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CERTIFIED DECARBONIZATION
PROFESSIONAL - CDP OVERVIEW
ONLINE TRAINING BY KRISHNAJI PAWAR
LEED AP(BD+C),GSAS CGP,GCP,ISO 14001
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MODULE 2

Climate Change and Sectoral Decarbonization Approaches

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CERTIFIED DECARBONIZATION PROFESSIONAL - CDP OVERVIEW

Climate risk, exacerbated by increased GHG concentrations since the Industrial Revolution, has led to the UN's creation of a legislative framework to prevent harmful anthropogenic interference with the climate system.

Learning Objectives

- Introduction
- Climate change and sectoral decarbonization approaches
- Strategies for a decorbonization-built environment
- Building Operational and Embodied Carbon, Kyoto Protocol, and Beyond.
- Professional certification for decarbonization audits
- Carbon, GHG, and Sustainability Accounting
- Summary and Resources
- ASHRAE CDP Practice Test V.4.1: Test Your Knowledge!

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INTRODUCTION

- Climate risk is a significant challenge to human development.
- Increased GHG concentrations since Industrial Revolution due to organization, production, and consumption methods.
- UNFCCC established a legal framework to prevent dangerous anthropogenic interference with the climate system.
- The built environment is crucial for sustainable development.
- Carbon management in the built environment is vital for a sustainable future.
- Buildings, particularly housing, fulfill the need for sustainable development, especially for the poor.
- Technological advancements in the built environment can lead to a low carbon future.

CARBON MANAGEMENT AND SUSTAINABLE DEVELOPMENT

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- Global climate change is a major factor in the current focus on carbon management.
- The built environment plays a significant role in the interaction between carbon emissions and sustainable development.
- Despite recent efforts, global greenhouse gas emissions and carbon intensity continue to rise.
- In the decade leading to 2008, the world emitted twice as much carbon dioxide per marginal unit of economic activity.

CARBON MANAGEMENT POLICIES AND PROTOCOLS

- Policies and protocols for carbon management range from national-level legislation to global treaties and protocols.
- The Kyoto Protocol, an international treaty ratified by over 190 countries, governs global carbon management protocols.
- The UNFCCC, adopted in May 1992, is the legal implementation mechanism for the Kyoto Protocol.
- The goal of the Convention is to stabilize greenhouse gas concentrations at "safe" levels.
- The Convention divides countries into Annex I (developed countries and transition economies) and non-Annex I (primarily developing countries).
- The Conference of Parties (COP) is the governing body with implementation, scientific, and technical responsibilities.
- Emission reduction methods are "market-based" and primarily based on the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET).

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EQUITY IMPLICATIONS OF CARBON MANAGEMENT

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- The Brundtland Commission's concept of equity is crucial in sustainable development.
- Carbon management efforts in the built environment must address equity in carbon emissions.
- Four equity implications are specific to the built environment:

- Current and projected energy intensity in buildings across the world.
- Inequities in building conditions within countries can lead to effects like fuel poverty.
- Concern over who establishes the standards for the building industry.
- Differential climate-related energy needs exist in different countries.

- Energy intensity and carbon intensity of buildings vary greatly between countries and regions.
- Focusing solely on energy efficiency is not just or fair.

GLOBAL ENERGY SITUATION ON CLIMATE CHANGE

Global sea-level rise could reach 0.2 to 2.5 m by 2100, potentially leading to the disappearance of 48 islands by the end of the century.

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CLIMATE CHANGE: A GLOBAL PROBLEM

- Climate change is the greatest human challenge.
- Effective tackling of climate change will determine the planet's future.
- Decisions on reducing greenhouse gases are crucial for limiting impacts.
- Carbon accounting plays a key role in developing evidence for climate change mitigation.

GLOBAL ENERGY SITUATION AND CLIMATE CHANGE

- Rising levels of greenhouse gases like CO2, methane, and nitrous oxide are causing global average temperatures to rise.
- Surface temperatures have been warmer than in any preceding decade since 1850.
- Between 1880 and 2012, global average temperatures rose 0.85°C.
- Ocean warming accounts for over 90% of the energy accumulated between 1971 and 2010.
- The ocean has warmed most in the water closest to the surface.
- Scientists predict an additional 0.3–0.7°C increase from 2016–2035 and likely exceed 1.5°C between 2081 and 2100.

IMPACT OF GREENHOUSE GASES ON EARTH'S HEAT BALANCE

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- Radiative forcing refers to the difference between the radiative energy received and emitted by a climatic system.
- Positive radiative forcing increases the system's heat, while negative radiative forcing leads to cooling.
- Water vapor is the main greenhouse gas, but direct emissions have minimal impact due to the planet's water cover and short atmospheric stay.
- CO2, Methane (CH4), and Nitrous oxide (N2O) are the other main greenhouse gases.
- Human activities have significantly impacted the concentration of GHGs in the atmosphere.

IMPACT OF GREENHOUSE GASES ON EARTH'S HEAT BALANCE +

- The rise in CO2 levels since the Industrial Revolution has led to a rise in atmospheric CO2 emissions.
- Burning fossil fuels releases an additional quantity of CO2, interfering with the natural carbon cycle.
- The Earth's natural process of recycling GHG emissions has been disrupted by human activities.
- The IPCC estimates that around 15 GtCO2e are accumulated annually in the atmosphere and are not recycled.
- The concentration of CO2 in the atmosphere has increased from 280 ppm in the pre-industrial era to 403 ppm in 2016, exceeding the interval of natural variation over the last 650,000 years.

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GLOBAL GHG EMISSIONS GROWTH AND SOURCES

- Global GHG emissions nearly doubled between 1970 and 2010, with the OECD predicting a further increase in the next 40 years.
- China has become the world's largest emitter since 2007, largely due to significant growth in the electricity sector.
- The United States, the second largest emitter, has recently decreased emissions due to a shift from coal to gas in the electricity-generation sector.
- Global anthropogenic emissions can be categorized into six: energy generation, industry, building, and transport.

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GLOBAL GHG EMISSIONS GROWTH AND SOURCES+

- Emissions from agriculture, forestry, and other land uses (AFOLU) increased by 20% from 9.9 GtCO2eq in 1970 to 12 GtCO2eq in 2010, constituting about 20% to 25% of all global emissions in 2010.
- The waste sector, which includes emissions from waste treatment and disposal, accounted for barely 2.5% of total anthropogenic greenhouse gas emissions in 2010.

CLIMATE CHANGE IMPACT ON ECOSYSTEMS AND SOCIETY

- Climate change, particularly temperature rises, is affecting physical systems, biodiversity, and societal organization.
- The IPCC predicts sea levels to rise between 26 and 82 cm from 1986–2005 to 208–1100 cm, threatening coastal areas and requiring adaptation initiatives.
- States with territories slightly above sea level, such as small island states and Bangladesh, could be displaced due to increased water levels.
- Extreme events like heavy rains, cyclones, heatwaves, and droughts are likely to become more frequent and intense.

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CLIMATE CHANGE IMPACT ON ECOSYSTEMS AND SOCIETY +

- Climate change is predicted to increase the risk of extinction for certain species.
- The effects will have significant social and economic impacts, particularly on food production, water access, and health.
- Human societies will need to adapt, with an expected increase in climate refugees.
- The increase in droughts and extreme climatic phenomena will increase the risk and scale of humanitarian crises.

SECTORAL APPROACHES TO CARBON MANAGEMENT

- Carbon management requires action across all economic sectors, including the built environment.
- Key sectors and infrastructures can significantly reduce emissions from built environments.
- Effective strategies account for the high interactivity between these systems and capitalize on opportunities to use packages of measures.

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SECTORAL APPROACHES TO CARBON MANAGEMENTKEY SECTORS

- Energy Generation: The focus has expanded to include the wider impacts of major developments, location of energy generation, and distribution due to the growth and diversity of renewable technologies.
- Information and Communications Technology: The global dependency on ICT networks presents a double-edged sword for reducing emissions.
- Manufacturing and Distribution: The growth of ICT networks is enabling energy efficiency in buildings and infrastructure through technologies like smart meters and intelligent energy management systems.

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SECTORAL APPROACHES TO CARBON MANAGEMENTKEY SECTORS +

- Green Spaces: Green spaces play a complex but essential role in reducing carbon emissions from the built environment and enhancing the sustainability of cities.
- Human Behavior: Understanding, modeling, and influencing human behavior is a significant challenge for reducing emissions from all economic sectors.

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