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CARBON AUDITOR OVERVIEW

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ONLINE TRAINING BY KRISHNAJI PAWAR

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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MODULE 3

Fundamentals of carbon accounting

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

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CARBON AUDITOR OVERVIEW

Regular inventories of GHG emissions inventory help quantify the problem's scale, identify significant sources, prioritize reduction strategies, and evaluate policies implemented by entities.

Learning Objectives

- Introduction
- Origins of Carbon Accounting
- Fundamentals of carbon accounting
- Kyoto Protocol and beyond
- Professional Certification for Carbon Auditing
- Business Applications of Corporate GHG Inventories
- Summary and Resources

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INTRODUCTION

- CO2, the primary greenhouse gas, is imperceptible to humans.
- Regular inventories are necessary to quantify the scale of the problem and determine necessary actions to limit anthropogenic influence on the atmosphere and climate.
- A GHG emissions inventory lists and quantifies emissions for an entity or product over a given period.
- This inventory helps identify significant emissions sources and prioritize them.
- It also provides third parties with a better understanding of the context for reduction strategies and enables evaluation of the policies and measures implemented by the entities publishing an inventory.

UNDERSTANDING GLOBAL WARMING POTENTIAL (GWP) OF GHGS

Global Warming Potentials (GWPs) are intended as a quantified measure of the globally averaged relative radiative forcing impacts of a particular greenhouse gas. It is defined as the cumulative radiative forcing—both direct and indirect effects—integrated over a period of time from the emission of a unit mass of gas relative to some reference gas (IPCC 1996). Carbon dioxide (CO_2) was chosen as this reference gas.





UNDERSTANDING GLOBAL WARMING POTENTIAL (GWP) OF GHGS +



- GHG emissions include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), refrigerant gases (HFCs, PFCs, and CFCs), sulfur hexafluoride (SF6), water vapor (H2O), and ozone (O3).
- Each GHG has a specific global warming potential (GWP), quantifying its impact on climate over a specific period.
- GWPN represents the ratio between cumulative radiative forcing of GHGs and CO2.
- The GWPN of CO2 is always 1, regardless of the value of N.
- Changes in understanding of CO2's global warming impacts will affect the GWP of all other GHGs.

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CARBON ACCOUNTING AND BIOGENIC CARBON

- Carbon accounting distinguishes between fossil carbon and carbon from living matter.
- Biogenic carbon refers to living carbon found in all animals and vegetables.
- Renewable energy combustion of biogenic carbon is considered CO2-neutral and zero in inventories.
- Flora and fauna are carbon sinks, if renewable and sink capacity is not reduced.
- Biomass use in EU forests is considered CO^-neutral, but not in tropical forests due to lack of tree replacement and additional emissions.
- Commercial logging and clearing of forests by peasants contribute to significant CO2 emissions.





CARBON SINKS AND CLIMATE CHANGE



- Carbon sinks, like reforestation, are theoretically effective in removing CO2 from the atmosphere.
- Implementing these practices is challenging due to the complexity of estimating their impact.
- Factors like soil type, biomass disposal, climatic zone, and tree species are crucial in estimating the impact of forest planting.
- Climate change could lead to the decline of newly planted forests, affecting the validity of emissions credits.
- Trees' impact on climate is still uncertain due to their emission of reactive volatile gases, which can affect cloud condensation.

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ROLE OF EMISSION FACTORS IN GHG EMISSION CALCULATION

- GHG emissions are difficult to measure directly due to their numerous sources and low concentration.
- Estimates of emissions are based on activity data, such as vehicle liters, industrial process tons, or farm cattle.
- The total amount of GHGs emitted by an activity is determined by multiplying this activity data by emission factors.
- An emission factor, or conversion factor, shows the quantity of GHGs emitted in relation to a particular activity in CO2-equivalent per accounting unit of the activity.





ROLE OF EMISSION FACTORS IN GHG EMISSION CALCULATION +



- The emission factor is the ratio between the quantity of GHGs emitted by an activity and the characteristic value of the activity, object, or material.
- Emission factors used in inventory methods often reflect average values or state-of-the-art values for technical equipment.
- Emission factors are often a function of current practices and change, making it crucial to choose recent emission factors appropriate for the relevant context.
- Emission factors can be highly mutually dependent, with an increase in renewable energy reducing the emission factor of electricity, affecting all products and services that use electricity during production.

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PRIMARY AND SECONDARY DATA IN ENVIRONMENTAL STUDIES

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Primary Data:

- Quantitative data gathered from direct measurements or calculations.
- Shows nature and effectiveness of an activity or process.
- Indicates specific environmental impact.

Example: Calculating carbon footprint of a building, energy consumption, and characteristics over time.

Secondary Data:

- Derived from sources other than direct measurements or calculations based on direct measurements.



THE GENERAL PRINCIPLES OF CARBON ACCOUNTING

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RELEVANCE

- Define boundaries of GHG emissions accounting based on the entity under study, the reason for gathering information, and users' needs.

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COMPLETENESS

- Ideally, all emissions sources within specified organizational and operational boundaries should be reported.
- If certain sources are not reported, they should be clearly indicated in the report.

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CONSISTENCY

- Use the same methods of calculation and presentation for tracking changes in emissions over time.
- Communicate any changes in accounting methodology clearly.
- Specify the context and justify all significant changes for comparison.

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TRANSPARENCY

- Ensure the subjects studied are well understood in the context of the reporting organization.
- Use independent external auditing to increase transparency

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ACCURACY

- Adherence to recommended GHG calculation methods and a strong accounting and reporting system with suitable internal and external controls can improve data accuracy.

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CONCEPT OF BOUNDARIES

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CARBON ACCOUNTING BOUNDERAIRES



- Fundamental to carbon accounting and standardization initiatives.
- ISO standards differentiate between organizational and operational boundaries.
- Organizational boundaries define study's geographical limits.
- Operational boundaries specify activities, products, and services covered.
- Greenhouse Gas Protocol and ISO standards recognize three scopes.

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CONCEPT OF BOUNDERAIRES

"Boundaries" in a GHG inventory

- Boundaries: Imaginary lines encompassing the emissions to include in a company's GHG inventory

1. Organizational boundaries
   - Determine which company operations to include
2. Operational boundaries
   - Determine which emissions sources to include
   - Determine how to categorize emissions





CONCEPT OF BOUNDERAIRES

- Bounderaires are key elements in standardizing carbon accounting methodologies.
- ISO standards distinguish between organizational and operational boundaries.
- Organizational boundaries define the geographical limits of the study.
- Operational boundaries specify activities, products, and services covered.



SCOPES IN CARBON ACCOUNTING





- Scope 1: Direct GHG emissions from sources owned or controlled by the reporting organization.
- Scope 2: Indirect emissions associated with the production of electricity, heat, or vapor that is imported or bought.
- Scope 3: Other indirect emissions arising from activities of the reporting company but from sources owned or controlled by another company.

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SCOPES IN CARBON ACCOUNTING +

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Examples include employee business travel, transportation of products, materials, and waste, outsourced activities, waste generated by the reporting company, use of products and services sold by the company, employee commuting with private vehicles, production of materials and products bought by the company, and purchase of agricultural products.



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CONTACT US

+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR Layout ,Bengaluru ,India



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