consensus that global warming is occurring and that human-made CO₂ emissions are driving it.

The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. There were 192 parties (Canada withdrew from the protocol, effective December 2012) to the Protocol in 2020.

The Kyoto Protocol implemented the objective of the UNFCCC to **reduce the onset of global warming by reducing greenhouse gas concentrations** in the atmosphere to "a level that would prevent dangerous anthropogenic interference with the climate system.

The Kyoto Protocol applied to the **seven greenhouse gases**

- 1) Carbon dioxide (CO₂),

- 2) Methane (CH₄),
- 3) Nitrous oxide (N₂O),
- 4) Hydrofluorocarbons (HFCs),
- 5) Perfluorocarbons (PFCs),
- 6) Sulfur hexafluoride (SF₆),
- 7) Nitrogen trifluoride (NF₃).
- 8) Nitrogen trifluoride was added for the second compliance period during the Doha Round.

The Protocol was based on the principle of common but differentiated responsibilities: it acknowledged that individual countries have different capabilities in combating climate change, owing to economic development, and therefore placed the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere.

The Protocol's first commitment period started in 2008 and ended in 2012. All 36 countries that fully participated in the first commitment period complied with the Protocol. However, nine countries had to resort to the flexibility mechanisms by funding emission reductions in other countries because their national emissions were slightly greater than their targets. The financial crisis of 2007–08 reduced emissions. The greatest emission reductions were seen in the former Eastern Bloc countries because the dissolution of the Soviet Union reduced their emissions in the early 1990s. Even though the 36 developed countries reduced their emissions, the global emissions increased by 32% from 1990 to 2010.

A second commitment period was agreed to in 2012 to extend the agreement to 2020, known as the Doha Amendment to the Kyoto Protocol, in which 37 countries had binding targets: Australia, the European Union (and its then 28 member states, now 27), Belarus, Iceland, Kazakhstan, Liechtenstein, Norway, Switzerland, and Ukraine. Belarus, Kazakhstan, and Ukraine stated that they may withdraw from the Kyoto Protocol or not put into legal force the Amendment with second round targets. Japan, New Zealand, and Russia had participated in Kyoto's first-round but did not take on new targets in the second commitment period. Other developed countries without second-round targets were Canada (which withdrew from the Kyoto Protocol in 2012) and the United States (which did not ratify). Canada's decision to withdraw was to the dismay of Environment minister, Peter Kent. If they were to remain as a part of the protocol, Canada would be hit with a \$14 billion fine, which would be devastating to their economy, hence the reluctant decision to exit. As of October 2020, 147 states had accepted the Doha Amendment. It entered into force on 31 December 2020, following its acceptance by the mandated minimum of at least 144 states, although the second commitment period ended on the same day. Of the 37 parties with binding commitments, 34 had ratified.

Negotiations were held in the framework of the yearly UNFCCC Climate Change Conferences on measures to be taken after the second commitment period ended in 2020. This resulted in the 2015 adoption of the Paris Agreement, which is a separate instrument under the UNFCCC rather than an amendment of the Kyoto Protocol.

Conference of the parties

A conference of the parties is the supreme governing body of an international convention (treaty, written agreement between actors in international law). It is composed of representatives of the member states of the convention and accredited observers. Scope of the COP is to review the "implementation of the Convention and any other legal instruments that the COP adopts and take decisions necessary to promote the effective implementation of the Convention".

It is made up of governments and organizations such as the European Union and is responsible for guiding the Convention so that it can respond to global challenges and national needs.

The first global conference on climate change was held in 1972 in Stockholm, Sweden.

This conference ushered in numerous global negotiations and international agreements on the environment.

All of these culminated in the establishment of the United Nations Framework Convention on Climate Change (UNFCCC) in Rio de Janeiro in Brazil, in 1992.

The treaty sets limits on GHG emissions in countries, but these are not binding and there are no enforcement mechanisms either.

However, there are provisions for updates or protocols that can be used to set legally binding emission limits on countries.

The parties to the convention meet annually in the Conference of the Parties or COP to review the progress under the convention.

The COP has been meeting biennially since 2001, and has held 14 sessions. UNCCD COP15 was held from 9-20 May 2022 in Abidjan.

The 2023 UN Climate Change Conference will convene from 30 November to 12 December 2023 in Dubai, United Arab Emirates (UAE). It will comprise:

- The 28th meeting of the Conference of the Parties (COP 28);
- The fifth meeting of the COP serving as the Meeting of the Parties to the Paris
- The 18th meeting of the COP serving as the Meeting of the Parties to the Kyoto Protocol
- The 59th meeting of the Subsidiary Body for Implementation (SBI 59); and
- The 59th meeting of the Subsidiary Body for Scientific and Technological Advice (SBSTA 59).

Clean Development Mechanism