UNIT-IV

GREEN ENVIRONMENTAL ISSUES

4.1. CLEAN DEVELOPMENT MECHANISM

History and Objectives of the Mechanism:

Clean Development Mechanism (CDM) is an economic instrument for inducing initiatives to meet the challenges faced by the impending threat of climate change. It is a mechanism for promoting technology transfer and investment from developed countries to the developing countries for projects to reduce the emissions of Greenhouse Gases (GHGs). The mechanism allows the governments or private parties of developed countries to make investment for emission reduction projects in developing countries and, in turn, get the benefit in terms of "Certified Emission Reduction (CER)" which could be credited against their national emission reduction targets.

The concept of CDM owes its origin to the Kyoto Protocol (1997) under the UN Framework Convention on Climate Change (UNFCCC) mooted at the United Nations Conference on Environment and Development (Earth Summit) in 1992. The Convention on Climate Change and the follow-up initiatives were prompted by the increasing evidence of global warming triggered by anthropogenic emissions of Greenhouse Gases (GHGs) which include Carbon Dioxide, Nitrous Oxide, Methane, Halogenated Hydrocarbon and Tropospheric Ozone. According to an assessment, doubling of carbon dioxide concentration in the atmosphere or an equivalent increase of a mixture of greenhouse gases can cause 1.5 to 4.5^{o}C rise in global temperature with associated impacts such as sea level rise,
Floods and droughts.

Purpose

The purpose of the CDM is to promote clean development in developing countries, i.e., the "non-Annex I" countries (countries that aren't listed in Annex I of the Framework Convention). The CDM is one of the Protocol's "project-based" mechanisms in that the CDM is designed to promote projects that reduce emissions. The CDM is based on the idea of emission reduction "production". These reductions are "produced" and then subtracted against a hypothetical "baseline" of emissions. The emissions baseline are the emissions that are predicted to occur in the absence of a particular CDM project. CDM projects are "credited" against this baseline, in the sense that developing countries gain credit for producing these emission cuts. The CDM is one of the "flexibility mechanisms" that is defined in the Kyoto Protocol. The flexibility mechanisms are designed to allow Annex B countries to meet their emission reduction commitments with reduced impact on their economies (IPCC, 2007).The flexibility mechanisms were introduced to the Kyoto Protocol by the US government.

For participation in CDM, all countries are required to meet the following prerequisites:

- Ratification of the Kyoto Protocol;
- Establishment of a National CDM Authority; and

 Willingness for voluntary participation in CDM.

In addition to the aforesaid pre-requisites, the developed countries should also comply with the following requirements as stipulated in the Protocol:

 National System for the estimation of GHG emissions;
 National registry and annual inventory;
 Accounting system for sale and purchase of emission reductions; and
 Establishment of assigned amount as per emission limitation and reduction Commitment to reduce their overall GHG emission by at least 5 per cent below 1990 levels in the first commitment period of 2008-2012.

The eligibility criteria for the CDM projects include the following:

 The projects must be approved by all parties involved;
 The projects should promote sustainable development in host countries;
 The projects should result in real, measurable and long term benefits towards climate change mitigation; and
 The emission reduction should be additional to what would have otherwise occurred without the projects.

Institutional structure

The institutional structure created for implementation of CDM includes three new entities:

 Executive Board;
 Designated National Authority; and
 Designated Operational Entity.

Sequence of the CDM project cycle: actors and activities

Stage	Actors	Activities
1.	Project Proponent	Project design
2.	Host Country Designated National Authority (DNA)	Project approval
3.	Designated Operational Entity (DOE)	Validation of the project design document
4.	CDM Executive Board (EB)	Registration of the project
5.	Project Proponent	Project Implementation and Monitoring
6.	Designated Operation Entity (DOE)	Verification andcertification of emission reduction from the project.
7.	CDM Executive Board (EB)	Issuance of Certified Emission Reductions (CERs)

The Clean Development Mechanism (CDM) Project Cycle

The Clean Development Mechanism of the Kyoto Protocol defines a series of steps necessary to develop certified emissions reductions (CERs):

1. Project Design

2. Project Validation
3. Host Country Approval
4. Registration with the CDM Executive Board
5. Implementation and Monitoring
6. Verification/Certification and Issuance of CERs
7. Sale of CERs

1.ProjectDesign

The first step starts with a determination of whether the project concept would qualify as a CDM project, including screening against project criteria, estimating the magnitude of emissions reductions, and preparing a Project Design Document (PDD) to meet certain specifications. The PDD must address the following key issues:

- Establishing the "baseline" for the project, which represents the anthropogenic emissions that would occur in the absence of the proposed project activity? The current flaring of gas may be an important consideration in establishing this baseline.
- Demonstrating "additionality," which in essence is a demonstration that the proposed project is not "business as usual." While this criterion has proved to be controversial on some projects, a series of guidelines is now available for making the additionality demonstration. and there is precedent for landfill gas recovery projects of the type envisioned.
- A monitoring methodology that effectively addresses gas flow and composition.

It is also critical to provide a basis for legal ownership of the project activity, i.e. the rights to the gas generated at landfill or wastewater treatment plant.

2.ProjectValidation

Validation is the process by which the PDD is independently evaluated by a "designated operation entity" (DOE) against the requirements of the CDM. The DOE must be a third party, separate and apart from the project developer and preparer of the PDD. Information submitted to the DOE should include comments by the local stakeholders and a summary of how due account was taken of any such comments, as well as an analysis of any environmental impact of the project's activity.

Based on its review, the DOE issues a validation report and opinion as to the adequacy of the PDD. The project developer/PDD consultant must respond to queries and comments to the satisfaction of the DOE for the final validation report to be issued.

3.Host Country Approval

Upon validation of the proposed project by the DOE, the following documentation must be submitted to the designated national authority (DNA) for host country approval:

1. The validation report.
2. The PDD, including a description of how the project will contribute to sustainable development.
3. If required by local law, an approved environmental impact assessment.
4. A written commitment to deliver an annual report on the results of monitoring, certification, and issuance of CERs.

Once the DNA requirements have been satisfied, a Letter of Approval is issued for the project.

4.RegistrationwiththeCDMExecutiveBoard

Following the issuance of the Letter of Approval, a request for registration is submitted to the CDM Executive Board in the form of the validation report, including the PDD, the written approval of the DNA and an explanation of how this takes into account any comments received. The CDM Executive Board reviews the proposal and may invite public comment or ask for additional information/details before rejecting or accepting the proposal, which becomes a public document once submitted to the CDM Executive Board. Registration is a formal acceptance by the CDM Executive Board of a validated project as a CDM project activity and is the official recognition of the project feasibility to generate CER.

5.ImplementationandMonitoring

Once the project has been validated, detailed engineering activities can be undertaken in parallel with the CDM approval process. Typically, construction would not occur until after CDM Executive Board approval. Monitoring of emissions reductions, as specified in the PDD monitoring plan, would then be implemented. In order to calculate the emissions reductions, the emissions of the project activity have to be subtracted from the reference scenario or Baseline outlined in the PDD.

6. Verification/Certification and issuance of CERs

Verification is required by a DOE, separate and apart from the preparer of the PDD and the DOE responsible for project validation, in order to demonstrate that actual emissions reductions are consistent with the PDD. A certification report is required on an annual basis to quantify the actual emissions reductions achieved during that period. The second DOE conducts on-site inspections, reviews monitoring results, and provides a verification report to the CDM Executive Board. The certification constitutes a request to the CDM Executive Board for issuance of CERs equal to the verified amount of reductions from the project. This issuance should be considered final 15 days after the day of receipt of the request for issuance, unless issues are raised by the CDM Executive Board or other parties involved. The requisite amount of CERs is then deposited in the registry account of the project developer.

7. Sale of CERs

The process of negotiating the sale of the CERs can usually start as the PDD is being finalized. A Term Sheet spelling out the terms of the agreement is initially prepared and later used for

drafting the so-called Emissions Reductions Purchase Agreement (ERPA). These agreements define the amount of CERs to be transferred, the purchase price, the time period of delivery, and other relevant conditions. ENVIRON is experienced in developing these agreements and working with the buyers in the emissions reductions marketplace, e.g., World Bank's Prototype Carbon Fund, tenders by national governments, brokers, and private sector buyer

Benefits and beneficiaries of the CDM

The CDM has the potential of multi-faceted benefits and multiple beneficiaries

Benefits

- Global reduction of greenhouse gases.
- Lesser cost of climate change mitigation.
- Additional benefits through reduction of other pollutants besides GHGs.
- Opening a market for carbon investment.
- Additional financial resources and alternative technologies.
- Initiatives for adaptation to climate change impacts.
- Focus on sustainable development.
- Scope for cooperation at various levels (national, sub-regional, Regional and global).

Beneficiaries

- Developed countries.
- Countries with economy in transition.
- Developing countries.
- Small inland countries.
- Public sector.
- Private sector.

4.2 CARBON FOOTPRINT

INTRODUCTION:

'Carbon footprint' measures the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product.

The footprint considers all six of the Kyoto Protocol greenhouse gases: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6).

A carbon footprint is measured in tones of carbon dioxide equivalent (tCO2e). The carbon dioxide equivalent (CO2e) allows the different greenhouse gases to be compared on a like-for-like basis relative to one unit of CO2. CO2e is calculated by multiplying the emissions of each of the six greenhouse gases by its 100 year global warming potential (GWP).

The main types of carbon footprint for organizations are:

A) ORGANISATIONAL CARBON FOOTPRINT

Emissions from all the activities across the organization, including buildings' energy use, industrial processes and company vehicles.

An organizational or business carbon footprint measures the direct and indirect greenhouse gas emissions arising from all of an organization's activities. A good place to get an estimation of your business carbon footprint is our carbon footprint indicator. Read more about organizational carbon footprints below.

- Types of emissions
- Why calculate
- How to calculate - organizational carbon footprints
- How we can help

The Greenhouse Gas Protocol* standard is commonly used to categorize an organization's emissions into 3 groups or 'scopes':

- **Scope 1 - Direct emissions**
  Direct emissions resulting from activities within the organization's control. Includes on-site fuel combustion, manufacturing and process emissions, refrigerant losses and company vehicles.
- **Scope 2 - Indirect emissions: electricity and heat**
  Indirect emissions from electricity, heat or steam purchased and used by the organization.
- **Scope 3 - Indirect emissions: other**
  Any other indirect emissions from sources not directly controlled by the organization. Examples include: employee business travel, outsourced transportation, waste disposal, water usage and employee commuting.

Under the Greenhouse Gas Protocol, an organization must include scope 1 and 2 emissions within its carbon footprint. There is broad discretion about which scope 3 emissions should be included in a business carbon footprint - for example; organizations often include waste disposed to landfill and employee business travel from scope 3.

If you have your energy usage details, use our carbon footprint calculator to calculate your organizational carbon footprint.

* The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, revised edition. World Business Council for Sustainable Development and World Resources Institute.

The 2 main reasons for calculating an organizational carbon footprint are that it will help you to:

- **Manage and reduce emissions**
  Reducing your business carbon footprint often results in cost savings. Analyzing your organization's carbon footprint will help you to identify and prioritize areas for potential reduction.

- **Reporting**
  More and more organizations want to be able to demonstrate their carbon footprint for reasons of:
  - **Mandatory reporting requirements**
    Climate change legislation such as the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) or EU Emissions Trading Scheme require such reporting, for example.
  - **Corporate social responsibility (CSR)**
    Showing that you are behaving in a responsible and ethical way is becoming ever more important
  - **Responding to requests**
    Partners, customers and investors are increasingly interested in carbon emissions data. There are also carbon reporting initiatives such as the Carbon Disclosure Project.

Steps:

The basic 6 steps required to calculate a carbon footprint for an organization are as follows:

1. Establishment of the assessment boundaries:
   • Organizational
   • Operational
   • Greenhouse gases
2. Collection of data.
3. Calculation of emissions using appropriate emissions factors
4.Convert usage into CO2 equivalent
5.Verifying the results (optional)
6.Reporting the carbon footprint

1. Method definition
You need to have a consistent method to get accurate results – especially if you are going to rely on lots of different people to collect and interpret data.
Good sources of standards include:

- Greenhouse Gas Protocol
  Free set of commonly used standards
- International Organization for Standardization, ISO 14064
  Builds on many of the concepts introduced by the GHG Protocol

2. Establishment of the assessment boundaries:
You will need to define:

- Organizational boundaries
  What parts of the organization are included? This can be complex for large organizations with many subsidiaries, joint ventures or leased assets.
- Operational boundaries
  All **scope 1** and **scope 2** emissions should be included, but the organization can choose which **scope 3** emissions to include.

When choosing a boundary try to take account of how your organization works, other reporting periods, legislative requirements, and the practicalities of data collection.

3. Collate data
It is important to collect data as thoroughly and accurately as possible. The main sources of data are usually:

- **Gas and electricity** – meter readings or bills (kWh)
- **Other fuels** – usage in liters, kWh, MJ, liters
- **Transport** – usage by fuel type (if this is not possible estimate it based on the mileage of the vehicles and fuel economy assumptions)

4.ConvertusageintoCO2equivalent
The carbon footprint is measured in tones CO2 equivalent (tCO2e). This is calculated by converting the data you have collected. You should always use conversions from credible sources, see our conversion factor tables. It is important that you identify any data gaps and list the assumptions you have made in calculating the footprint.

5.Verifyingtheresults(optional)
To add credibility, it makes sense for a third party to verify your carbon footprint. The Carbon Trust Standard is one such company that can do this – as well as helping you to measure, reduce, and communicate your carbon footprint.

6.Reportingthecarbonfootprint
Make sure you carbon footprint is presented clearly and honestly. This means providing complete information about each of the steps above, including methods, footprint boundaries, data quality and assumptions. Also - try to keep a consistent approach over different years, explaining any changes in reporting or business structure that might impact the footprint.

B) PRODUCT CARBON FOOTPRINT

Emissions over the whole life of a product or service, from the extraction of raw materials and manufacturing right through to its use and final reuse, recycling or disposal.

A product carbon footprint measures the greenhouse gas emissions at each stage of the product's life.

A product carbon footprint measures the greenhouse gas emissions at each stage of the product's life. This includes:

- Extraction, production and transportation of raw materials
- Manufacture or service provision
- Distribution
- End-use
- Disposal/recycling

At each stage greenhouse gas emissions can result from such sources as: energy use, transportation fuel refrigerant losses from air conditioning units and waste. In the case of a "service product" the life-cycle stages are defined across the duration of the service.

Measuring a product's carbon footprint offers a number of benefits, including:

- **Attracting customers**
  Customers are becoming increasingly aware of the environmental impact of the goods and services they use. Working with the Carbon Trust Foot printing Companyor demonstrating a lower footprint than competitor products can deliver competitive advantage.
- **Brand identity**
  Reporting product carbon footprints shows that an organization takes its social responsibility seriously.
- **Leadership**
  Reporting your products' carbon footprints will support your corporate responsibility programme and enhance your reputation.
- **Cost savings**
  Identifying areas where greenhouse gas emissions can be reduced often results in cost savings - in terms of transport energy, waste and packaging for example.
- **Emissions savings**
  Looking at the whole supply chain could help you identify savings.

The basic steps required to calculate a carbon footprint for a product are as follows:

1. Analyze the materials and supply chain processes.
2. Build a supply chain map for the product.
3. Define the assessment boundaries (including the selection of greenhouse gases and the emissions sources which will be included).
4. Data collection
5. Calculation of emissions using appropriate emissions factors.

1. The **primary footprint** is a measure of our direct emissions of CO2 from the burning of fossil fuels including domestic energy consumption and transportation (e.g. car and plane). We have direct control of these.

2. The **secondary footprint** is a measure of the indirect CO2 emissions from the whole lifecycle of products we use - those associated with their manufacture and eventual breakdown. To put it very simply – the more we buy the more emissions will be caused on our behalf.

Product Carbon Footprints are commonly expressed either as 'cradle to gate' footprints, or 'cradle to grave' depending on the life-cycle stages included.