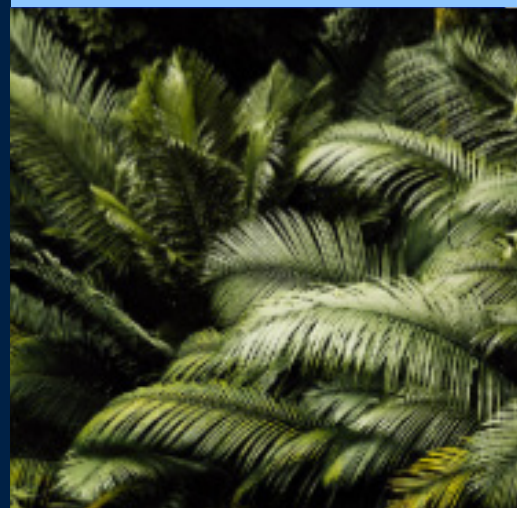


Global Carbon Markets:101

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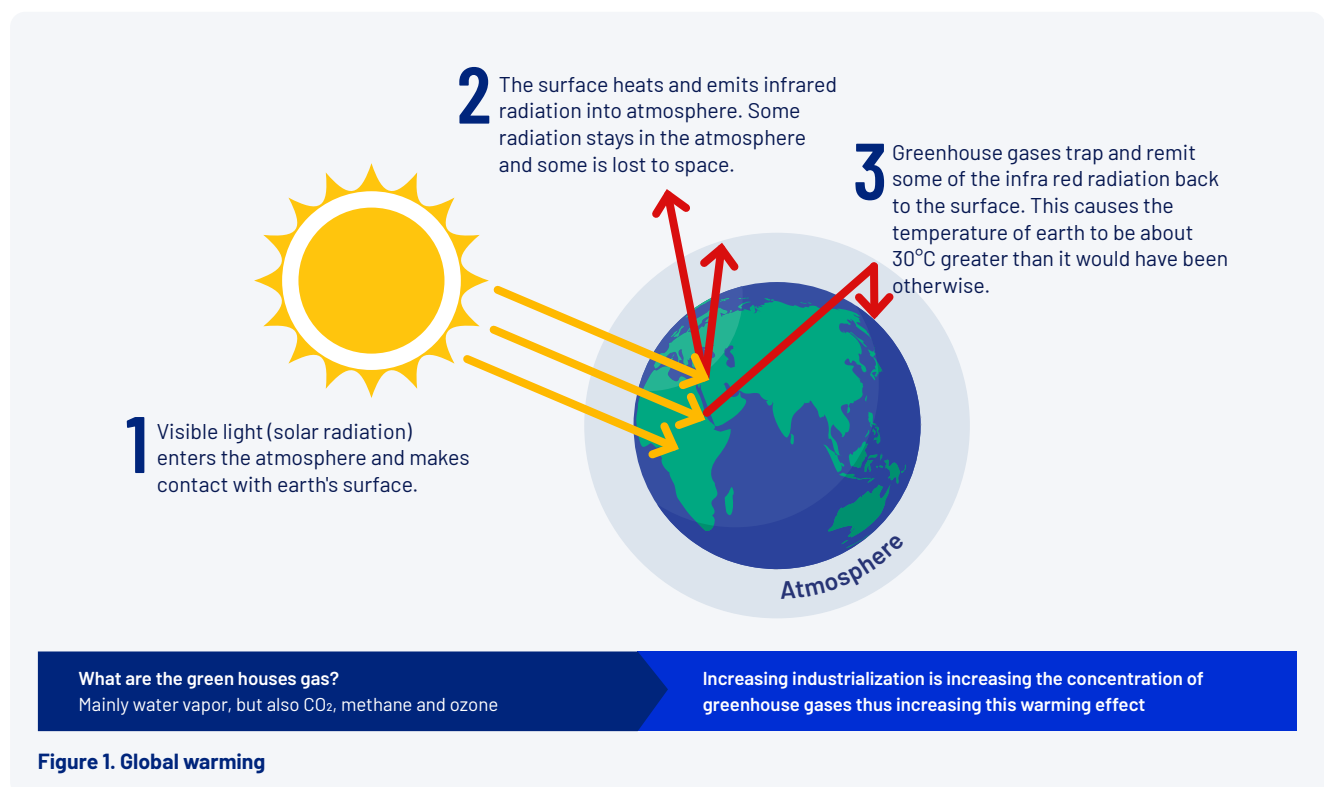
Abbreviations

GHG	Greenhouse Gas
CO ₂	Carbon Dioxide
N ₂ O	Nitrous Oxide
CH ₄	Methane
UNFCCC	United Nations Framework Convention on Climate Change
NDC	Nationally Determined Contributions
GCF	Green Climate Fund
IPCC	Intergovernmental panel on Climate Change
COP	Conference of Parties
ERU	Emission Reduction Unit
REC	Renewable Energy Certificates
CDM	Clean Development Mechanism
EU ETS	European Union Emissions Trading Scheme
VCS	Verified Carbon Standard
SME	Small & Medium Enterprises
NGO	Non-Profit Organization
EUA	European Union Allowances
CER	Certified Emission Reduction
VCU	Verified Carbon Unit
GS VER	Gold Standard Verified Emission Reduction
GCC	Global Carbon Council
RGGI	Regional Greenhouse gas Initiative
NZ ETS	New Zealand Emissions Trading Scheme
JI	Joint Implementation
SDG	Sustainable Development Goals
CCBS	Climate Community & Biodiversity Standard
ACC	Approved Carbon Council
ITMO	Internationally Transferred Mitigation Outcomes
MRV	Monitoring, Reporting & Verification
PDD	Project Design Document
DNA	Designated National Authorities
LoA	Letter of approval
CORSIA	Carbon Offsetting & Reduction Scheme for International Aviation
BAU	Business-as-usual
GETA	German Emissions Trading Authority

01 Introduction

1.1 What is Global warming and its causes?

Global warming refers to the long-term increase in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases (GHGs) into the atmosphere. The Earth's climate is influenced by the presence of certain gases, such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and water vapour, which trap heat and create the greenhouse effect. Human activities, especially the burning of fossil fuels and deforestation, have significantly increased the concentration of these gases, enhanced the greenhouse effect and leading to a warming of the planet.



Source: <https://www.slideshare.net/sanjoysanyal/introduction-to-carbon-markets>

1.1.1 Causes of Global Warming:

- **Burning of Fossil Fuels:** The combustion of coal, oil, and natural gas for energy releases large amounts of carbon dioxide into the atmosphere.
- **Deforestation:** The clearing of forests reduces the number of trees that can absorb and store carbon dioxide, contributing to higher atmospheric concentrations of greenhouse gases.
- **Industrial Processes:** Certain industrial activities release potent greenhouse gases, such as methane and nitrous oxide, into the atmosphere.
- **Agriculture:** Agricultural practices, including livestock farming and rice cultivation, produce methane emissions. The use of nitrogen-based fertilizers also contributes to nitrous oxide emissions.
- **Land Use Changes:** Alterations in land use, such as urbanization and changes in agricultural practices, can impact the balance of greenhouse gases in the atmosphere.

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1.2 International Community Response to Global Warming:

The international community has taken various steps to address the challenge of global warming¹. Key milestones include:

- **United Nations Framework Convention on Climate Change (UNFCCC):**
Adopted in 1992, the UNFCCC is an international treaty that provides the framework for addressing climate change². The ultimate objective is to stabilize greenhouse gas concentrations to prevent dangerous anthropogenic interference with the climate system.
- **Kyoto Protocol (1997):**
An extension of the UNFCCC, the Kyoto Protocol established legally binding emission reduction targets for developed countries. It introduced market-based mechanisms like emissions trading and the Clean Development Mechanism (CDM) to facilitate cost-effective emissions reductions.
- **Paris Agreement (2015):**
The Paris Agreement³, adopted at the 21st Conference of the Parties (COP21) to the UNFCCC, aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit it to 1.5 degrees Celsius. Unlike the Kyoto Protocol, the Paris Agreement includes commitments from both developed and developing countries.
- **Nationally Determined Contributions (NDCs):**
Under the Paris Agreement, countries submit NDCs outlining their individual climate action plans and contributions to emission reduction. These are reviewed and updated periodically to reflect evolving national circumstances and ambitions.
- **Green Climate Fund (GCF):**
Established as part of the UNFCCC financial mechanism, the GCF supports developing countries in their efforts to mitigate and adapt to climate change. It provides financial resources to help these nations transition to low-carbon and climate-resilient development pathways.
- **Intergovernmental Panel on Climate Change (IPCC):**
The IPCC⁴ provides scientific assessments of climate change, its impacts, and potential adaptation and mitigation strategies. It plays a crucial role in informing international climate policy.
- **COP Meetings:**
Annual Conferences of the Parties (COP) meetings bring together representatives from countries worldwide to discuss and negotiate climate policies. These meetings serve as platforms for shaping and refining international climate agreements.
- **Global Climate Action:**
Beyond formal agreements⁵, there is a growing emphasis on global climate action involving non-state actors, such as cities, businesses, and civil society. Initiatives like the Global Compact of Mayors and the Science-Based Targets initiative exemplify this trend.

While these international efforts represent important steps, challenges remain, including the need for increased ambition in emission reductions, enhanced financial support for developing countries, and effective implementation of climate policies at the national and global levels. Addressing global warming requires continued collaboration and commitment from all nations to transition to a sustainable, low-carbon future.

1.3 Carbon Market commodities

The term "carbon market commodities" refers to goods and services associated with carbon trading and carbon markets⁶. Carbon markets are designed to help reduce greenhouse gas emissions by creating economic incentives for businesses and organizations to lower their carbon emissions. These markets operate by putting a price on carbon emissions and allowing entities to buy and sell emission allowances or offsets. Here are some key components and commodities related to carbon markets:

¹ <https://www.slideshare.net/sanjoysanyal/introduction-to-carbon-markets>

² <https://unfccc.int>

³ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

⁴ <https://www.ipcc.ch>

⁵ <https://www.globalcarbonproject.org>

Introduction

- **Carbon Allowances:** These are permits or allowances that represent the right to emit a specific quantity of carbon dioxide or other greenhouse gases. They are typically issued by government authorities or regulatory bodies and can be bought and sold within the carbon market.
- **Carbon Offsets⁷:** Carbon offsets represent emissions reductions achieved by projects that reduce or remove greenhouse gas emissions, such as reforestation, renewable energy projects, or methane capture from landfills. These offsets can be purchased by entities to compensate for their own emissions.
- **Carbon Credits⁸:** Carbon credits are a general term used to describe both carbon allowances and carbon offsets. They represent a unit of measurement for greenhouse gas emissions reductions or allowances.
- **Emission Reduction Units (ERUs):** ERUs are carbon credits generated under the United Nations Framework Convention on Climate Change (UNFCCC) through the Clean Development Mechanism (CDM) and Joint Implementation (JI) programs. They can be traded in international carbon markets.
- **Renewable Energy Certificates (RECs):** In some carbon markets, renewable energy certificates are used as a way to support and incentivize the production of renewable energy. RECs represent the environmental benefits of generating electricity from renewable sources and can be traded.
- **Compliance Markets⁹:** Some carbon markets, such as the European Union Emissions Trading System (EU ETS), are designed to help countries or regions comply with legally mandated emissions reduction targets. Entities subject to emission limits can buy and sell allowances in these markets to meet their obligations.
- **Voluntary Markets¹⁰:** In addition to compliance markets, there are voluntary carbon markets where organizations and individuals can purchase carbon offsets or credits voluntarily to offset their own emissions and demonstrate their commitment to environmental sustainability.
- **Carbon Pricing Instruments¹¹:** Various mechanisms can be used to put a price on carbon, including carbon taxes, cap-and-trade systems, and carbon pricing schemes. These instruments help establish the cost of emitting carbon and drive emission reduction efforts.

The trading of these carbon market commodities is intended to create financial incentives for emissions reduction and support the transition to a low-carbon economy. These markets play a crucial role in global efforts to combat climate change and reduce greenhouse gas emissions.

⁶ <https://carbonmarketwatch.org>

⁷ <https://www.slideshare.net/kumaraguruveerasamy/carbon-credits-carbon-offsets>

⁸ <https://www.slideshare.net/Greydronenim/carbon-credit-32605841>

⁹ https://ec.europa.eu/clima/policies/ets_en

¹⁰ <https://www.vcsprojectdatabase.org>

¹¹ https://www.slideshare.net/abhijat4/the-economics-of-carbon-pricingpptx?from_search=1

02 Carbon Credits

2.1 What are Carbon Credits

Carbon credits¹², also known as carbon offsets, are a key component of carbon markets. They represent a quantifiable reduction or removal of greenhouse gas emissions from the atmosphere. These credits can be bought and sold in carbon markets, allowing entities that need to meet emission reduction targets to compensate for their own emissions by investing in projects that reduce or remove an equivalent amount of emissions elsewhere.

2.1.1 How do Carbon Credits qualify in Carbon Markets?

To qualify in carbon markets, carbon credits must meet specific criteria:

- **Additionality¹³:** The emissions reductions or removals achieved by the project must be additional to what would have occurred in a business-as-usual scenario. In other words, the project must demonstrate that it wouldn't have happened without the financial incentive provided by the carbon market.
- **Measurability and Verifiability:** Emission reductions or removals must be measurable and verifiable. There should be a clear methodology in place to quantify the emissions that the project is preventing or removing, and this should be independently verified.
- **Permanence:** Projects should ensure that the emissions reductions or removals will be permanent. For example, reforestation projects should have measures to prevent deforestation or other losses in carbon stocks.
- **Leakage Prevention:** Leakage refers to the possibility that emissions may be displaced to other areas or activities due to the project. Effective projects need mechanisms in place to account for and prevent leakage.
- **Social and Environmental Safeguards:** Projects should consider and address potential social and environmental impacts, ensuring that they don't negatively affect local communities or ecosystems.
- **Certification:** Carbon credits should be certified by a recognized standard or registry to ensure their quality and integrity. Different standards, such as the Clean Development Mechanism (CDM) or Verified Carbon Standard (VCS), provide guidelines and oversight for the creation and trading of carbon credits.

2.1.2 Types of Projects Generating Carbon Credits

Types of projects that can generate carbon credits include:



Figure 2. Where do Carbon Credits come from?

Source: South Pole

¹² Credits, C. (2022, January 26). The Ultimate Guide to Understanding Carbon Credits. Carbon Credits. <https://carboncredits.com/the-ultimate-guide-to-understanding-carbon-credits/>

¹³ <https://www.wri.org/insights/what-you-need-know-about-article-6-paris-agreement>

Carbon Credits

- **Renewable Energy Projects:** Wind, solar, hydropower, and other clean energy projects that replace or reduce the use of fossil fuels.
- **Energy Efficiency Improvements:** Projects that increase energy efficiency in industrial processes, buildings, or transportation.
- **Afforestation and Reforestation:** Planting new forests or restoring degraded forests to sequester carbon.
- **Methane Capture:** Projects that capture and utilize methane emissions from landfills, agriculture, or wastewater treatment.
- **Agricultural and Land Use Practices:** Projects that promote sustainable agricultural practices, reduce emissions from livestock, or enhance carbon sequestration in soils.
- **Waste Management:** Projects that reduce methane emissions from landfills or promote recycling and waste reduction.
- **Technology Innovation:** Projects that develop and implement innovative technologies to reduce emissions.

Carbon credits represent a way for companies or countries to meet their emission reduction targets or obligations under cap-and-trade programs¹⁴. By purchasing credits, they effectively "offset" their own emissions by supporting projects that reduce emissions elsewhere, contributing to the global effort to combat climate change. However, it's important to note that carbon credits are not a substitute for direct emissions reductions, which should always be the primary goal in addressing climate change.

2.2 Demand for Carbon Credits or mitigation outcomes

The demand for carbon credits or mitigation outcomes comes from various sources, including both compliance markets (regulated by government policies) and voluntary markets (driven by voluntary actions). Here's an overview of the demand and potential buyers from different sectors and industries:

1. Compliance Markets:

a) Regulated Entities:

- **Energy Sector:** Power plants, utilities, and other energy-intensive industries may purchase credits to comply with emissions reduction targets set by government regulations.
- **Manufacturing:** Industries with significant emissions, such as cement, steel, and chemical manufacturing, often participate in compliance markets to meet regulatory requirements.
- **Transportation:** Airlines and shipping companies may buy credits to offset emissions, especially if they are subject to emissions reduction mandates.

b) Government Entities:

- **National Governments:** Governments may purchase credits to meet their national emission reduction targets or to comply with international agreements.
- **Regional Authorities:** Local and regional governments involved in emissions trading systems may buy credits to manage compliance obligations.

2. Voluntary Markets:

a) Corporate Entities:

- **Large Corporations:** Companies with ambitious sustainability goals or commitments to achieving carbon neutrality may purchase credits voluntarily.
- **Technology Companies:** Data centers and tech companies may buy credits to offset the energy consumption of their operations.

¹⁴ <https://www.energimyndigheten.se/49e25f/globalassets/klimat-miljo/internationella-klimatinsatser/raising-climate-ambition-with-carbon-credits.pdf>

b) Small and Medium Enterprises (SMEs):

- SMEs: Small and medium-sized enterprises may participate in voluntary markets to demonstrate environmental responsibility and offset their carbon footprint.

c) Financial Institutions:

- Banks and Investment Firms: Financial institutions may invest in carbon credits as part of green finance initiatives or to support sustainable projects.

d) Individuals:

- Consumers: Individuals concerned about their personal carbon footprint may buy credits voluntarily to offset emissions associated with travel, energy consumption, etc.

3. Potential Buyers by Sector/Industry:

a) Renewable Energy Developers:

- Solar and Wind Developers: Companies in the renewable energy sector may invest in offset projects to support additional clean energy generation.

b) Agriculture and Land Use:

- Agribusiness: Companies in agriculture may engage in projects related to sustainable farming practices and land use.
- Forestry Companies: Organizations involved in sustainable forestry or reforestation projects may generate and sell carbon credits.

c) Technology and Innovation:

- Clean Tech Companies: Organizations developing innovative solutions for emissions reduction may participate in offset projects to support their industry.

d) Event Organizers:

- Event Management Companies: Organizations hosting events may purchase credits to make their events carbon-neutral.

e) NGOs and Environmental Groups:

- Non-Profit Organizations: Environmental NGOs may buy credits to support projects aligned with their goals, contributing to conservation and community development.

f) Transportation:

- Automotive Companies: Car manufacturers may invest in offset projects to counterbalance emissions from the production and use of vehicles.
- Logistics and Shipping Companies: Entities involved in logistics and shipping may buy credits to offset emissions from transportation activities.

4. Potential Buyers by Group:

a) Climate-Conscious Consumers:

- Individuals and Families: People concerned about climate change may buy credits to offset their personal carbon footprint.

b) Industry Alliances and Coalitions:

- Business Coalitions: Groups of businesses or industry alliances may collectively invest in offset projects as part of sector-wide sustainability initiatives.

c) Innovative Financing Mechanisms:

- Impact Investors: Investors focused on impact investing may contribute to funds that support emissions reduction projects.

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5. Cross-Sector Collaboration:

Collaborative Initiatives: Cross-sector collaborations, such as partnerships between technology companies and NGOs, may drive demand for credits.

6. Global Initiatives:

Global Sustainability Initiatives: International initiatives, like the United Nations' Sustainable Development Goals, may drive demand for credits with a focus on global sustainability.

The demand for carbon credits is dynamic and influenced by regulatory frameworks, corporate sustainability goals, consumer preferences, and industry-specific considerations. As awareness and commitment to climate action increase, the diversity of potential buyers and sources of demand for carbon credits is likely to expand.

03 Introduction to Carbon Markets

3.1 What are Carbon Markets?

Carbon markets¹⁵, also known as emissions trading systems or cap-and-trade programs, are mechanisms designed to reduce greenhouse gas emissions. The primary goal is to provide economic incentives for businesses and industries to limit their carbon dioxide (CO₂) and other greenhouse gas emissions. The basic idea behind carbon markets is to create a financial value for the right to emit carbon, encouraging companies to reduce their emissions to save on compliance costs or generate revenue through the trading of carbon credits.

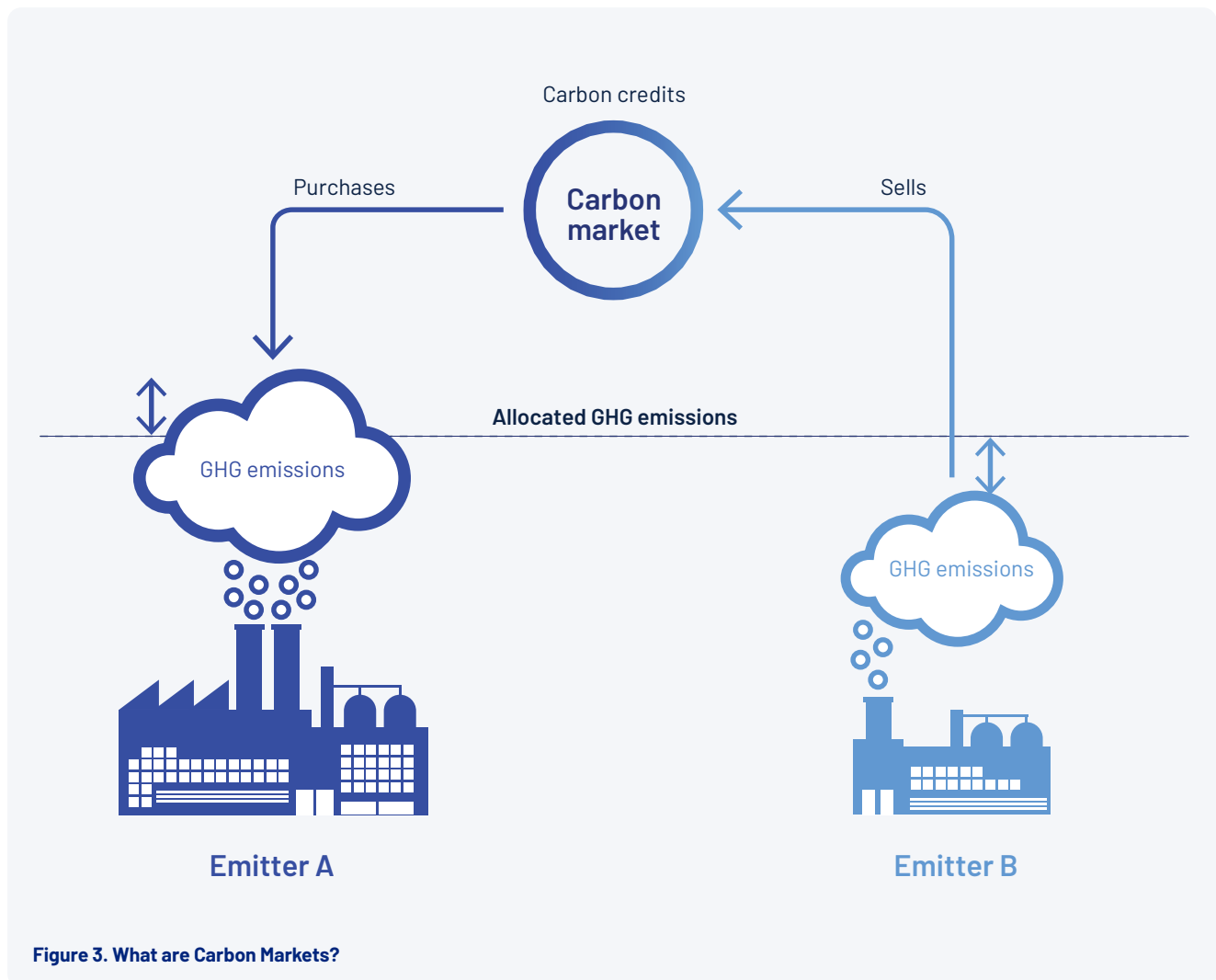


Figure 3. What are Carbon Markets?

Source: South Pole training module for GIZ 2021

¹⁵ <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important>

Introduction to Carbon Markets

Below are some characteristics of the compliance and voluntary carbon markets (Table 1). In India, a compliance carbon market does not exist and hence, for a business, purchasing credits in a voluntary market could be an effective option to reduce/offset its emissions.

Table 1. Overview of carbon markets and their characteristics

Market	Compliance		Voluntary
Credit type	Permits to pollute	Project-based emission reduction credits	Project-based emission reduction credits
Description	A 'certificate to pollute' one tonne of CO ₂ e. Number of certificates issued corresponds to the emission cap of the trading scheme	A carbon credit of 1 tonne generated from an emission reduction project	A carbon credit of 1 tonne generated from an emission reduction project
Issued by	National Governments/Agencies	Certification body recognised by Compliance Scheme e.g. CDM	Independent certification bodies e.g. VERRA, Gold Standard, GCC and GES
Examples	European Union Allowance (EUA)	Certified Emission Reduction (CER)	Verified Carbon Unit (VCU), Gold Standard Verified Emissions Reductions (GS VER), Global Carbon Council (ACCs)

Source: IETA, 2017

3.1.1 How do Carbon Markets work?

- **Cap and Trade:** Governments set an overall limit (cap) on the total amount of greenhouse gases that can be emitted by covered entities, such as power plants or industrial facilities. This cap is usually gradually reduced over time to encourage emission reductions.
- **Allowances:** Under the cap, a certain number of emissions allowances are distributed or auctioned to covered entities. Each allowance represents the right to emit a specified amount of greenhouse gases, usually one ton of CO₂ equivalent.
- **Trading:** Companies that can reduce their emissions more than required can sell their surplus allowances to those struggling to meet their emissions targets. This creates a financial incentive for companies to invest in cleaner technologies and practices.
- **Compliance:** At the end of a compliance period, covered entities must surrender enough allowances to cover their actual emissions. If they exceed their allocated allowances, they must buy additional allowances on the market.
- **Offsets:** Some carbon markets allow the use of carbon offsets, which are credits generated by projects that reduce or remove emissions outside the capped sectors. These offsets can be purchased by companies to compensate for their emissions.

Carbon markets aim to create a flexible and cost-effective approach to reducing emissions by letting the market determine the most efficient way to achieve emission reductions. While there are different carbon market designs around the world, they all share the common goal of promoting the transition to a low-carbon economy. However, the effectiveness of carbon markets can depend on the stringency of the emissions caps, the availability of low-carbon technologies, and the enforcement of regulations.

3.2 Types of Carbon Markets

There are several types of carbon markets, each with its own characteristics and mechanisms. The two primary types are voluntary carbon markets and compliance carbon markets¹⁶. Here's an overview of each:

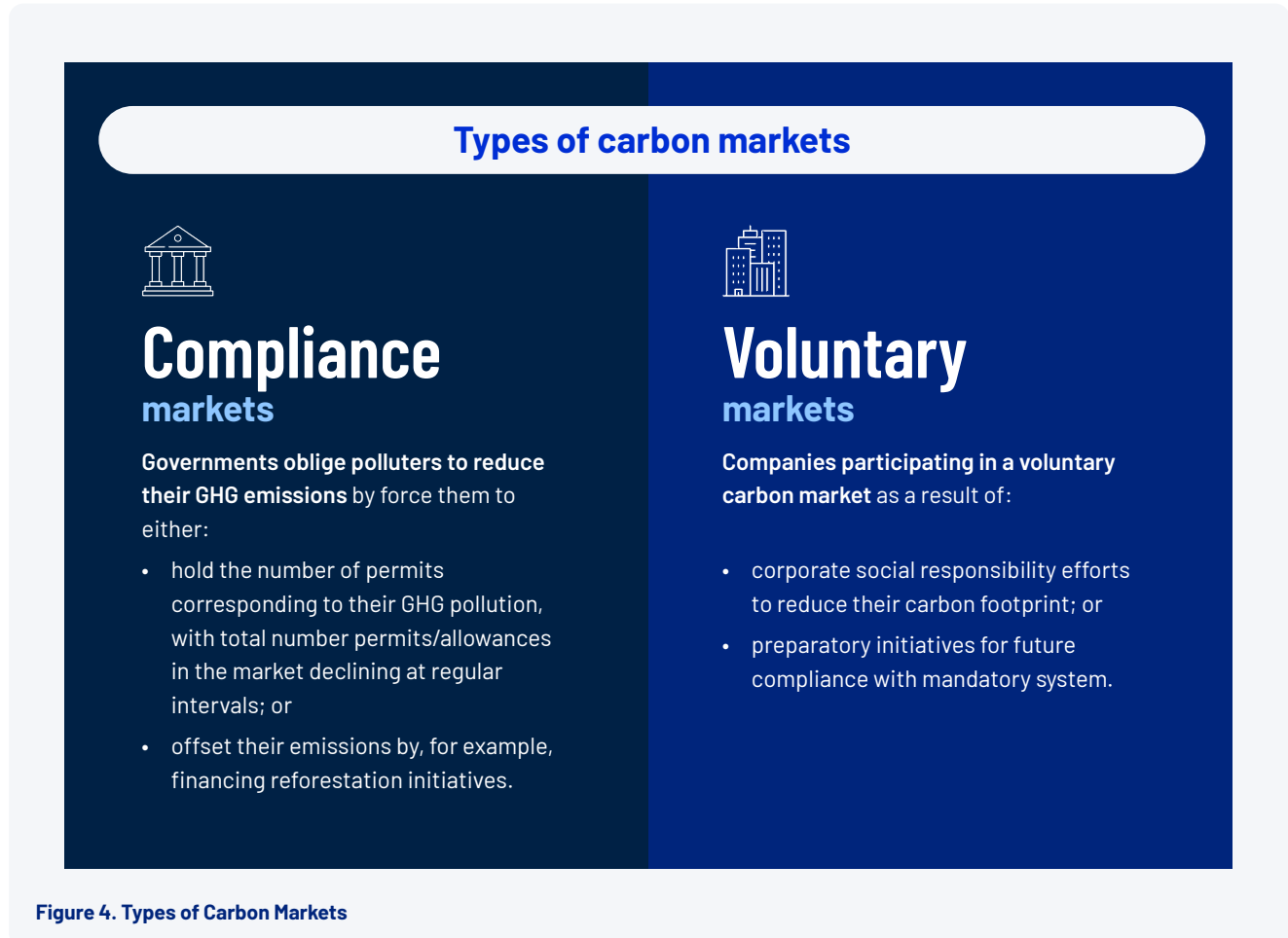


Figure 4. Types of Carbon Markets

Source: South Pole

1. Compliance Carbon Markets:

- **Cap-and-Trade Systems:** In these markets, governments set a cap on the total amount of greenhouse gas emissions allowed within a certain jurisdiction. Covered entities receive or purchase emission allowances, and they can trade these allowances with one another. The cap is typically lowered over time to encourage emission reductions.
- **Carbon Taxes:** While not a traditional cap-and-trade system, carbon taxes can be considered a form of a carbon market. Governments impose a tax on the carbon content of fossil fuels, encouraging businesses and individuals to reduce their emissions to avoid higher costs.
- **Regional and National Markets:** Examples of compliance carbon markets include the European Union Emissions Trading System (EU ETS), the California Cap-and-Trade Program, and the Regional Greenhouse Gas Initiative (RGGI) in the north-eastern United States.

2. Voluntary Carbon Markets:

- **Voluntary Offsetting:** In voluntary markets, businesses, organizations, and individuals voluntarily purchase carbon credits to offset their own emissions. These credits often come from projects that reduce or remove greenhouse gas emissions, such as renewable energy projects, afforestation initiatives, or methane capture projects.

¹⁶ <https://corporatefinanceinstitute.com/resources/esg/carbon-markets/>

Introduction to Carbon Markets

- **Corporate Social Responsibility (CSR):** Many companies participate in voluntary carbon markets as part of their CSR initiatives. They may commit to becoming "carbon neutral" by offsetting their emissions through the purchase of carbon credits.
- **Global Carbon Markets:** Some platforms facilitate the trading of voluntary carbon credits on a global scale. These platforms aim to connect buyers and sellers of carbon credits and provide transparency and standardization in the voluntary offset market.
- **Gold Standard, VCS, and Other Standards:** Various standards exist to ensure the quality and credibility of voluntary carbon credits. Examples include the Gold Standard and the Verified Carbon Standard (VCS), which provide guidelines for project development and credit issuance.

It's important to note that while compliance markets are often regulated by governments, voluntary markets operate based on voluntary commitments without regulatory mandates. Both types of markets play a role in addressing climate change, with compliance markets typically having more direct regulatory impact, and voluntary markets allowing for broader participation and innovation.

3.3 Compliance Carbon Market Schemes

Compliance carbon market schemes, also known as cap-and-trade systems, are regulatory frameworks implemented by governments to limit and reduce greenhouse gas emissions from specific sectors. Here are some notable compliance carbon market schemes:

1. European Union Emissions Trading System (EU ETS)¹⁷:

- **Scope:** Covers various industries, including power generation, manufacturing, and aviation, within the European Union member states.
- **Mechanism:** Operates on a cap-and-trade system, with a declining cap on total emissions. Allowances are distributed or auctioned to participants, and trading occurs on the European carbon market.

2. California Cap-and-Trade Program¹⁸:

- **Scope:** Covers multiple sectors, including electricity generation, industrial facilities, and fuel distributors, within the state of California, USA.
- **Mechanism:** Establishes a declining cap on emissions, and participants must acquire allowances to cover their emissions. Auctions and trading platforms facilitate the buying and selling of allowances.

3. Regional Greenhouse Gas Initiative (RGGI)¹⁹:

- **Scope:** Includes power plants in nine northeastern U.S. states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.
- **Mechanism:** Similar to other cap-and-trade systems, with a cap on emissions from covered power plants. States auction allowances and utilities can trade them to meet their compliance obligations.

4. Tokyo Metropolitan Emissions Trading Scheme:

- **Scope:** Targets large facilities in the Tokyo metropolitan area, Japan.
- **Mechanism:** Adopts a cap-and-trade approach, with covered facilities receiving emissions allowances. The scheme aims to promote energy efficiency and emissions reductions in the covered sectors.

5. New Zealand Emissions Trading Scheme (NZ ETS)²⁰:

- **Scope:** Encompasses various sectors, including forestry, energy, and industry, in New Zealand.
- **Mechanism:** Uses a cap-and-trade system with a gradually decreasing cap. Participants can trade emissions units, and forestry projects can earn carbon credits through the scheme.

¹⁷ https://ec.europa.eu/clima/policies/ets_en

¹⁸ <https://ww2.arb.ca.gov>

¹⁹ <https://www.rggi.org/>

²⁰ <https://www.mfe.govt.nz/>

Introduction to Carbon Markets

6. South Korea Emissions Trading System²¹:

- **Scope:** Covers industries such as power generation, petrochemicals, and steel production in South Korea.
- **Mechanism:** Adopts a cap-and-trade structure with emissions allowances distributed to covered entities. Participants can trade allowances to comply with their emission reduction obligations.

These compliance carbon market schemes vary in their coverage, regulatory details, and the sectors they include. They share the common goal of reducing greenhouse gas emissions by putting a price on carbon and encouraging industries to adopt cleaner technologies and practices. The effectiveness of these schemes depends on factors such as the stringency of the emissions cap, the accuracy of emissions monitoring, and the enforcement of compliance measures.

3.3.1 Kyoto Protocol

The Kyoto Protocol²² is an international treaty aimed at addressing climate change by setting legally binding emission reduction targets for developed countries. It was adopted on December 11, 1997, in Kyoto, Japan, and entered into force on February 16, 2005. The protocol was negotiated under the United Nations Framework Convention on Climate Change (UNFCCC), which was established during the Earth Summit in Rio de Janeiro in 1992.

Key features of the Kyoto Protocol include:

- **Binding Emission Reduction Targets:** The Kyoto Protocol divided participating developed countries and economies in transition (known as Annex I countries) into two groups. Each group was assigned a collective target for reducing their greenhouse gas emissions, primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The targets were set for the first commitment period from 2008 to 2012.
- **Flexible Mechanisms:** The protocol introduced three market-based mechanisms to help countries achieve their emission reduction targets more cost-effectively:
 - **Emissions Trading:** Annex I countries could buy and sell emission allowances to each other.
 - **Clean Development Mechanism (CDM)**²³: Annex I countries could invest in emission reduction projects in non-Annex I (developing) countries and receive certified emission reduction (CER) credits for the reductions achieved.
 - **Joint Implementation (JI)**²⁴: Annex I countries could invest in emission reduction projects in other Annex I countries and receive emission reduction units (ERUs) for the reductions achieved.
- **Commitment Periods:** The Kyoto Protocol had commitment periods during which countries aimed to meet their emission reduction targets. The first commitment period was from 2008 to 2012.
- **Compliance Mechanism:** The protocol established a compliance system to ensure that countries met their emission reduction targets. Non-compliance could result in penalties, and mechanisms were in place for countries to make up for shortfalls.

Despite being an important step in the international effort to address climate change, the Kyoto Protocol faced challenges²⁵. One of the main criticisms was the lack of binding emission reduction commitments for developing countries, which were becoming significant contributors to global emissions. Negotiations for a successor agreement culminated in the Paris Agreement, adopted in 2015, which includes all countries and aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels.

The Kyoto Protocol remains historically significant as the first international agreement that legally bound developed countries to reduce their greenhouse gas emissions. However, its effectiveness in achieving significant global emissions reductions was limited, and its approach was revisited and expanded upon in subsequent climate negotiations.

3.3.2 Paris Agreement

The Paris Agreement²⁶ is an international treaty on climate change that was adopted on December 12, 2015, at the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris, France. It entered into force on November 4, 2016. The Paris Agreement represents a landmark in global efforts to address climate change, as it brings together almost all countries in a collective effort to limit global warming and its impacts.

²¹ <http://eng.k-ets.or.kr>

²² https://unfccc.int/kyoto_protocol

²³ <https://cdm.unfccc.int/>

²⁴ <https://ji.unfccc.int/>

²⁵ <https://www.ieta.org/>

²⁶ <https://unfccc.int/process-and-meetings/the-paris-agreement>

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Key elements of the Paris Agreement include:

- **Global Temperature Goal²⁷:** The primary objective of the Paris Agreement is to limit the increase in global average temperature to well below 2 degrees Celsius above pre-industrial levels, with an ambition to limit the increase to 1.5 degrees Celsius. This more ambitious target recognizes the severe impacts that even a 2-degree increase could have on vulnerable ecosystems and communities.
- **Nationally Determined Contributions (NDCs)²⁸:** Each participating country submits a Nationally Determined Contribution, outlining its climate action plan and commitments to reduce greenhouse gas emissions. NDCs are voluntary and self-determined, reflecting the principle of "common but differentiated responsibilities" to accommodate the varying capacities and circumstances of different countries.
- **Regular Review and Enhancement:** The Paris Agreement establishes a mechanism for countries to regularly review and enhance their NDCs. This process is intended to encourage increased ambition over time, reflecting advancements in technology, changes in national circumstances, and the evolving understanding of climate science.
- **Global Stocktake²⁹:** The agreement includes a process known as the Global Stocktake, which occurs every five years. This process assesses collective progress toward the agreement's goals and informs future actions. It provides an opportunity for countries to take stock of their efforts and enhance their contributions.
- **Adaptation and Loss and Damage:** The Paris Agreement recognizes the importance of adaptation to the impacts of climate change, particularly for vulnerable countries. It also acknowledges the concept of "loss and damage," addressing the irreversible impacts of climate change that cannot be mitigated or adapted to.
- **Financial Support:** Developed countries commit to providing financial support to developing countries to assist them in both mitigation and adaptation efforts. The financial support aims to help developing nations transition to low-carbon, climate-resilient economies.
- **Transparency Framework:** The agreement establishes a common transparency framework to ensure that countries' actions and progress are clear, comparable, and verifiable. This enhances mutual trust and accountability among nations.

The Paris Agreement marked a shift in the approach to addressing climate change by embracing a bottom-up, nationally determined approach. It emphasizes the importance of global solidarity and cooperation in the face of a shared challenge. The agreement has garnered widespread international support, with virtually all countries becoming parties to it.

3.3.3 Transition from Kyoto Protocol to Paris Agreement

The transition from the Kyoto Protocol to the Paris Agreement reflects the evolution of international efforts to address climate change and the changing dynamics in the global response to this pressing issue³⁰. Here are key aspects of the transition:

1. Broadening Participation:

- **Kyoto Protocol (1997-2012):** The Kyoto Protocol primarily involved legally binding emission reduction targets for developed countries (Annex I countries). Developing countries had no binding emission reduction obligations.
- **Paris Agreement (2015 onwards):** The Paris Agreement marks a shift to a more inclusive and flexible approach. It includes all countries, both developed and developing, and encourages each nation to set its own voluntary emission reduction targets known as Nationally Determined Contributions (NDCs).

2. Flexible Approach and Voluntary Commitments:

- **Kyoto Protocol:** The Kyoto Protocol relied on a top-down approach, with predetermined emission reduction targets for Annex I countries.
- **Paris Agreement:** The Paris Agreement employs a bottom-up approach, allowing countries to voluntarily determine their NDCs based on their national circumstances and capabilities. This approach recognizes the principle of common but differentiated responsibilities.

²⁷ <https://unfccc.int/process-and-meetings/the-paris-agreement/global-climate-action-portal>

²⁸ <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions/ndc-registry>

²⁹ <https://www.ipcc.ch/>

³⁰ <https://www.adb.org/sites/default/files/publication/541116/article6-paris-agreement-jcm.pdf>

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3. Global Temperature Goals:

- Kyoto Protocol: While the Kyoto Protocol aimed to reduce emissions, it did not explicitly set a global temperature goal.
- Paris Agreement: The central goal of the Paris Agreement is to limit global temperature increase to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit the increase to 1.5 degrees Celsius. This reflects an acknowledgement of the need for more ambitious action to avoid severe climate impacts.

4. Adaptive and Evolving Nature:

- Kyoto Protocol: The Kyoto Protocol had a fixed commitment period from 2008 to 2012, and discussions on its extension faced challenges.
- Paris Agreement: The Paris Agreement features an adaptive and evolving framework. It allows for regular reviews and updates of countries' NDCs every five years, fostering a continuous cycle of ambition and improvement.

5. Market Mechanisms:

- Kyoto Protocol: Included market-based mechanisms like the Clean Development Mechanism (CDM) and Joint Implementation (JI), but these were primarily focused on Annex I countries.
- Paris Agreement: While the Paris Agreement acknowledges the importance of market mechanisms, it does not have a centralized carbon market. Instead, it encourages voluntary international cooperation and the transfer of mitigation outcomes.

6. Inclusiveness and Global Solidarity:

- Kyoto Protocol: The division between developed and developing countries contributed to challenges in garnering universal support.
- Paris Agreement: A key feature is the inclusion of all countries, reflecting a more inclusive and cooperative approach. The agreement emphasizes the shared responsibility of all nations in addressing climate change.

The transition from the Kyoto Protocol to the Paris Agreement represents a maturation of global climate governance, recognizing the need for a more inclusive, flexible, and ambitious approach to tackle the complex challenges posed by climate change³¹. It reflects a collective commitment to advancing global efforts in a manner that accommodates diverse national circumstances and promotes a unified response to the shared threat of climate change.

3.4 Voluntary Carbon Market Schemes

Voluntary carbon markets are initiatives where organizations and individuals voluntarily purchase carbon credits or offsets to compensate for their own greenhouse gas emissions. These markets operate independently of regulatory requirements and allow participants to take voluntary action to address climate change. Here are some key aspects of voluntary carbon market schemes:

3.4.1 VERRA (earlier known as verified carbon standard)

VERRA is a global non-profit organization that focuses on developing and managing standards for voluntary carbon and sustainable development markets. Formerly known as the Verified Carbon Standard (VCS), VERRA plays a significant role in the establishment and oversight of high-quality standards for carbon offset projects and programs.

Key aspects of VERRA include:

- **Verified Carbon Standard (VCS)³³:**
VERRA initially started as the organization overseeing the Verified Carbon Standard, which is one of the most widely used voluntary greenhouse gas accounting programs. The VCS provides a framework for quantifying, validating, and verifying emissions reductions and removals. The VCS establishes guidelines for various project types, including renewable energy, forestry, methane capture, and more.

³¹ <https://unfccc.int/>

³² <https://verra.org/>

³³ <https://verra.org/project/vcs-program/>

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- **Additional Standards:**
In addition to the VCS, VERRA has expanded its portfolio to include other standards and programs related to sustainable development and environmental integrity. Notable standards under VERRA include the Gold Standard for the Global Goals, which focuses on projects delivering sustainable development co-benefits alongside emissions reductions.
- **Carbon Offset Program Oversight:**
VERRA is involved in overseeing and accrediting entities that conduct third-party validation and verification of projects seeking to generate carbon credits. These credits, often referred to as carbon offsets, represent emissions reductions or removals achieved by specific projects.
- **Sustainable Development Goals (SDGs):**
VERRA places an emphasis on supporting projects that contribute to the United Nations Sustainable Development Goals (SDGs). This aligns with the broader trend in the carbon market to ensure that emission reduction projects also bring social, economic, and environmental benefits to local communities.
- **Market Mechanisms:**
VERRA's standards and programs contribute to the development and functioning of voluntary carbon markets. These markets allow businesses, governments, and individuals to voluntarily offset their carbon emissions by purchasing verified carbon credits.
- **Land Use and Forestry Programs:**
VERRA is involved in developing standards for Land Use and Forestry (LUF) projects, which include activities such as afforestation, reforestation, and sustainable land management practices.
- **Blockchain and Digital Solutions:**
VERRA explores the use of technology, including blockchain, to enhance transparency, traceability, and efficiency in carbon credit tracking and transactions.

VERRA's work is essential in maintaining the integrity of voluntary carbon markets by establishing rigorous standards and ensuring that emission reduction projects contribute to sustainable development goals. The organization continues to evolve and adapt its programs to address emerging challenges and opportunities in the field of climate change mitigation and sustainable development.

3.4.2 Gold Standard

The Gold Standard³⁴ for the Global Goals, often referred to as the Gold Standard is a certification standard within the voluntary carbon market. It is widely recognized for its dual focus on carbon mitigation and sustainable development. Here are key aspects of the Gold Standard within the voluntary carbon market:

- **Carbon Offset Projects:**
The Gold Standard certifies projects that generate carbon credits by reducing or removing greenhouse gas emissions. These projects span various sectors, including renewable energy, energy efficiency, afforestation, reforestation, and sustainable land use.
- **Sustainable Development Criteria:**
A distinguishing feature of the Gold Standard is its emphasis on sustainable development. Projects seeking certification must demonstrate positive impacts on local communities and contribute to specific United Nations Sustainable Development Goals (SDGs). The standard evaluates social, economic, and environmental co-benefits alongside emissions reduction.
- **Stringent Certification Process:**
The certification process involves a comprehensive and rigorous assessment of a project's additionality, emissions reductions, and sustainable development contributions. Projects are evaluated against specific criteria to ensure their environmental and social integrity.
- **United Nations Sustainable Development Goals (SDGs):**
Gold Standard projects align with and contribute to the achievement of specific SDGs. The standard helps bridge the gap between climate action and broader sustainable development objectives, emphasizing the interconnectedness of environmental and social goals.

³⁴ <https://www.goldstandard.org>

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- **Community Engagement and Stakeholder Inclusivity:**

Gold Standard projects are required to engage with local communities and stakeholders throughout the project development and implementation phases. This inclusivity aims to ensure that projects benefit those directly affected and that the local context is considered.

- **Additionality and Permanence:**

Projects must demonstrate additionality, meaning they go beyond business-as-usual practices, and implement measures that result in real, measurable emissions reductions. Additionally, mechanisms are in place to address issues such as permanence, ensuring that the environmental benefits are sustained over the long term.

- **Market Recognition and Credibility:**

Gold Standard-certified carbon credits, often known as Gold Standard Gold VERs (GS-VERs), are recognized and valued in the voluntary carbon market. The Gold Standard's reputation for high standards and its focus on sustainable development contribute to the credibility of its certified credits.

- **Continuous Improvement and Updates:**

The Gold Standard undergoes periodic reviews and updates to remain aligned with the latest developments in climate science, sustainable development, and best practices in carbon accounting. This commitment to continuous improvement enhances the standard's relevance and effectiveness.

The Gold Standard's unique approach addresses the interconnected challenges of climate change and sustainable development, making it a preferred choice for organizations and individuals seeking high-quality and impactful carbon offsets in the voluntary carbon market.

3.4.3 Social Carbon Standard

The Social Carbon Standard³⁵ is a certification standard within the voluntary carbon market that focuses on the social aspects of projects that generate carbon credits. It is designed to ensure that projects not only contribute to greenhouse gas emissions reduction but also deliver tangible social benefits to local communities. Here are key aspects of the Social Carbon Standard in the context of the voluntary carbon market:

- **Social Co-Benefits:**

The Social Carbon Standard places a strong emphasis on projects generating social co-benefits in addition to reducing or removing greenhouse gas emissions. These co-benefits may include poverty alleviation, job creation, community empowerment, and improvements in health and education.

- **Community Engagement:**

Projects seeking Social Carbon Standard certification must actively engage with local communities throughout the project lifecycle. This engagement aims to ensure that the project is aligned with community needs and priorities and that the benefits are distributed equitably.

- **Stakeholder Inclusivity:**

The standard promotes inclusivity by encouraging the active participation of a broad range of stakeholders, including local communities, indigenous peoples, and other relevant groups. This inclusive approach ensures that the perspectives and interests of different stakeholders are considered.

- **Gender Equality:**

The Social Carbon Standard recognizes the importance of gender equality and promotes the inclusion of women in decision-making processes related to the project. It seeks to ensure that women benefit from and contribute to project activities.

- **Capacity Building:**

Certified projects are expected to contribute to the capacity building of local communities. This may involve providing training, education, and skills development to enhance the ability of community members to participate in and benefit from the project.

³⁵ <https://www.socialcarbon.org/>

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- **Economic and Social Development:**
Social Carbon Standard projects are evaluated based on their potential to contribute to broader economic and social development goals. This could include the creation of income-generating opportunities, improvement of living standards, and enhancement of social infrastructure.
- **Certification Process:**
The Social Carbon Standard involves a certification process that assesses a project's social impacts alongside its environmental performance. The process includes criteria for project design, implementation, monitoring, and reporting to ensure that the intended social benefits are achieved.
- **Market Recognition:**
Projects that meet the requirements of the Social Carbon Standard are issued social carbon credits, which are recognized in the voluntary carbon market. The emphasis on social co-benefits enhances the market value and appeal of these credits to businesses and individuals seeking meaningful and holistic climate action.

The Social Carbon Standard reflects a growing awareness in the voluntary carbon market of the importance of addressing social aspects alongside environmental considerations. This standard provides a framework for projects to deliver positive outcomes for both people and the planet, contributing to a more comprehensive and sustainable approach to carbon offsetting.

3.4.4 The Climate Community and Biodiversity Standard (CCBS)

The Climate, Community, and Biodiversity (CCB) Standards³⁶ are a set of certification standards within the voluntary carbon market. These standards are designed to assess and certify projects that generate carbon credits based on their contributions not only to climate change mitigation but also to community well-being and biodiversity conservation. The CCB Standards aim to ensure that projects deliver a triple bottom line of environmental, social, and biodiversity benefits. Here are key aspects of the Climate, Community, and Biodiversity Standards:

- **Triple Benefit Approach:**
The CCB Standards focus on three key pillars: climate change mitigation, community well-being, and biodiversity conservation. Projects seeking certification must demonstrate positive outcomes in all three areas.
- **Climate Change Mitigation:**
Projects must contribute to reducing or removing greenhouse gas emissions to qualify for CCB certification. This involves implementing activities such as reforestation, afforestation, renewable energy projects, and sustainable land use practices.
- **Community Well-being:**
The CCB Standards assess the social impacts of projects on local communities. This includes considerations such as job creation, income generation, community empowerment, and the enhancement of social infrastructure. Community engagement and stakeholder participation are key components of the certification process.
- **Biodiversity Conservation:**
Biodiversity considerations are integral to the CCB Standards. Projects are evaluated based on their impact on local ecosystems, including measures to protect and enhance biodiversity. This may involve the preservation of natural habitats, the restoration of degraded ecosystems, and the promotion of sustainable land management practices.
- **Stakeholder Engagement:**
The CCB Standards emphasize the importance of engaging and consulting with relevant stakeholders, including local communities, indigenous peoples, and biodiversity experts. This inclusive approach ensures that diverse perspectives are considered in project design and implementation.
- **Certification Process:**
The certification process involves a thorough assessment of project documentation, methodologies, and on-the-ground activities. Projects must meet specific criteria related to climate change, community benefits, and biodiversity conservation to receive CCB certification.

³⁶ <https://www.climate-standards.org/>

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- **Market Recognition:**

Projects that meet the requirements of the CCB Standards are issued CCB credits, which are recognized and traded in the voluntary carbon market. The triple-benefit approach enhances the market value and appeal of these credits to organizations and individuals seeking comprehensive and impactful climate action.

- **Adaptation Considerations:**

The CCB Standards recognize the importance of adaptation to climate change. Projects are encouraged to consider and address the vulnerabilities and resilience of communities and ecosystems to climate impacts.

- **Continuous Improvement and Updates:**

The CCB Standards undergo regular reviews and updates to stay aligned with the latest developments in science, best practices, and the evolving understanding of the interconnections between climate, community, and biodiversity.

The Climate, Community, and Biodiversity Standards provide a robust framework for projects to demonstrate their commitment to delivering positive outcomes across multiple dimensions. This approach reflects the growing recognition in the voluntary carbon market of the need for comprehensive and sustainable solutions to address the complex challenges of climate change, community development, and biodiversity conservation.

3.4.5 The Global Carbon Council (GCC)

The Global Carbon Council (GCC)³⁷ is a voluntary carbon offsetting programme that aims to help companies in reducing their carbon footprints, assist sectors economies in diversifying through low-carbon paths, and catalyse climate action on the ground. The GCC intends to do this by:

- Help organisations execute GHG reduction programmes and measures.
- Develop severe but simple guidelines for calculating emission reductions and monitoring GHG reduction programmes and initiatives performed by regional bodies;
- Create a market mechanism for GHG reduction project owners who want to sell carbon offsets and project supporters who give carbon financing to project owners.
- Establish clear and straightforward certification methods in line with international protocol for the operationalization of carbon offsetting programmes capable of providing highly credible, cost-effective, and long-term carbon offsets to organisations; and
- Create a compendium of climate activities to communicate organisational and regional climate efforts to the world in a positive perspective.

- **Framework for Documentation**

The GCC's documentation framework makes it easier for enterprises to submit GHG emission reduction initiatives to the GCC while adhering to the framework's rules, processes, and standards. GCC secures project activity approval through an impartial, open, and objective review procedure. GCC awards the emission reduction units (referred to as "Approved Carbon Credits" or "ACCs") that the project accomplishes throughout the project's monitoring period, after ensuring that rigorous monitoring and independent verification are carried out in accordance with authorised criteria.

- **Carbon Neutrality**

The GCC aids public and commercial organisations, as well as governments, in developing strategies, policies, and actions to begin the low-carbon journey by creating short, medium, and long-term carbon neutrality targets.

- **Capacity Building**

GCC considers that companies with qualified and experienced personnel may successfully drive their organisations' sustainability and carbon management activities. To do this, the GCC provides a variety of capacity-building seminars and training programmes for stakeholders at all levels of government, business, industry, and society.

³⁷ <https://www.globalcarboncouncil.com/about-gcc/global-carbon-council/>

3.5 Choice of Mechanism

The choice between participating in voluntary and compliance markets depends on the goals, regulatory environment, and priorities of the entity seeking to engage in carbon markets, whether it's a company, organization, or government³⁸. Here are key considerations for choosing between voluntary and compliance markets:

1. Regulatory Obligations:

- **Compliance Markets:** Entities subject to regulatory requirements to limit and report greenhouse gas emissions may choose to participate in compliance markets. These markets operate under government-mandated cap-and-trade systems or carbon pricing mechanisms, and participation helps entities meet regulatory obligations.
- **Voluntary Markets:** Organizations without mandatory emissions reduction targets may opt for voluntary markets as a proactive step to address their carbon footprint voluntarily.

2. Geographic Scope:

- **Compliance Markets:** Compliance markets often have specific geographic scopes, governed by regional or national regulations. Entities operating in regions with established compliance markets may choose to participate to align with local regulatory frameworks.
- **Voluntary Markets:** Voluntary markets are often global and allow participants to support projects anywhere in the world. This can be attractive for organizations with a global presence or those seeking a broader range of project options.

3. Emission Reduction Goals:

- **Compliance Markets:** Entities with specific emission reduction targets, set by regulatory authorities, may choose compliance markets to ensure they meet their mandated goals. Penalties for non-compliance can be a motivating factor.
- **Voluntary Markets:** Organizations committed to sustainability and corporate social responsibility may engage in voluntary markets to offset their emissions and demonstrate environmental stewardship.

4. Flexibility and Innovation:

- **Compliance Markets:** Compliance markets are often more rigid due to regulatory frameworks. However, they may also provide a structured approach to achieving emissions reductions.
- **Voluntary Markets:** Voluntary markets offer more flexibility and room for innovation. Participants can choose projects aligned with their values and goals, contributing to a diverse range of emissions reduction activities.

5. Stakeholder and Brand Considerations:

- **Compliance Markets:** Meeting regulatory requirements can enhance an entity's reputation, demonstrating compliance and responsibility to stakeholders³⁹.
- **Voluntary Markets:** Participating in voluntary markets can enhance a company's brand image by showcasing a commitment to sustainability, and attracting environmentally conscious consumers and investors.

6. Project Types:

- **Compliance Markets:** The types of projects supported in compliance markets may be influenced by regulatory requirements. Projects often focus on sectors with mandatory emissions reduction targets.
- **Voluntary Markets:** Voluntary markets offer a broader range of project types, including renewable energy, forestry, and community-based projects, allowing participants to support initiatives aligned with their values.

Ultimately, the decision between voluntary and compliance markets depends on the specific context, goals, and regulatory landscape of the entity involved. Some entities may choose to engage in both markets to address different aspects of their emissions reduction strategy.

³⁸ <https://unfccc.int/>

³⁹ <https://carbonmarketwatch.org/>

04 Carbon Markets in New Climate Agreements

4.1 Role of Carbon Markets in New Climate Agreements

Carbon markets encourage climate action by permitting parties to trade carbon credits earned by reducing or removing GHGs from the atmosphere, such as through switching from fossil fuels to renewable energy or increasing or conserving carbon reserves in ecosystems like forests. By 2030, trading carbon credits could cut the cost of implementing countries' Nationally Determined Contributions (NDCs) by more than half, saving \$250 billion. In other words, carbon trading may remove 50% more emissions (approximately 5 gigatons of carbon dioxide per year by 2030) at no additional cost. As countries reach net zero emissions, markets will become obsolete.

Article 6 of the Paris Agreement allows nations to cooperate cooperatively to meet emission reduction objectives outlined in their NDCs⁴⁰. It establishes the Paris Agreement-governed international compliance carbon markets for trading carbon credits. Under Article 6, emission reductions that have been authorised for transfer by the selling country's government may be transferred to another country, but only one country may count the emission reduction towards its NDC. It is crucial to minimise double counting so that global emission reductions are not exaggerated. The Article 6 agreement introduced a "corresponding adjustment" accounting procedure to prevent double counting.

The role of carbon markets in a new climate agreement is a critical aspect of international efforts to address climate change. Carbon markets can play a significant role in the following ways:

- **Emission Reduction and Trading:** Carbon markets provide a mechanism for countries and entities to achieve their emission reduction targets. Under a new climate agreement, participating countries may commit to specific emission reduction goals. Carbon markets enable them to meet these targets by allowing the purchase and sale of emissions allowances, credits, or offsets. This provides flexibility for countries to reduce emissions cost-effectively and helps ensure that overall global emissions decrease.
- **Cooperation and Mitigation:** Carbon markets encourage international cooperation on emissions reductions. Countries with surplus emissions allowances can sell them to countries that exceed their allocated limits, promoting collaboration in the fight against climate change. This cooperation is crucial for achieving global climate goals and can help facilitate technology transfer and knowledge sharing.
- **Supporting Developing Countries:** Climate agreements often include provisions for financial and technical support to developing countries to help them transition to low-carbon economies and adapt to climate change. Carbon markets can be a source of revenue for developing countries by allowing them to participate in emissions reduction projects and sell carbon credits to developed countries. This financial support can facilitate clean energy development and sustainable practices in these nations.
- **Innovation and Technology Transfer:** The use of carbon markets can incentivize innovation and the development and deployment of clean technologies. As countries seek to meet their emission reduction targets, they invest in new technologies and practices that can reduce emissions. These innovations can be transferred to other regions, leading to the global spread of clean energy and sustainable practices.

⁴⁰ <https://carbonmarketwatch.org/2022/11/02/cop27-faq-article-6-of-the-paris-agreement-explained/>

Carbon Markets in New Climate Agreements

- **Market Linkages:** A new climate agreement may encourage the linking of carbon markets across different countries and regions. Linked markets can increase liquidity and reduce costs, making it more efficient and cost-effective to achieve emission reductions. An example of this is Article 6 of the Paris Agreement, which seeks to create a framework for market-based approaches to emissions reduction.
- **Economic Growth:** By creating a market for emissions reductions, carbon markets can drive economic growth and create opportunities for green jobs. Companies and individuals involved in emissions reduction projects, clean energy development, and carbon trading can contribute to a more sustainable and resilient global economy.
- **Transparency and Accountability:** Carbon markets are based on measurable and verifiable emission reductions. This promotes transparency and accountability in emissions reporting and tracking. These principles are crucial for the trust and effectiveness of any climate agreement.

It's important to note that the effectiveness of carbon markets in a new climate agreement depends on well-designed rules, robust monitoring and verification processes, and international cooperation. Challenges, such as addressing issues related to double counting, ensuring environmental integrity, and preventing market manipulation, need to be addressed to maximize the benefits of carbon markets in the context of climate agreements. A well-crafted climate agreement can provide a strong framework for harnessing the potential of carbon markets to combat climate change.

4.2 Article 6 of the Paris Agreement

Article 6 of the Paris Agreement is a crucial section that outlines mechanisms for international cooperation in achieving emission reduction targets and fostering sustainable development. It establishes the framework for market-based approaches to help countries and parties work together to mitigate climate change. Article 6 consists of three parts:

- **Article 6.1 – Cooperative Approaches⁴¹:** Article 6.1 promotes the idea of international cooperation, where countries can voluntarily work together to achieve their Nationally Determined Contributions (NDCs). This cooperation can involve various mechanisms, including bilateral agreements, emission reduction trading systems, and regional initiatives. Parties can engage in cooperative approaches as long as they ensure environmental integrity and transparency.
- **Article 6.2 – Internationally Transferred Mitigation Outcomes (ITMOs):** Article 6.2 establishes a framework for the use of internationally transferred mitigation outcomes (ITMOs). These are the emissions reductions or removals achieved in one country that can be transferred to another country to help meet its NDC. ITMOs are generated through cooperative projects and mechanisms. The rules for accounting, tracking, and verifying ITMOs are to be developed under the Paris Agreement's guidelines, considering principles like environmental integrity and avoiding double counting.
- **Article 6.4 – Mechanism to Contribute to the Mitigation of Greenhouse Gas Emissions and Support Sustainable Development:** Article 6.4 outlines a mechanism designed to help countries meet their NDCs while supporting sustainable development. It allows for the use of market-based instruments and mechanisms such as emissions trading, the Clean Development Mechanism (CDM), and Joint Implementation (JI). Like Article 6.2, this mechanism also aims to ensure environmental integrity and avoid double counting. It encourages financial support and technology transfer to developing countries, and it can help mobilize funding for climate projects in these nations.
- **Article 6.8 – Cooperative Approaches:** Article 6.8 is a specific subsection of Article 6 in the Paris Agreement, which addresses the use of cooperative approaches to achieve emissions reduction goals and promote sustainable development. Article 6 of the Paris Agreement outlines several provisions related to market-based mechanisms, international cooperation, and emissions trading. Article 6.8 is one of these provisions and is focused on non-market approaches.

Article 6 of the Paris Agreement is significant because it offers a flexible framework for international collaboration on climate action, allowing countries to leverage market mechanisms and incentives to meet their emission reduction targets while promoting sustainable development. However, the specific rules and guidelines for implementing Article 6 are still subject to ongoing discussions and negotiations within the United Nations Framework Convention on Climate Change (UNFCCC).

⁴¹ Rambharos, K. K. L. M. (n.d.). What You Need to Know About Article 6 of the Paris Agreement. World Resources Institute. <https://www.wri.org/insights/what-you-need-know-about-article-6-paris-agreement>

4.2.1 How Article 6 effective for cities?

Article 6 refers to a specific provision within the Paris Agreement, which is an international treaty aimed at addressing climate change. Article 6 of the Paris Agreement primarily focuses on the use of market-based mechanisms to help countries and entities achieve their greenhouse gas emissions reduction targets and combat climate change. While Article 6 is not specific to cities, it can be effective for cities in several ways:

- **Emission Reduction Collaboration:** Article 6 allows for international cooperation in achieving emissions reduction targets. Cities can partner with other cities or entities, both within their own country and abroad, to collaborate on emission reduction projects. This collaboration can lead to more cost-effective and efficient emissions reductions.
- **Carbon Trading and Offsetting:** Article 6 establishes a framework for emissions trading and offsetting. Cities can participate in carbon markets, buying and selling emissions allowances or offsets to achieve their targets. This can provide financial incentives for cities to reduce their emissions and invest in sustainable projects.
- **Mobilizing Finance:** Access to international carbon markets and mechanisms under Article 6 can help cities secure financing for emissions reduction projects and sustainable development initiatives. This can be critical for cities that lack the financial resources to implement climate actions independently.
- **Technology Transfer:** Article 6 encourages the transfer of environmentally sound technologies, which can benefit cities looking to adopt cleaner and more efficient technologies for urban planning, transportation, and energy systems.
- **Sustainable Urban Development:** Cities are major contributors to greenhouse gas emissions, and they also face significant climate change-related challenges. Article 6 can support the development and implementation of sustainable urban policies and projects, including public transportation systems, energy-efficient buildings, and green infrastructure.
- **Capacity Building:** Article 6 promotes capacity-building activities, which can help cities improve their ability to monitor and report emissions data accurately, set emission reduction targets, and implement climate actions effectively.

It's important to note that the effectiveness of Article 6 for cities depends on national and local governments' willingness to engage with the provisions of the Paris Agreement, as well as the establishment of clear rules and regulations for implementing Article 6 mechanisms within each country. The success of Article 6 also relies on the active participation of the private sector, non-governmental organizations, and other stakeholders. Ultimately, Article 6 can provide cities with valuable tools and opportunities to contribute to global climate efforts and reduce their carbon footprint.

05 Indian Carbon Markets

5.1 Roadmap for Carbon Markets in India

The Clean Development Mechanism (CDM) under the Kyoto Protocol has significantly supported GHG emission reduction initiatives in India⁴². As of December 2012, the CDM and other market mechanisms have funded 3,000 projects in India, with 40% registered with the UNFCCC. Over INR 1.6 trillion has been invested in these initiatives, resulting in over 170 million CERs that may be utilized by developed nations to satisfy Kyoto Protocol compliance obligations. With this, India ranks second globally, after China but far ahead of Brazil, Mexico, and South Korea. Industrial gas projects have consistently contributed the majority of CERs, whereas renewable energy initiatives have led in terms of registered CDM projects.

Designing and implementing a carbon market requires a comprehensive roadmap that considers the unique circumstances of India's economy, energy mix, and development goals⁴³. Here is a broad roadmap that India could consider when developing its own carbon market:

- **Assessment of Emissions:**
Conduct a thorough assessment of current and projected greenhouse gas emissions across sectors. This baseline will help establish emission reduction targets and allocate appropriate allowances within the carbon market.
- **Setting Emission Reduction Targets:**
Define clear and ambitious emission reduction targets aligned with India's national climate goals. These targets can be sector-specific, considering the diverse nature of the Indian economy.
- **Selection of Sectors and Industries:**
Identify key sectors and industries to be included in the carbon market. Start with sectors that contribute significantly to emissions and have the potential for cost-effective emission reductions.
- **Establishing a Cap-and-Trade System:**
Choose a cap-and-trade system as the foundation for the carbon market. Set an overall emissions cap for covered sectors and allocate allowances to regulated entities. Allowances represent the right to emit a specific amount of greenhouse gases.
- **Developing Monitoring, Reporting, and Verification (MRV) Systems:**
Implement robust MRV systems to accurately measure, report, and verify emissions from covered entities. This ensures the integrity and transparency of the carbon market.
- **Allocation of Allowances:**
Determine the method for allocating initial allowances to covered entities. Consider historical emissions, sectoral benchmarks, and other relevant factors to ensure a fair and equitable distribution.
- **Promoting Carbon Offsets:**
Integrate a mechanism for the use of carbon offsets within the market. This allows entities to earn credits by investing in emission reduction projects outside the capped sectors, further incentivizing sustainable practices.
- **Market Infrastructure:**
Establish the necessary infrastructure for the carbon market, including a registry for tracking allowances and transactions, a trading platform, and regulatory bodies for oversight.
- **Engaging Stakeholders:**
Conduct extensive consultations with industry, environmental groups, and other stakeholders during the design and implementation phases. Address concerns, gather input, and build broad support for the carbon market.

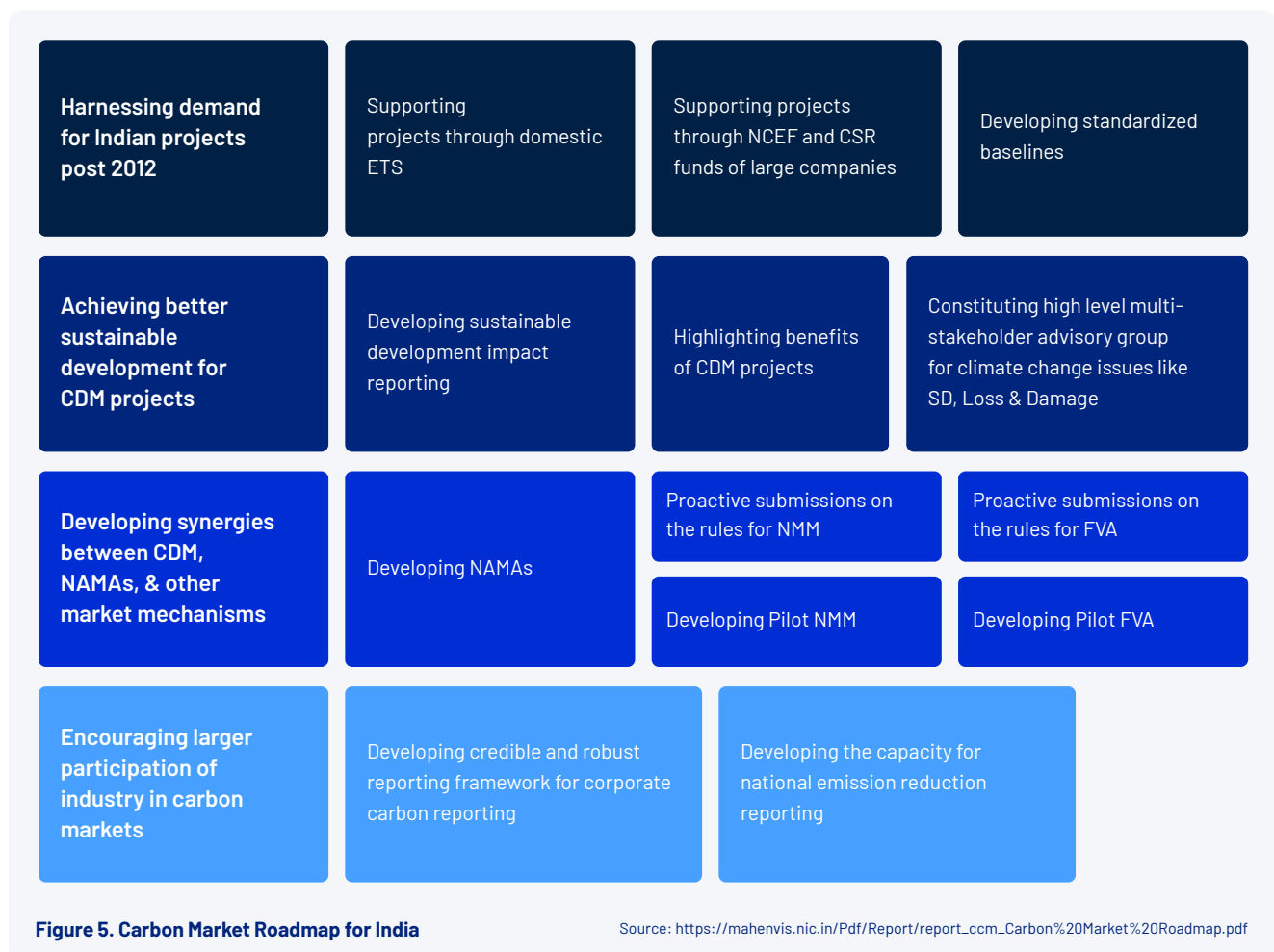
⁴² https://mahenvis.nic.in/Pdf/Report/report_ccm_Carbon%20Market%20Roadmap.pdf

⁴³ <https://www.spglobal.com/commodityinsights/en/ci/research-analysis/opportunities-to-set-up-a-national-ghg-emissions-trading.html>

Indian Carbon Markets

- **Capacity Building:**
Invest in capacity building and training programs to enhance the skills and knowledge of government officials, industry participants, and other stakeholders involved in the carbon market.
- **Public Awareness and Education:**
Implement a comprehensive public awareness and education campaign to inform the public about the benefits of the carbon market, its role in addressing climate change, and the importance of sustainable practices.
- **Legal and Regulatory Framework:**
Develop and enact the necessary laws and regulations to support the carbon market. Ensure that the legal framework provides clarity, transparency, and enforceability.
- **International Collaboration:**
Engage in international collaboration to align the domestic carbon market with global standards. This can include harmonizing measurement methodologies, participating in international carbon credit trading, and leveraging support for capacity building.
- **Continuous Monitoring and Evaluation:**
Establish a system for continuous monitoring and evaluation of the carbon market's performance. Periodically review and adjust the system based on lessons learned and changes in emission patterns.
- **Adaptability and Flexibility:**
Design the carbon market to be adaptable and flexible, allowing for adjustments as the economy evolves, technology advances, and global climate agreements change.

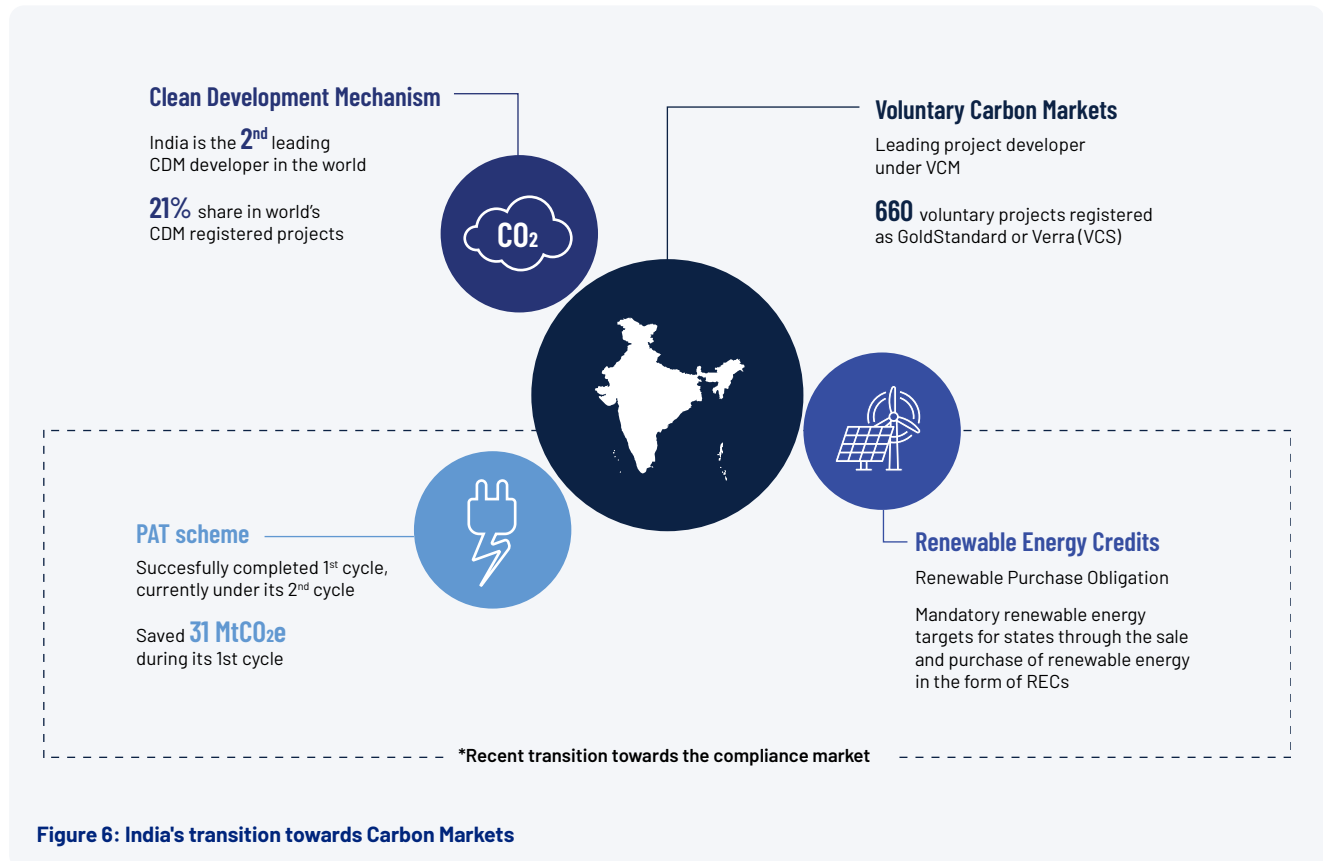
It's crucial for India to tailor its carbon market roadmap to its specific circumstances and regularly update the plan to address emerging challenges and opportunities in the transition to a low-carbon economy. Additionally, ongoing collaboration with stakeholders and periodic reviews will be essential for the success of the carbon market in India.



Indian Carbon Markets

5.1.1 Present and Future scenarios and potential of Carbon Markets in India

The present and future scenario of carbon markets in India is shaped by a combination of domestic policies and international commitments to address climate change⁴⁴. While carbon markets have been somewhat limited in India, there is potential for significant growth and impact in the future.



Source: South Pole

1. Present Scenario:

- **Voluntary Carbon Market:** India has seen engagement in the voluntary carbon market, with companies and individuals purchasing carbon credits to offset their emissions⁴⁵. This is often driven by corporate social responsibility (CSR) initiatives and environmental consciousness among consumers. However, the volume of voluntary offset projects in India has been relatively low compared to more developed markets.
- **Clean Development Mechanism (CDM):** India has been actively involved in the CDM; a market mechanism established under the Kyoto Protocol. The CDM allowed India to host a substantial number of projects that generated carbon credits, particularly in the renewable energy sector. These credits were primarily sold to entities in developed countries seeking to meet their emissions reduction targets.

2. Future Potential:

- **National Carbon Market:** India has expressed interest in developing its own national carbon market. This could be a compliance market where companies and industries are required to meet emission reduction targets. The development of a national carbon market would depend on the specific policies and regulations implemented by the Indian government.
- **Renewable Energy Growth:** India has ambitious renewable energy targets, and investments in solar, wind, and hydropower projects are expected to increase. As these projects reduce emissions, they have the potential to generate a significant number of carbon credits.

⁴⁴ <https://beeindia.gov.in/sites/default/files/publications/files/NCM%20Final.pdf>

⁴⁵ <https://shaktifoundation.in/wp-content/uploads/2018/07/Briefing-paper-Carbon-markets-in-India.pdf>

Indian Carbon Markets

- **Energy Efficiency Initiatives:** India is also focusing on energy efficiency improvements across various sectors, including industry, transportation, and buildings. These efforts can lead to emissions reductions, which can be monetized through carbon markets.
- **Afforestation and Reforestation:** India has undertaken afforestation and reforestation initiatives, which can sequester carbon and potentially generate carbon credits. These projects can play a role in carbon market activities.
- **Linking with International Markets:** As international carbon markets continue to evolve, India may explore opportunities for linking its carbon market with others, facilitating the exchange of carbon credits and promoting global cooperation in emissions reduction.
- **Technology Transfer and Collaboration:** India can benefit from technology transfer and financial support through participation in international carbon markets. This can help the country adopt cleaner technologies and enhance its ability to reduce emissions.



Source: <https://corporatefinanceinstitute.com/resources/esg/carbon-markets/>

While India's present carbon market activity is relatively modest, the country's future holds significant potential for growth, particularly as it continues to develop its renewable energy sector and embrace sustainable practices. This growth will depend on the government's commitment to climate action, the establishment of clear regulatory frameworks, and active engagement with international climate agreements and mechanisms.

5.1.2 How Indian cities can leverage Carbon Markets?

Indian cities can leverage carbon markets by implementing emissions reduction projects and initiatives that generate carbon credits or offsets⁴⁶. These projects can contribute to both local sustainable development and the global effort to combat climate change. Here are some ways in which Indian cities can participate in carbon markets:

⁴⁶ <https://files.wri.org/d8/s3fs-public/2023-07/leveraging-carbon-markets-india.pdf?VersionId=fk7zHlymTHHJQvYDR29wXEHdcsLLe1L6>

Carbon Markets

How pricing emissions can lead to predictable, cost-efficient and ambitious emission reductions.

1

Help achieve current & future climate ambitions

- Complement existing markets to meet current climate goals more efficiently
- Expand on existing markets to harness the potential of untapped sectors and emission sources to meet future climate goals

2

Bring about developmental co-benefits

- Improve air quality and health outcomes
- Increase job opportunities
- Lower risk to physical assets from climate change induced impacts
- Ensure resource & energy security

3

Flexibility & local relevance

Enable least cost emission reduction

- Provide flexibility in when, where and how businesses reduce emissions by virtue of trading
- Allow emission reduction at the least possible cost

4

Provide long term policy predictability

Incentivize innovation & finance

Enable low carbon industry growth

- Signal long term predictability on the cost of emissions
- Incentivize business to shift investments and innovate to low carbon operations and technologies

5

Boost competitive advantage of businesses

- Reduce cost from increased resource efficiency
- Boost competitive advantage in low carbon products
- Reduce risk of stranded assets
- Help meet shareholder and stake holder expectations

6

Open low carbon opportunities for MSMEs

Linking domestic markets to the international market can:

- Provide liquidity to Indian credits
- Unlock climate finance
- Spur clean innovation
- Induce technology transfer

Figure 8: How Indian cities can leverage to Carbon Markets?

Source: <https://wri-india.org/blog/five-ways-which-carbon-markets-can-boost-india%E2%80%99s-climate-efforts>

Indian Carbon Markets

- **Renewable Energy Projects:** Indian cities can invest in renewable energy projects, such as solar and wind power installations, which can generate carbon credits. These projects reduce greenhouse gas emissions by displacing fossil fuel-based energy sources. Cities can either sell these credits in the carbon market or use them to offset their own emissions.
- **Energy Efficiency Measures:** Implementing energy-efficient technologies and practices in public buildings, street lighting, transportation, and industries can lead to significant emissions reductions. These reductions can be quantified and used to generate carbon credits, which can be sold or used to meet emission reduction targets.
- **Public Transportation Initiatives:** Expanding and improving public transportation systems, promoting electric or hybrid buses, and encouraging the use of non-motorized transport can reduce emissions and traffic congestion. These initiatives can generate credits that can be monetized.
- **Waste Management and Recycling:** Effective waste management practices, including recycling and waste-to-energy projects, can help cities reduce emissions from landfills. By capturing and utilizing methane emissions, cities can generate carbon credits.
- **Afforestation and Reforestation:** Urban afforestation and reforestation projects, including tree planting and urban green spaces, can sequester carbon and contribute to carbon credit generation. These projects can also enhance the urban environment and provide other ecological benefits.
- **Urban Resilience Projects:** Climate adaptation projects that increase urban resilience, such as flood control measures and green infrastructure development, can also qualify for carbon credits if they lead to emissions reductions or removals.
- **Participation in International Agreements:** Cities can participate in international agreements and initiatives that promote urban sustainability and climate action. These initiatives may offer opportunities to access funding for emissions reduction projects and collaborate with other cities and organizations.
- **Innovative Financing:** Indian cities can explore innovative financing mechanisms, including green bonds and public-private partnerships, to fund emissions reduction projects. These financing mechanisms can help support the development of projects that qualify for carbon credits.
- **Data and Measurement:** It is essential for cities to establish robust emissions measurement and reporting systems to accurately quantify emissions reductions. Reliable data is critical for participating in carbon markets and demonstrating the environmental integrity of projects.
- **Capacity Building:** Building the capacity of city governments and local institutions to develop and manage emissions reduction projects and navigate the complexities of carbon markets is crucial. Accessing expertise and resources for project development and carbon credit generation is vital for success.
- **Public Awareness and Engagement:** Engaging with citizens and local stakeholders is important to gain support for emissions reduction projects. Public buy-in can facilitate the implementation of carbon-reducing measures and improve the marketability of generated credits.

Indian cities can leverage their unique circumstances and opportunities to contribute to carbon markets, enhance their sustainability, and generate revenue to fund further emissions reduction efforts⁴⁷. Collaboration with national and international organizations can help cities access the necessary resources and expertise to participate effectively in carbon markets.

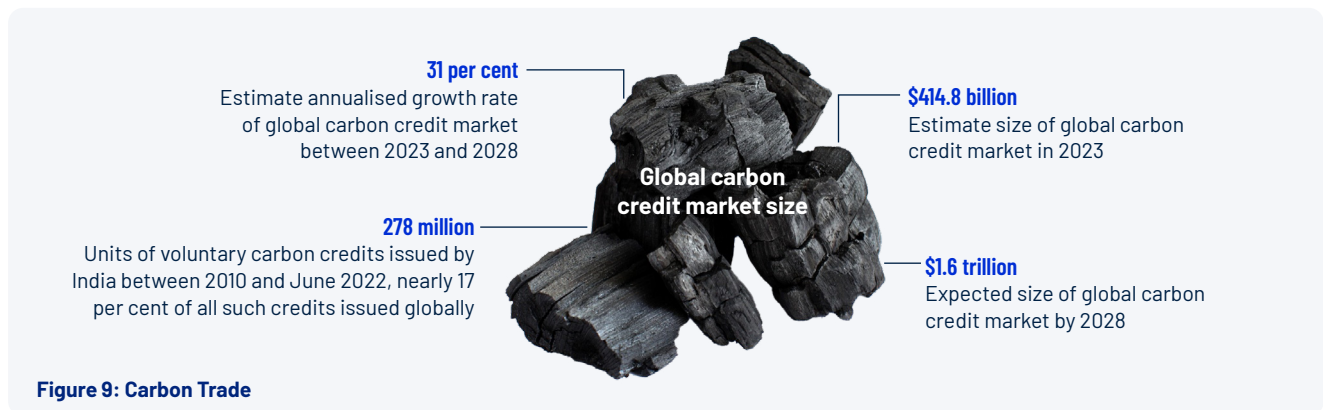
5.1.3 How does Carbon Market trading help India to reach its Net-zero goals?

The government's work to set up a system for selling carbon credits can help India Inc. and the country cut down on greenhouse gas emissions and meet its officially determined contributions⁴⁸. It may also encourage innovation and technological progress.

Setting up its own carbon trading market can be a strategic and effective approach for India to achieve its green goals. Carbon trading is a market-based mechanism that allows countries or entities to buy and sell carbon credits, which represent the right to emit a certain amount of greenhouse gases. Here are several ways in which establishing a carbon trading market can benefit India in pursuing its environmental objectives:

⁴⁷ <https://www.wri.org/research/carbon-markets-cost-efficient-emissions-reductions-india>

⁴⁸ https://assets.ey.com/content/dam/ey-sites/ey-com/en_au/topics/sustainability/ey-net-zero-centre-carbon-offset-publication-20220530.pdf



Source: <https://www.businesstoday.in/magazine/drive/story/how-carbon-credits-can-help-india-reach-its-net-zero-goals-385533-2023-06-14>

- Encouraging Emission Reductions:**
Carbon trading creates economic incentives for industries to reduce their greenhouse gas emissions. Companies that can reduce emissions below their allocated limits can sell excess carbon credits to those struggling to meet their targets. This incentivizes emission reduction efforts and helps India achieve its climate targets more efficiently.
- Cost-Effective Mitigation:**
A carbon market provides a cost-effective way for industries to comply with emissions reduction targets. Instead of imposing strict regulations that might burden businesses, a market-driven approach allows for flexibility and cost-effectiveness in achieving emissions reductions.
- Attracting Investment in Clean Technologies:**
The establishment of a carbon trading market can attract investments in clean and sustainable technologies. Investors are more likely to support projects in regions where they can trade carbon credits, as this provides a potential revenue stream and enhances the economic viability of green initiatives.
- Promoting Innovation:**
A carbon market encourages innovation by rewarding companies that develop and implement new technologies to reduce emissions. This stimulates a culture of continuous improvement and fosters the development of a sustainable and green economy.
- International Collaboration:**
Participating in the global carbon market allows India to collaborate with other nations in the fight against climate change. It provides an avenue for international cooperation and allows India to demonstrate its commitment to global climate goals, potentially opening up avenues for financial and technological support.
- Generating Revenue:**
By selling carbon credits in the global market, India can generate revenue, which can be reinvested in further environmental initiatives. This revenue can be used to fund research and development, support local communities affected by climate change, and finance other sustainable projects.
- Compliance with International Agreements:**
A domestic carbon market aligns with international agreements such as the Paris Agreement. By demonstrating a commitment to reducing emissions through market mechanisms, India can strengthen its position in global climate negotiations.
- Balancing Economic Growth and Environmental Protection:**
A carbon market provides a mechanism for balancing the need for economic growth with environmental protection. It allows industries to grow while ensuring that emissions are reduced in a quantifiable and accountable manner.

However, it's essential to design the carbon trading system carefully, taking into account the specific circumstances of the Indian economy and ensuring that it is transparent, fair, and effectively monitored. Additionally, complementary policies and measures may be needed to address specific challenges and ensure the success of the carbon market in driving sustainable development.

06 Development of Carbon/Climate Action Project

6.1 Developing a Carbon or Climate Action Project

A climate action project is a project that lead to either the reduction of GHG emissions or the removal of carbon from the atmosphere. This section provides an overview of developing such a project. The methodology has been defined for both: developing a CDM project and developing other projects that are not for CDM. Given below (Figure 3) are the steps that are used:



Source: South Pole's own elaboration

- **Step 1 Developing a project idea**: The first step to developing a climate action project is to select a project idea and develop a concept note. Ideally, the project idea should define a business model, check the availability of resources, define the methodology, the feasibility of a project, and finally the projected impacts of the project. This idea can be presented to various stakeholders associated and once finalized can be taken to the next step.
- **Step 2 Development of project design document (PDD)**: The second step is to develop a PDD. The PDD should describe the planned activities of the project, including the methodology used to calculate emission reductions. The following are the key required contents for a PDD:
 - Description of the project activities
 - Baseline methodology
 - Project additionality

Development of Carbon/Climate Action Project

- Duration of the project or crediting period
- Monitoring methodology and plan
- Estimation of GHG emissions by sources
- Environmental impacts of the project
- Stakeholder comments

The development of a project as a climate change mitigation project requires the application of an approved methodology. In case no directly applicable methodology is found, based on the review of existing methodologies with partial fitment, revisions/ deviations of the most relevant methodology may be proposed to make them applicable. In case no existing methodology is applicable (fully/partially), the development of a new methodology will be required.

The quantification of emission reductions is carried out by applying an approved methodology.

Further, the approved methodology also provides the necessary aspects of monitoring and reporting. This includes documenting the necessary steps for monitoring, reporting, and verifying gross generation data at the project level, including, for example, data metering standards, data collection procedures, etc.

6.1.1 Initiating registration of the project

This should include the potential options for registration, and criteria based on which the client may select a standard or registry or mechanism (CDM, GS or VERRA or any other scheme).

6.1.2 Roles and responsibilities

The roles and responsibilities of the project developer, the consultant supporting the emission reduction preparation process, and other stakeholders involved in the process at different stages is depicted in the following figure:

Steps	Description	Actors
1 Project design	Drafting a PDD in accordance with EB's Guidelines	Project developer
2 National approval	Approving the project including confirming that it contribute to sustainable development	DNA
3 Validation	Reviewing PDD and validating the project eligibility	DOE
4 Registration	Registration, rejection or request for review	CDM EB
5 Monitoring and Reporting	Monitoring and reporting of performance	Project developer
6 Verification and Certification	Verifying monitoring report including the emission reduction claim	DOE
7 Issuance of CERs	Issuing CERs based on verification outcomes	CDM EB

Figure 11: Steps in the carbon asset development and roles of stakeholders

Source: Authors

Although, the above figure is depicted in the context of CDM, however, the steps and roles are essentially the same, except for the approval not required in the independent schemes (GS, VERRA) and the role of CDM EB is performed by the respective authority at GS and VERRA.

Development of Carbon/Climate Action Project

6.1.3 Methodology for quantification of emission reductions

Methodologies for quantifying GHG emissions reductions help project developers to determine project boundaries, set baselines, and assess additionality in addition to quantifying the GHG emissions itself. This subsection provides an overview of different methodologies used in quantifying emission reductions.

6.1.3.1 Existing approved methodology

Most of the existing approved methodologies are based on CDM methodologies. CDM currently has 115 approved methodologies for various large-scale project activities⁴⁹ and another 100 approved methodologies for small-scale project activities⁵⁰.

Other voluntary standards such as VERRA also allow projects to use CDM methodologies in addition to its own standardised methodologies. VERRA also categorises its methodologies based on project sectors including energy, construction, waste, mining, industrial processes, mining, agriculture, forestry, grasslands, wetlands, and livestock and manure. VERRA also allows registered projects to use methodologies from the Climate Action Reserve Standard⁵¹.

6.1.3.2 Revision/deviation from the approved methodology

To ensure an approved methodology remains robust, these standards/programs carry out periodic reviews after which a methodology may be revised, withdrawn, or put-on hold. CDM also allows project proponents to submit request for revision of an approved methodology with specific deadlines for each project category⁵².

6.1.3.3 New methodology development

If a project developer cannot find a methodology that best suits its needs, it can apply for a new methodology. Each standard/program such as CDM⁵³ VERRA and GS have its own set of guidelines for proposing a new methodology. Some costs may be incurred for a new methodology development application. For instance, GS listed application costs of USD 7,500 for fast-track procedure (for methodologies that have been approved by another international standard/domestic scheme) and USD 15,000 for regular procedure.

Other than the above, there are a few elements that define a PDD:

Baseline: A scenario which would occur if the project did not exist. The emissions associated with that scenario are called baseline emissions (tCO₂e)

Additionality: In the business-as-usual (BAU) scenario, the project would not have been carried out. Also, the project must go beyond regulatory requirements. A project is considered additional if the emissions reduction achieved from a project activity is more than what would be achieved under a business-as-usual scenario and the project would not have occurred without the incentives from the carbon credits. The additionality of a project should be demonstrated and assessed according to the requirements outlined in the methodology used by the project.

There are two approaches used to determine additionality: project-specific approach and standardised approach. In project specific approach, the analysis depends on the individual characteristics and circumstances surrounding the project. This could include an investment analysis whether the project is financially attractive in the absence of credit incentives; barriers analysis demonstrating that at least one alternative to the project would not be prevented by non-technical implementation barriers and common practice analysis showcasing the project is not a common practice or at least have significant distinction with similar types of projects.

Conversely, a standardized approach evaluates projects against a predetermined set of criteria. A standardized approach is used by some voluntary carbon offset programs, most notably CAS and VERRA who applies the standardised approach to some project types.

Emission reduction: The calculation is a function of baseline emissions getting deducted by any project emissions and other leakage emissions not in control of the project entity.

⁴⁹ <https://cdm.unfccc.int/methodologies/PAMethodologies/approved>

⁵⁰ <https://cdm.unfccc.int/methodologies/SSCMethodologies/approved>

⁵¹ <https://verra.org/methodologies/>

⁵² <https://cdm.unfccc.int/Projects/pac/howto/CDMProjectActivity/NewMethodology/Revisions/index.html>

⁵³ <https://cdm.unfccc.int/Projects/pac/howto/CDMProjectActivity/NewMethodology/index.html>

Development of Carbon/Climate Action Project

The draft PDD is then submitted to:

1. Designated National Authorities (DNA), in case the project has been developed for CDM
 2. Client, in case the other (non-CDM) project has been developed.
- **Step 3 Host Country Approval and Authorisation:** An approval is provided in the form of a Letter (known as Letter of Approval (LoA)) and is provided by the host party and the investor countries (also known as Designated National Authorities (DNA)). In current scenario, LoA is only mandatory in CDM standard, other voluntary standards do not require approval from local DNA. The approval is only provided if:
 - The project has been approved for the purposes of Article 12 of the Kyoto Protocol
 - That participation in project is voluntary
 - The project assists in achieving country's sustainable development objectives
 - Authorize the project participants to participate in the CDM project

NOTE: Apart from the formal requirement of LoA under CDM, in the post 2020 regime, to avoid double claiming with progress towards mitigation targets pledged by countries in their Paris Agreement Nationally Determined Contributions (NDCs), countries must authorize the use of offset credits (Internationally Transferred Mitigation Outcome (ITMO)) by other countries or under the international aviation scheme CORSIA.

- **Step 4 Validation:** As soon as the client's/NDA's approval is received on the draft PDD, project documentation can be submitted to an independent auditor authorised by a standard for validation, i.e., for the approval of the planned project activities. An independent third-party auditor/verification bodies assess an emissions reduction project against the applied methodology. This assessment process is crucial in ensuring the integrity of an emissions reduction project registered to any standard/program.
- **Step 5 Registration:** After validation, the project is then submitted for registration either under the CDM process or the other carbon labels. The project then becomes publicly available on one of the public registries.
- **Step 6 Monitoring:** The post-registration phase begins with the monitoring of the project and the generation of the **monitoring report**. Each project has a robust monitoring plan in place that enables the project developer to successfully track project activities and emission reductions. Monitoring activities are performed continuously throughout a project's crediting period, thus ensuring that the project is on track to successfully issue carbon credits.
- **Step 7 Verification:** Depending on the length of the monitoring period (it varies and can be up to six years), the project developer submits the monitoring report to an independent third-party verifier (auditor) for approval. The auditor conducts a site visit and evaluates the integrity of the monitored data before officially verifying the project. The **verification report** is generated by the auditor. An independent third party will verify the GHG emissions reduction in the monitoring report.
- **Step 8 Issuance of carbon credits:** Once the site visit is completed, the verification outcome is submitted by the auditor to the carbon standard. Once accepted and approved by the standard, **the credits can be issued** into the project developer's account. When a credit is issued, it is assigned a unique serial number and listed on a registry that traces the credit from issuance through transaction(s), until retirement. This is a critical step in providing transparency around credit ownership and preventing double-claiming.

For a project qualification, the projects must adhere to the following principles. These are upheld by internationally recognized and ratified standards that provide a consistent and robust framework.

Development of Carbon/Climate Action Project

Real Proven to have genuinely taken place.	Additional The project must not be able to be built or operate without the revenue from carbon credits. The project must go beyond regulatory requirements.	Measurable Quantifiable, using recognized measurement tools against a credible emissions baseline. Adjustments must be for uncertainty and leakage.
Verifiable An independent, third-party auditor must verify the emissions reductions. The Auditor must be accredited under one of the ICROA-approved standards in the sector in which the project is taking place	Permanent Credits must represent permanent emissions reductions and removals for 100 years. Where projects carry a risk of reversibility, at minimum, adequate safeguards must be in place.	Unique Only one carbon credit can be associated with a single reduction or removal of 1 tonne of CO ₂ e, no "double counting". Carbon credits must be stored and retired in an independent registry.

Figure 12: How do projects qualify for carbon credits

Source: South Pole 2021

07 Co-benefits and Environmental Integrity

7.1 Co-benefits of a Carbon Project

Deploying climate action projects will not only help reduce GHG emissions but also will attract additional social, economic, and environmental benefits (co-benefits). For instance, a company investing in an energy efficiency project will help save its energy consumption and in return, decrease its energy bills. Investing in energy-efficient equipment has proven to help a company be more competitive, with the saved expenditures from the reduced bills can be used for innovation, marketing purposes, among others. A company investing in sustainable wastewater management can help reduce soil and water pollution from waste leakage while also utilising the wastewater for biogas for own consumption, thus reducing energy bills. Another example is investments in clean cooking projects whereby not only emissions from biomass can be reduced, but they can also promote gender equality as low-income women often spend hours collecting biomass and cook in an unhealthy kitchen, leading to premature death.

Given below are some of the sustainable development benefits that climate action projects lead to:



Figure 13: Co-benefits of climate action project

Note: The above list is indicative and all of them may not be applicable for some projects while some projects may have more benefits

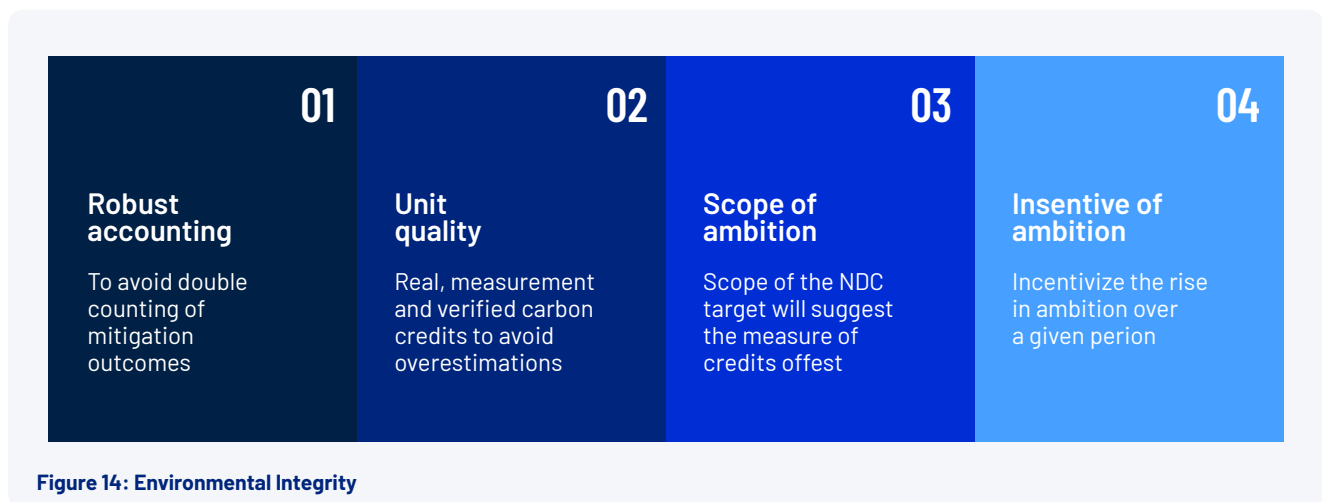
Source: South Pole, 2020

7.2 Environmental Integrity

In the context of international MBMs under Article 6 of the Paris Agreement, environmental integrity means the transfer of emissions reduction units does not result in higher global emissions than if the NDC has been achieved through the domestic market. It ensures overestimation of GHGs. Therefore, ensuring environmental integrity is crucial for the effectiveness and credibility of market mechanisms⁵⁴.

In the context of international crediting mechanisms, environmental integrity of a carbon emissions reduction unit is defined through additionality. Additionality means that the emission reductions would not occur in the absence of the incentives from the crediting mechanism⁵⁵.

There are four critical factors to ensure the environmental integrity:



Source: South Pole based on [German Emissions Trading Authority 2017](#)

- **Robust accounting:** It is a key prerequisite to ensure environmental integrity for international transfers. The global GHG emissions could increase as a result of transfer if they are not accounted for properly and in a robust way. If there is a lack of robust accounting, it could undermine the integrity of GHGs in several ways and could lead to double counting.
- **Unit quality:** It basically refers to the level of quality or confidence of a carbon credit. It serves as an important parameter to maintain environmental integrity as it is not guaranteed by robust accounting methods and ambitious mitigation targets in the Paris Agreement. Hence, the unit quality credits provide assurance that GHG emissions will not rise because of International transfers.
- **Scope of ambition:** It decides the level of credit offset measures. If a NDC target for a country is higher than its business-as-usual (BAU) then that country would only be able to transfer the reductions on paper as the potential to emit is higher than to reduce. A country with an ambitious economy-wide NDC target has an incentive to ensure that mechanisms issue units that have quality: if it transfers units that lack quality to another country, it would have to compensate for the transfer in order to still achieve its NDC target, by either further reducing emissions or purchasing international units ([German Emissions Trading Authority, 2017](#)).
- **Incentives of ambitions:** It means that the countries that raise their ambitions should be rewarded for generating additional reduction projects. This is important to maintain environmental integrity because if, for example, countries might fail to raise the ambition of their NDCs over time as much as they would have otherwise. Hence, to provide assurances about the overall environmental integrity, a country may need to take steps to demonstrate increasing ambition over time in their NDCs and incentivising the same will ensure it.

⁵⁴ <https://mediamanager.sei.org/documents/Publications/Climate/SEI-PB-2016-Market-mechanisms-Paris-Agreement.pdf>

⁵⁵ *ibid.*

