



Carbon Market And Trading In Kyoto Protocol

VASNI SAHU
Student
Kalinga University

Abstract

The Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change, established the first global carbon market intending to reduce greenhouse gas emissions and combat climate change. This market is underpinned by the Protocol's 'flexible mechanisms' which include the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET).

The CDM allows emission reduction projects in developing countries to earn certified emission reductions (CERs), each equivalent to one tonne of CO₂, which can be traded and sold. JI enables industrialized countries to carry out emission reduction projects in other developed countries, while the IET allows countries that have emission units to spare to sell this excess capacity to countries that are over their targets.

These mechanisms were designed to promote cost-effective emissions reduction, encourage private sector involvement, and facilitate technology transfer. The carbon market created by the Kyoto Protocol has been a key tool in reducing emissions worldwide, worth billions of dollars and is expected to grow. However, the transition from the Kyoto Protocol to the Paris Agreement has marked a shift in the approach to international carbon markets, with lessons learned from the former informing the development of new mechanisms under the latter.

The success of carbon markets under the Kyoto Protocol offers valuable insights for building an international carbon market under the Paris Agreement, highlighting the importance of robust market design, transparency, and environmental integrity to achieve global climate goals.

CHAPTER 1

Introduction Carbon market and trading in Kyoto Protocol

Carbon market and trading:-

The advent of carbon markets and trading has marked a significant milestone in the global effort to address climate change. At the heart of this initiative is the Kyoto Protocol, an international treaty that extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and commits its parties to reduce greenhouse gas emissions. The Protocol's innovative approach introduced market-based mechanisms, such as the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET), which have collectively laid the groundwork for carbon trading.

Carbon markets operate on the principle that parties with lower costs of carbon abatement can sell their surplus allowances or credits to parties with higher costs, creating a financial incentive to reduce emissions. This system not only encourages the reduction of emissions where it is most cost-effective but also stimulates the development and deployment of green technologies.

The Kyoto Protocol has been pivotal in operationalizing these markets, setting binding emission reduction targets for developed countries, and establishing a framework for carbon trading. Through its mechanisms, the Protocol has facilitated the transfer of sustainable technology to developing countries, promoted energy efficiency, and fostered renewable energy projects.

As the world transitions to the Paris Agreement, the experiences and lessons learned from the Kyoto Protocol's carbon market are invaluable. They inform the ongoing evolution of international climate policy and continue to shape the mechanisms that will drive future market-based climate action. The integration of carbon markets into broader environmental and economic policies remains a critical component in the quest to achieve a sustainable and low-carbon global economy.

Carbon markets, also known as emissions trading systems (ETS), are designed to reduce greenhouse gas emissions through a market-driven approach. They operate on the principle of 'cap and trade', where a cap is set on the total amount of certain greenhouse gases that can be emitted by factories, power plants, and other installations. Entities that keep their emissions below their cap can sell their surplus allowances to others who need them, creating a financial incentive to reduce emissions.

Types of Carbon Markets

There are two main types of carbon markets:

- **Compliance Markets:** These are mandatory and regulated by governments or international bodies. Entities within these markets are legally required to hold a sufficient number of allowances corresponding to their emissions¹.
- **Voluntary Markets:** In these markets, carbon credits can be traded voluntarily. Companies and individuals purchase carbon credits to offset their emissions, often as part of corporate social responsibility initiatives or environmental commitments².

Trading Strategies

1. **Buy and Hold:** Investors purchase carbon credits and hold them with the expectation that their value will increase as the cap on emissions is lowered over time, making allowances scarcer and more valuable¹.
2. **Hedging:** Companies that are subject to emissions caps can use carbon markets to hedge against the risk of future price increases in carbon credits. By purchasing credits in advance, they can protect themselves against potential cost spikes¹.
3. **Speculation:** Traders may buy and sell carbon credits based on predictions about market movements, regulatory changes, or technological advancements that may affect the supply and demand for credits¹.

Challenges and Considerations

While carbon markets are growing rapidly, they face challenges such as price volatility, regulatory uncertainty, and the complexity of linking different systems. Additionally, the effectiveness of carbon markets in reducing emissions has been a subject of debate.

How do companies participate in voluntary carbon markets?

1. **Purchasing Carbon Credits:** Companies can buy carbon credits to offset their greenhouse gas emissions. Each credit typically represents one metric ton of reduced, avoided, or removed CO₂ or equivalent GHG.
2. **Industry-Wide Schemes:** Some companies may join industry-wide schemes like the Carbon Offsetting and Reduction Scheme for International Aviation (CORSA), which allows participants to offset their emissions above a certain baseline.
3. **Project Financing:** Businesses can finance projects that reduce GHGs elsewhere, such as reforestation or renewable energy projects, and receive offsets that can be sold to third parties.
4. **Market Facilitation:** Companies can also act as market facilitators by warehousing risk, capturing arbitrage opportunities, and providing liquidity to the market.
5. **Types of Credits:** There are two main types of credits in the voluntary market: avoidance credits for projects that avoid or reduce emissions, and removal credits for projects that lower existing emissions.

Examples of successful voluntary carbon offset projects: -

1. **Reforestation and Afforestation Projects:** These involve planting trees in areas that have been deforested or never had forests. Trees absorb CO₂ as they grow, making these projects effective at removing carbon from the atmosphere¹.
2. **Renewable Energy Projects:** Investing in renewable energy sources like wind, solar, and hydroelectric power helps to reduce reliance on fossil fuels and thus avoid carbon emissions².
3. **Methane Capture:** Projects that capture methane from landfills or agricultural operations prevent this potent greenhouse gas from entering the atmosphere³.
4. **Improved Cookstoves:** Providing communities with efficient cookstoves can reduce emissions from cooking with biomass, which is a common practice in many developing countries.
5. **Carbon Farming:** This involves agricultural practices that improve the rate at which CO₂ is removed from the atmosphere and converted to plant material and soil organic matter.

Carbon market and trading in 2024: -

Several key developments characterise the carbon market and trading landscape in 2024:

- **Global Carbon Market Outlook:** Prices across different carbon markets are expected to become more aligned as new programs set records and older ones stabilize. Net-zero targets are driving regulators to tighten supply and expand market sectors. Carbon border adjustment taxes are gaining traction, and market-tightening reforms in the US and Australia are pushing allowance prices up. In contrast, the EU is likely to see more subdued prices due to interventionist measures
- **Emissions Trading Systems (ETS):** The International Carbon Action Partnership's report indicates that jurisdictions representing 58% of global GDP are utilizing ETS. There are 36 systems in place, with 22 more under development or consideration. Emerging economies are increasingly adopting emissions trading, with local adaptations. Global revenue from ETSs surpassed USD 74 billion in 2023, with funds often reinvested into emission reduction initiatives
- **India's Carbon Trading:** India is planning to implement carbon trading and emission reduction targets for key sectors starting from 2024-25, with the carbon trade commencing in 2025-26. This initiative aligns with the country's emission intensity reduction goals submitted to the United Nations
- **Market Dynamics:** Companies and countries are expected to re-engage with carbon markets aggressively as they face the realities of decarbonisation commitments made to the UN and through the Science-Based Targets Initiative
- **Carbon Prices:** California's carbon price is expected to average around \$42 per metric ton in 2024, with projections of reaching as high as \$93 per ton by the end of the decade. EU carbon prices are forecast to average €71 per ton (\$76 per ton) in 2024, down from the previous year, but projected to increase to €149 per ton by 2030.

Carbon market and trading in 2021 and 2024: -

The carbon market and trading have seen significant developments between 2021 and 2024. Here's a comparative overview:

2021:

- **Global Revenue:** The global carbon pricing revenue increased by almost 60% from 2020 levels to around \$84 billion¹.
- **Carbon Pricing Instruments:** There were 68 direct carbon pricing instruments in operation, including 36 carbon taxes and 32 Emissions Trading Systems (ETSs)¹.
- **New Implementations:** Four new carbon pricing instruments were implemented, including one in Uruguay and three in North America.
- **Record Prices:** Carbon prices hit record highs in many jurisdictions, including the EU, California, New Zealand, Korea, Switzerland, and Canada¹.
- **Voluntary Carbon Markets:** The voluntary carbon markets posted a near-60% **increase** in value from the previous year, driven by corporate net-zero ambition and growing interest in carbon markets to achieve Paris climate goals².

2024:

- **Market Outlook:** Prices across different carbon markets are expected to become more aligned, with net-zero targets driving regulators to tighten supply and expand market sectors¹.
- **ETS Expansion:** Jurisdictions representing 58% of global GDP are utilizing ETS, with 36 systems in place and 22 more under development².
- **India's Carbon Trading:** India plans to implement carbon trading and emission reduction targets for key sectors starting from 2024-25³.
- **Market Dynamics:** Companies and countries are re-engaging with carbon markets as they face the realities of decarbonisation commitments⁴.

- **Carbon Prices:** California's carbon price is expected to average around \$42 per metric ton in 2024, with EU carbon prices forecast to average €71 per ton¹.

Kyoto Protocol: -

History of Kyoto Protocol: -

The **Kyoto Protocol**, named after the Japanese city where it was adopted in **December 1997**, is an **international treaty** designed to address the urgent issue of **global warming** by reducing greenhouse gas emissions. Here are the key points about the Kyoto Protocol:

1. **Background and Provisions:**

- The protocol is an addition to the **United Nations Framework Convention on Climate Change (UNFCCC)**.
- It commits signatory countries to develop national programs aimed at reducing their emissions of greenhouse gases.
- These gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF₆).
- The goal is to mitigate the energy balance of the global atmosphere and prevent overall temperature increases (known as global warming).
- The long-term effects of global warming include rising sea levels, melting glaciers, extreme climate events, and risks to plant and animal species.
- The Kyoto Protocol specifically targeted signatories (which included developed countries and economies in transition) and set mandatory emission-reduction targets.

2. **Commitment Period:**

- The commitment period for emission reduction was from **2008 to 2012**.
- The goal was to reduce emissions to **5.2 per cent below 1990 levels**.

3. **Effectiveness and Criticism:**

- Widely hailed as the most significant environmental treaty ever negotiated, the Kyoto Protocol faced some criticism regarding its effectiveness.
- Despite misgivings from critics, it remains a landmark effort in the fight against climate change.

Objective

The primary objective of the Kyoto Protocol is to reduce greenhouse gas emissions worldwide. It operationalises the United Nations Framework Convention on Climate Change (UNFCCC) by committing industrialised countries and economies in transition to limit and reduce their emissions following agreed individual targets.

Principles The protocol is based on the principle of “common but differentiated responsibilities and respective capabilities.” This acknowledges that developed countries are largely responsible for the high levels of greenhouse gases in the atmosphere due to more than a century of industrial activity.

Commitments

Under the protocol, 37 industrialized countries and the European Union have committed to reducing their emissions to an average of 5 per cent against 1990 levels over the five years from 2008 to 2012. This is known as the first commitment period. The Doha Amendment introduced a second commitment period, starting in 2013 and lasting until 2020, with new commitments for Annex I Parties to reduce emissions by at least 18 per cent below 1990 levels.

Mechanisms

The Kyoto Protocol introduced three market-based mechanisms to assist countries in meeting their targets economically. These are:

- **Emissions Trading:** Known as the “carbon market,” it allows countries that have emission units to spare to sell this excess capacity to countries that are over their targets.
- **Clean Development Mechanism (CDM):** It allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries.
- **Joint Implementation (JI):** It allows a country with a commitment under the Kyoto Protocol to earn emission reduction units from an emission-reduction or emission-removal project in another country with a commitment under the Protocol

Significance

The Kyoto Protocol was the first of its kind to set binding emission reduction targets for nations. Its mechanisms and commitments were designed to lower the global emissions of six major greenhouse gases, which contribute to global warming and climate change.

The Kyoto Protocol employs a multi-faceted strategy to combat climate change by reducing greenhouse gas emissions. Here are the key strategic elements of the Kyoto Protocol:

1. Binding Commitments: The protocol sets binding emission reduction targets for industrialized countries and economies in transition. These targets are designed to reduce overall emissions of greenhouse gases to an average of 5 per cent below 1990 levels during the first commitment period (2008–2012) and at least 18 per cent below 1990 levels in the second commitment period (2013–2020)¹.

2. Market-Based Mechanisms: To facilitate the achievement of these targets, the Kyoto Protocol introduced three market-based mechanisms:

- **Emissions Trading:** Allows countries with surplus emissions allowances to sell them to countries that are over their targets.
- **Clean Development Mechanism (CDM):** Enables developed countries to invest in emission reduction projects in developing countries and earn emission reduction credits.
- **Joint Implementation (JI):** Permits industrialized countries to carry out emission reduction projects in other developed countries¹.

3. Differentiated Responsibilities: The protocol follows the principle of “common but differentiated responsibilities and respective capabilities,” recognizing that developed countries are largely responsible for the current high levels of greenhouse gas emissions in the atmosphere due to their historical industrial activities¹.

4. Reporting and Verification: Parties to the Kyoto Protocol are required to maintain national inventories of greenhouse gas emissions and removals, which are subject to international review and verification¹.

5. Adaptation and Support: The protocol also includes provisions for financial assistance, technology transfer, and capacity-building to support developing countries in their efforts to address climate change.

6. Flexibility: The Kyoto Protocol allows for flexibility in how countries meet their targets, including the use of carbon sinks such as forests, which can absorb carbon dioxide from the atmosphere¹.

7. Amendment for Enhanced Action: The Doha Amendment to the Kyoto Protocol, adopted in 2012, introduced a second commitment period with new targets and an updated list of greenhouse gases to be reported on by Parties.

KYOTO PROTOCOL IN 2024: -

As of 2024, the Kyoto Protocol continues to be a significant international agreement within the framework of the United Nations Framework Convention on Climate Change (UNFCCC). Here's an update on the status and impact of the Kyoto Protocol as of this year:

- **Status of Ratification:** The Kyoto Protocol has been ratified by 192 parties, which includes 191 states and one regional economic integration organization. This widespread ratification signifies a global commitment to addressing climate change through the protocol's mechanisms¹.
- **Transition to the Paris Agreement:** The Kyoto Protocol's second commitment period ended in 2020. Following this, the focus has shifted to the Paris Agreement, which builds upon the protocol and aims to further limit global warming to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees Celsius. The Paris Agreement encourages greater ambition in reducing emissions and is widely viewed as the successor to the Kyoto Protocol².
- **Achievements and Challenges:** The closure of the annual reviews for the second commitment period of the Kyoto Protocol showed that developed countries that ratified the protocol managed to reduce average annual emissions by 17 per cent compared to 1990 levels. The European Union cut emissions by 25 per cent, and countries like Germany by 30 per cent. These results indicate that steps are being taken to meet the reduction objectives set out in the Paris Agreement. However, there is a consensus that global ambition needs to be considerably ramped up to meet the key temperature goals of the Paris Agreement.
- **Continued Relevance:** Despite the transition to the Paris Agreement, the Kyoto Protocol remains relevant as it paved the way for the current climate action framework. The protocol's mechanisms, such as emissions trading and the Clean Development Mechanism (CDM), have laid the groundwork for similar mechanisms under the Paris Agreement. The experience gained from the Kyoto Protocol is instrumental in developing rigorous transparency systems for future reporting under the Paris Agreement.
- In summary, the Kyoto Protocol in 2024 stands as a foundational element in the history of international climate change efforts. Its legacy continues to influence current and future actions under the broader umbrella of the UNFCCC and the Paris Agreement.

KYOTO PROTOCOL IN 2021 AND 2024: -

The Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change, has seen changes in its status and relevance between 2021 and 2024.

In 2021:

- The Kyoto Protocol was effectively replaced by the Paris Agreement, which went into effect in 2016¹.
- The Doha Amendment to the Kyoto Protocol, which extended the commitment period until 2020, entered into force on 31 December 2020².
- Developed countries had committed to reduce their greenhouse gas emissions by an average of 5.2% by the year 2012, with varying targets for individual countries¹.
- The Kyoto Protocol established mechanisms like the International Emissions Trading to enable countries to meet their targeted emissions limits¹.

In 2024:

- The Kyoto Protocol continues to be recognized for its historical significance in setting a precedent for international climate agreements³.
- The closure of Parties' annual reviews for the second commitment period (2013–2020) of the Kyoto Protocol showed a push by developed countries to reduce emissions and be transparent about those efforts³.
- The review results confirmed that developed countries that ratified the Kyoto Protocol managed to reduce average annual emissions by 17 per cent compared to 1990 levels³.

- The Kyoto Protocol has paved the way for greater ambition under the Paris Agreement, with Parties starting to take necessary steps to meet reduction objectives set out in the Paris Agreement

How did different countries respond to the Kyoto Protocol?

1. United States:

- Initially, the U.S. signed the protocol but did not ratify it. The main reason was concern about the economic impact on American industries.
- In 2001, President George W. Bush officially withdrew the U.S. from the protocol, citing its potential harm to the U.S. economy.

2. European Union (EU):

- The EU collectively committed to reducing emissions by 8 per cent below 1990 levels during the commitment period.
- Many EU member states implemented policies such as promoting renewable energy, improving energy efficiency, and setting emission reduction targets.

3. Japan:

- Japan ratified the protocol and aimed to reduce emissions by 6 per cent below 1990 levels.
- The country implemented measures like energy conservation, promoting clean technologies, and investing in renewable energy.

4. Russia:

- Russia's participation was crucial for the protocol to come into force.
- Russia ratified the protocol and set a target of limiting emissions to 1990 levels.
- The collapse of the Soviet Union contributed to Russia's ability to meet its targets.

5. Canada:

- Canada initially committed to reducing emissions by 6 per cent below 1990 levels.
- However, it failed to meet its targets due to increased emissions from transportation and oil production.

6. Developing Countries:

- Developing nations, including China, India, and Brazil, were not bound by mandatory targets under the Kyoto Protocol.
- Instead, they focused on sustainable development and adaptation measures.

7. Overall Impact:

- Despite mixed responses, the protocol raised global awareness about climate change.
- It paved the way for subsequent agreements like the **Paris Agreement**, which involves more countries and emphasizes voluntary commitments.

What were the consequences of not meeting Kyoto Protocol targets?

1. Environmental Impact:

- **Increased Greenhouse Gas Emissions:** Failure to meet targets meant higher emissions of greenhouse gases, contributing to global warming and climate change.
- **Melting Glaciers and Rising Sea Levels:** The failure to curb emissions exacerbated the melting of glaciers and ice sheets, leading to rising sea levels and coastal erosion.

2. Economic Consequences:

- **Penalties and Reputation Damage:** Countries that did not meet their targets faced penalties and reputational damage. Investors and businesses considered environmental compliance when making investment decisions.
- **Loss of Trade Opportunities:** Some countries faced trade restrictions or lost access to markets due to their failure to reduce emissions.

3. Shift in Global Leadership:

- **Leadership Vacuum:** The absence of strong global leadership in addressing climate change hindered coordinated efforts.

- **Emergence of New Players:** Other countries, such as China, stepped up as major players in climate negotiations.
4. **Adaptation Challenges:**
 - **Increased Vulnerability:** Failure to mitigate climate change made communities more vulnerable to extreme weather events, droughts, and food shortages.
 - **Costly Adaptation Measures:** Countries had to invest in costly adaptation measures to cope with changing climate patterns.
 5. **Legacy and Lessons:**
 - **Legacy of Inaction:** The Kyoto Protocol's shortcomings highlighted the need for more comprehensive and inclusive agreements.
 - **Lessons for Future Agreements:** The experience informed subsequent agreements like the Paris Agreement, emphasizing voluntary commitments and global cooperation.

What are some success stories in meeting climate targets post-Kyoto?

1. **Post-Kyoto Negotiations:**
 - After the first commitment period of the Kyoto Protocol (which ended in 2012), negotiations continued under the United Nations Framework Convention on Climate Change (UNFCCC).
 - The **Bali Road Map** and **Decision 1/CP.13** (known as "The Bali Action Plan") set the stage for these discussions.
 - High-level talks aimed to limit greenhouse gas emissions and address global warming.
 - The **Copenhagen Climate Conference (COP-15)** in 2009 was a significant milestone in these negotiations¹.
2. **G8+5 Agreement:**
 - In February 2007, the G8+5 group of leaders agreed in principle to a **global cap-and-trade system** applicable to both industrialized nations and developing countries.
 - Their goal was to halve global CO₂ emissions by 2050.
 - The agreement emphasized using proceeds from emission rights auctions to support climate protection projects in developing countries.
3. **G8 Summit Commitment:**
 - At the **33rd G8 summit** in 2007, leaders announced their aim to **at least halve global CO₂ emissions by 2050**.
 - The details for achieving this target were to be negotiated within the UNFCCC framework, involving major emerging economies as well.
 - The G8 also expressed a desire to use financial tools to support climate projects in developing nations.
4. **Mixed Results Post-Kyoto:**
 - Although overall global emissions rose, **38 countries collectively reduced their emissions by 2 GtCO₂ per year** from 2008 to 2012 compared to 1990 levels.
 - While some consider this a success, others highlight the need for more ambitious targets and faster action.
5. **Lima Summit Outcomes:**
 - The Lima Summit resulted in commitments to prepare **National Adaptation Plans (NAPs)** and launched the **NAZCA Climate Action Portal**.
 - Efforts to promote gender balance in climate measures were initiated through the **Lima Work Programme on Gender**.
 - The special event **UNFCCC NAMA Day** focused on nationally appropriate mitigation actions.

CHAPTER-II

REVIEW OF LITERATURE

The review of related studies enables the researcher to acquire up-to-date information in the chosen area of study. For any researcher, the review of studies related to his/her field of investigation is essential and also provides background information about what has been done so far in the field. Familiarity with the previous research and theory in the area of study can help not only in conceptualizing the problem but also in conducting the study and interpreting the findings. A comprehensive study of the past works would offer the scholar the right background against the present research study. Prior knowledge shows the method and instruments through which the themes were analysed. This ultimately gives the research scholar a firm foundation to combine the strong evidence of the past with the new findings of the present which sows the seeds for further research. This chapter provides an elaborate review of causes, components and consequences.

Introduction: -

The Kyoto Protocol, adopted in 1997, was a groundbreaking international agreement that aimed to reduce greenhouse gas emissions and mitigate climate change. It introduced market-based mechanisms such as the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET), which were designed to provide cost-effective solutions for reducing emissions.

Carbon Market Systems Typology

the Protocol established a typology of carbon market systems, which included the aforementioned mechanisms. These systems allowed for the trading of emission reduction credits between countries, providing a flexible approach to meeting emission reduction targets.

Lessons Learned

A critical examination of the carbon markets under the Kyoto Protocol reveals several lessons learned. The World Bank's document "Carbon Markets Under the Kyoto Protocol" discusses these lessons, offering insights into what worked well and what did not. The paper suggests that while the Protocol had its challenges, it laid the foundation for future international carbon markets, such as those under the Paris Agreement.

Effectiveness and Efficiency

The literature often debates the effectiveness and efficiency of the Kyoto Protocol's mechanisms. For instance, a review in the Oxford Review of Economic Policy provides a critical assessment of the Protocol's potential performance and discusses amendments to foster its effectiveness and efficiency. It highlights the importance of the Protocol as a starting point for shaping efficient climate policies in the future.

Transition to the Paris Agreement

With the de facto end of the Kyoto Protocol and the advent of the Paris Agreement, there has been a shift in the international climate policy landscape. The new agreement brings changes in scope, centralization, and logic, which are expected to influence the future of carbon markets and trading.

Carbon Markets and Trading: A Review: -

Carbon markets have emerged as a pivotal mechanism in the global strategy to mitigate climate change. They operate on the principle of cap-and-trade, where a limit (cap) is set on emissions, and entities such as companies or countries can trade (buy or sell) emission allowances or credits within that cap. This system incentivizes the reduction of greenhouse gas emissions by assigning a cost to carbon, effectively making it a commodity.

- **Compliance vs. Voluntary Markets**

There are two main types of carbon markets: compliance and voluntary¹. Compliance markets are regulated by governments or international bodies and are mandatory for certain industries. Entities that emit less than their allowance can sell their excess credits to those that exceed their limits. Voluntary markets, on the other hand, allow businesses and individuals to purchase carbon credits to offset their emissions out of corporate responsibility or environmental commitment.

- **Criticism and Growth**

Despite its noble intentions, carbon trading has faced criticism for being less effective than anticipated. Concerns include the potential for market manipulation, the actual impact on emission reductions, and the complexity of measuring and verifying the effectiveness of carbon offset projects. Nevertheless, both compliance and voluntary markets are expanding rapidly, indicating a growing recognition of the need to price carbon emissions and reduce greenhouse gases¹.

- **Recent Initiatives**

Recent initiatives aim to create more functional, transparent, and effective carbon marketplaces. There is a growing intersection between government and private sector activity in voluntary markets, with novel initiatives demonstrating how market design choices imply different goals for voluntary markets

Kyoto Protocol: A Comprehensive Review: -

- **Achievements and Criticisms**

The Protocol was celebrated for its ambitious goals and the establishment of a broad international mechanism for climate protection activities. It aimed for an average 5% emission reduction compared to 1990 levels over the five years 2008–2012, known as the first commitment period.

The Doha Amendment extended this for a second commitment period from 2013 to 2020, with Parties committed to reducing GHG emissions by at least 18% below 1990 levels.

However, the Protocol has faced criticism for its approach, particularly the setting of targets and timetables for emission reductions, which some argue is flawed. Concerns have been raised about its effectiveness, the complexity of measuring and verifying emissions reductions, and the potential for market manipulation.

- **Legacy and Transition**

Despite these criticisms, the ratification of the Kyoto Protocol has been deemed important for the ongoing policy process of climate protection. It has established a flexible, broad-based international mechanism that provides a valuable starting point for shaping efficient climate policies in the future¹. The closure of Parties' annual reviews for the second commitment period in 2023 showed a push by developed countries to reduce their emissions and to be transparent about those efforts, indicating a drive that started almost 20 years ago.

Review Carbon market and trading in Kyoto Protocol in India: -

1. Kyoto Protocol and Emissions Trading:

- The Kyoto Protocol, an international treaty aimed at combating climate change, introduced mechanisms to address greenhouse gas emissions. One of these mechanisms is emissions trading.
- Under Article 17 of the Kyoto Protocol, countries with emission units to spare (i.e., emissions permitted but not fully utilized) can sell this excess capacity to countries that exceed their emission targets. This created a new commodity: emission reductions or removals.
- Carbon dioxide (CO₂), being the principal greenhouse gas, is commonly associated with this trading. Hence, it's often referred to as the "carbon market".
- Beyond actual emissions units, other trading units can also be transferred under the scheme, including:
 - Removal Units (RMUs) based on land use, land-use change, and forestry (LULUCF) activities like reforestation.
 - Emission Reduction Units (ERUs) generated by joint implementation projects.
 - Certified Emission Reductions (CERs) from clean development mechanism projects.
- These transactions are tracked and recorded through registry systems under the Kyoto Protocol

2. India's Role in Emissions Trading:

- International Emissions Trading (IET) allows countries to trade in the international carbon credit market to cover their shortfall in Assigned Amount Units (AAUs).
- Countries with surplus units can sell them to countries exceeding their emission targets under Annex B of the Kyoto Protocol.
- India, as a participant, can engage in such trading to manage its emissions commitments and contribute to global climate goals

3. India's Domestic Carbon Market:

- Recently, India took a significant step by notifying the Carbon Credit Trading Scheme, 2023 (CCTS 2023) under the Energy Conservation Act, 2001.
- The CCTS 2023 aims to establish India's first-ever domestic carbon market.
- Key features of the Indian Carbon Market (ICM) include setting Greenhouse Gas (GHG) reduction targets and defining roles for diverse stakeholders.
- This initiative reflects India's commitment to sustainable development and climate action.

Review carbon market and trading in Kyoto Protocol in International:

1. Kyoto Protocol and Emissions Trading:

- The Kyoto Protocol, an international treaty aimed at mitigating climate change, introduced mechanisms to address greenhouse gas emissions.
- One of these mechanisms is emissions trading.
- Under Article 17 of the Kyoto Protocol, countries with emission units to spare (i.e., emissions permitted but not fully utilized) can sell this excess capacity to countries that exceed their emission targets.
- This created a new commodity: emission reductions or removals.
- Since carbon dioxide (CO₂) is the principal greenhouse gas, people commonly refer to this trading as the "carbon market."

- Beyond actual emissions units, other trading units can also be transferred under the scheme, including:
 - Removal Units (RMUs) based on land use, land-use change, and forestry (LULUCF) activities such as reforestation.
 - Emission Reduction Units (ERUs) generated by joint implementation projects.
 - Certified Emission Reductions (CERs) from clean development mechanism projects.
- These transactions are tracked and recorded through registry systems under the Kyoto Protocol¹.

2. Market-Based Mechanisms in the Kyoto Protocol:

- To help countries meet their emission targets, the Kyoto Protocol included three market-based mechanisms:
 - International Emissions Trading (IET): Allows countries with spare emission units to sell this excess capacity to countries exceeding their targets.
 - Clean Development Mechanism (CDM): Encourages private sector investment in emission reduction projects in developing countries.
 - Joint Implementation (JI): Facilitates emission reduction projects between Annex I countries.
- These mechanisms promote global cooperation and incentivize emission reductions.

3. Lessons from the Kyoto Protocol's Carbon Market:

- The partial international carbon market created by the Kyoto Protocol's flexible mechanisms offers valuable lessons for policymakers.
- The European Union emissions trading scheme, one of the largest in operation, exemplifies the effectiveness of emissions trading at both national and regional levels

Research gap of the carbon market and trading in the Kyoto Protocol

1. Effectiveness of Flexible Mechanisms:

- The Kyoto Protocol introduced three flexible mechanisms: Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET).
- Research should assess the effectiveness of these mechanisms in achieving emission reduction targets and promoting sustainable development.
- Understanding the impact of these mechanisms on global emissions and their economic implications is crucial.

2. Market Dynamics and Price Volatility:

- Investigate the dynamics of the carbon market, including price fluctuations and volatility.
- Understand how external factors (e.g., economic conditions, policy changes, technological advancements) influence carbon credit prices.
- Analyse the stability and resilience of the market under different scenarios.

3. Equity and Distributional Impacts:

- Assess the distributional effects of emissions trading across countries, sectors, and income groups.

- Examine whether emissions trading exacerbates or mitigates existing inequalities.
 - Consider social and environmental justice implications.
4. **Linkages Between International and Domestic Markets:**
- Explore the interactions between international carbon markets (such as the Kyoto Protocol) and emerging domestic markets (e.g., India's Carbon Credit Trading Scheme).
 - Investigate how these linkages affect overall emission reductions and market efficiency.
5. **Institutional and Governance Challenges:**
- Study the institutional arrangements governing carbon markets.
 - Identify barriers to effective implementation, including regulatory frameworks, monitoring, reporting, and verification systems.
 - Address challenges related to transparency, accountability, and enforcement¹.
6. **Lessons for the Paris Agreement Era:**
- Compare the Kyoto Protocol's carbon market experience with the evolving landscape under the Paris Agreement.
 - Understand how the transition from the Kyoto Protocol to the Paris Agreement impacts carbon market dynamics, governance, and ambition levels.

CHAPTER – III

Management of carbon market and trading in Kyoto Protocol

The Kyoto Protocol introduced a carbon market and trading system as a means to help countries meet their greenhouse gas (GHG) emissions reduction targets. Here's a brief overview of how it works:

- **Emissions Trading:**

Article 17 of the Kyoto Protocol allows countries with excess emission units, which are emissions permitted but not used, to sell this capacity to countries that are over their targets. This created a new commodity in the form of emission reductions or removals, commonly referred to as trading in carbon¹.

- **Assigned Amount Units (AAUs):**

The allowed emissions for countries with commitments under the Kyoto Protocol are divided into AAUs, which can be traded among countries.

- **Additional Trading Units:**

Besides AAUs, other units can be traded, such as Removal Units (RMUs) based on land use and forestry activities, Emission Reduction Units (ERUs) generated by joint implementation projects, and Certified Emission Reductions (CERs) from clean development mechanism project activities.

- **Registry Systems and International Transaction Log:**

Transfers and acquisitions of these units are tracked through registry systems, and an international transaction log ensures secure transfer of emission reduction units between countries.

- **Commitment Period Reserve:**

To prevent overselling of units, each country must maintain a reserve of ERUs, CERs, AAUs, and/or RMUs in its national registry, known as the commitment period reserve.

- **Relation to Domestic and Regional Emissions Trading Schemes:**

National and regional emissions trading schemes may be established as climate policy instruments, setting emissions obligations for participating entities. The European Union emissions trading scheme is the largest of such schemes.

The carbon market created by the Kyoto Protocol's flexible mechanisms offers lessons for policymakers, especially in the context of building an international carbon market under the Paris Agreement. These mechanisms include the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET), and they differ in scope, centralization, and logic from the Paris Agreement.

Management of carbon market and trading in Kyoto Protocols in 2024

The management of carbon markets and trading under the Kyoto Protocol has evolved, and in 2024, there are several key points to consider:

- **Global Emissions Trading Systems (ETS):** As of 2024, emissions trading systems are in place in jurisdictions representing 58% of global GDP. There are 36 systems currently operational, with an additional 22 under development or consideration¹.
- **Emerging Economies:** There's a notable increase in emerging economies turning to emissions trading, with systems being adapted to local circumstances. Countries like Argentina, Brazil, India, Türkiye, and Vietnam are among those considering or developing ETS.
- **Revenue Generation:** In 2023, global revenue from ETSs surpassed USD 74 billion, a record year, driven by higher prices in some systems and increased use of auctioning to distribute allowances. These funds are often reinvested into initiatives aimed at reducing emissions, supporting low-carbon technologies, or aiding lower-income communities.
- **Intensity-Based ETS:** The 2024 ICAP Status Report includes, for the first time, an overview of intensity-based emissions trading systems, reflecting their growing use. This approach adjusts for production levels, offering a different method for carbon pricing.
- **Kyoto Protocol's Legacy:** The Kyoto Protocol's mechanisms have provided valuable lessons for the ongoing development of international carbon markets under the Paris Agreement. The experience under Kyoto is critical for understanding the complexities of global carbon trading and for informing future policy decisions.

Management of carbon market and trading in Kyoto Protocols in 2021

In 2021, the management of carbon markets and trading under the Kyoto Protocol was characterized by several key features:

- **Emissions Trading:** The Kyoto Protocol allowed countries with excess emission units to sell this capacity to countries that were over their targets. This created a new commodity in the form of emission reductions or removals, commonly referred to as trading in carbon.
- **Assigned Amount Units (AAUs):** The allowed emissions for countries with commitments under the Kyoto Protocol were divided into AAUs, which could be traded among countries.
- **Additional Trading Units:** Besides AAUs, other units could be traded, such as Removal Units (RMUs) based on land use and forestry activities, Emission Reduction Units (ERUs) generated by joint implementation projects, and Certified Emission Reductions (CERs) from clean development mechanism project activities¹.

- **Registry Systems and International Transaction Log:** Transfers and acquisitions of these units were tracked through registry systems, and an international transaction log ensured the secure transfer of emission reduction units between countries.
- **Commitment Period Reserve:** To prevent overselling of units, each country was required to maintain a reserve of ERUs, CERs, AAUs, and/or RMUs in its national registry, known as the commitment period reserve.
- **Relation to Domestic and Regional Emissions Trading Schemes:** National and regional emissions trading schemes may be established as climate policy instruments, setting emissions obligations for participating entities. The European Union emissions trading scheme was the largest of such schemes.

2021 Wealth Management

The management of carbon markets and trading under the Kyoto Protocol in 2021 was a complex process that involved various mechanisms and principles. While the Kyoto Protocol itself did not directly address wealth management, the trading of carbon credits and the mechanisms established had significant implications for financial markets and wealth management strategies. Here are some key aspects:

- **Carbon Credits as Financial Assets:** Carbon credits, such as Certified Emission Reductions (CERs), were treated as financial assets. This meant they could be traded on carbon markets, influencing wealth management strategies as they became part of investment portfolios.
 - **Price Volatility:** The price of carbon credits could be volatile, influenced by policy changes, supply and demand dynamics, and other market factors. Wealth managers had to consider these fluctuations when including carbon credits in their asset management strategies.
 - **Risk Management:** Trading in carbon markets involves risks, including regulatory risk, market risk, and project risk. Wealth managers had to develop risk management strategies to mitigate these risks when advising clients on carbon market investment.
 - **Diversification:** For investors, carbon credits offer a way to diversify their portfolios. Wealth managers could use carbon credits to spread risk across different asset classes¹.
 - **Sustainable Investing:** The growing trend of sustainable and responsible investing meant that wealth managers increasingly considered the environmental impact of investments. Carbon credits could align with these values by supporting projects that reduce greenhouse gas emissions¹.
 - **Regulatory Environment:** The regulatory environment surrounding carbon markets was an important consideration for wealth management. Changes in climate policy could impact the value of carbon credits and the viability of carbon market investments.
-
- **Market Mechanisms:** The Kyoto Protocol's market mechanisms, such as the Clean Development Mechanism (CDM), allowed for the generation and trading of carbon credits. Wealth managers need to understand these mechanisms to effectively manage carbon market investments.
 - **Transition to the Paris Agreement:** The transition from the Kyoto Protocol to the Paris Agreement also had implications for carbon markets and wealth management. The Paris Agreement introduced new mechanisms and goals, which could affect the long-term outlook for carbon market investments.

2024 Wealth Management

The **Kyoto Protocol** and its carbon markets have indeed evolved, reflecting a growing recognition of the importance of market-based mechanisms in addressing climate change. The **ICAP Emissions Trading Worldwide 2024 Status Report** underscores this evolution, with emissions trading systems now a part of the economic landscape, covering a significant portion of global GDP and raising substantial funds for climate action.

In wealth management, the trends for 2024 emphasize **sustainability, inclusivity, and transparent ESG metrics**, aligning financial growth with environmental responsibility. The expansion of wealth management services to broader wealth bands and the strategic use of emerging technologies like generative AI for workflow optimization is indicative of the sector's adaptation to modern challenges and opportunities.

For wealth managers, the integration of carbon market trading and ESG considerations into investment strategies is not just a trend but a necessity. Staying abreast of the latest developments in carbon markets is essential for providing informed advice and aligning client investments with both financial goals and sustainability objectives.

Consulting with experts in carbon market dynamics can provide valuable insights, ensuring that investment strategies are well-informed and in line with the latest trends and regulations. This approach can help navigate the complexities of carbon markets and trading, making it a viable component of a comprehensive wealth management strategy.

The management of carbon markets and trading under the Kyoto Protocol has evolved, and in 2024, it continues to be a significant aspect of global efforts to reduce greenhouse gas emissions. The International Carbon Action Partnership's (ICAP) Emissions Trading Worldwide 2024 Status Report highlights that emissions trading systems (ETS) are being used by jurisdictions making up 58% of global GDP. There are now 36 systems in place, with an additional 22 under development or consideration. These systems have raised a record-breaking USD 74 billion in 2023, indicating a strong commitment to using market-based mechanisms to combat climate change.

2024 vs 2021 Wealth Management

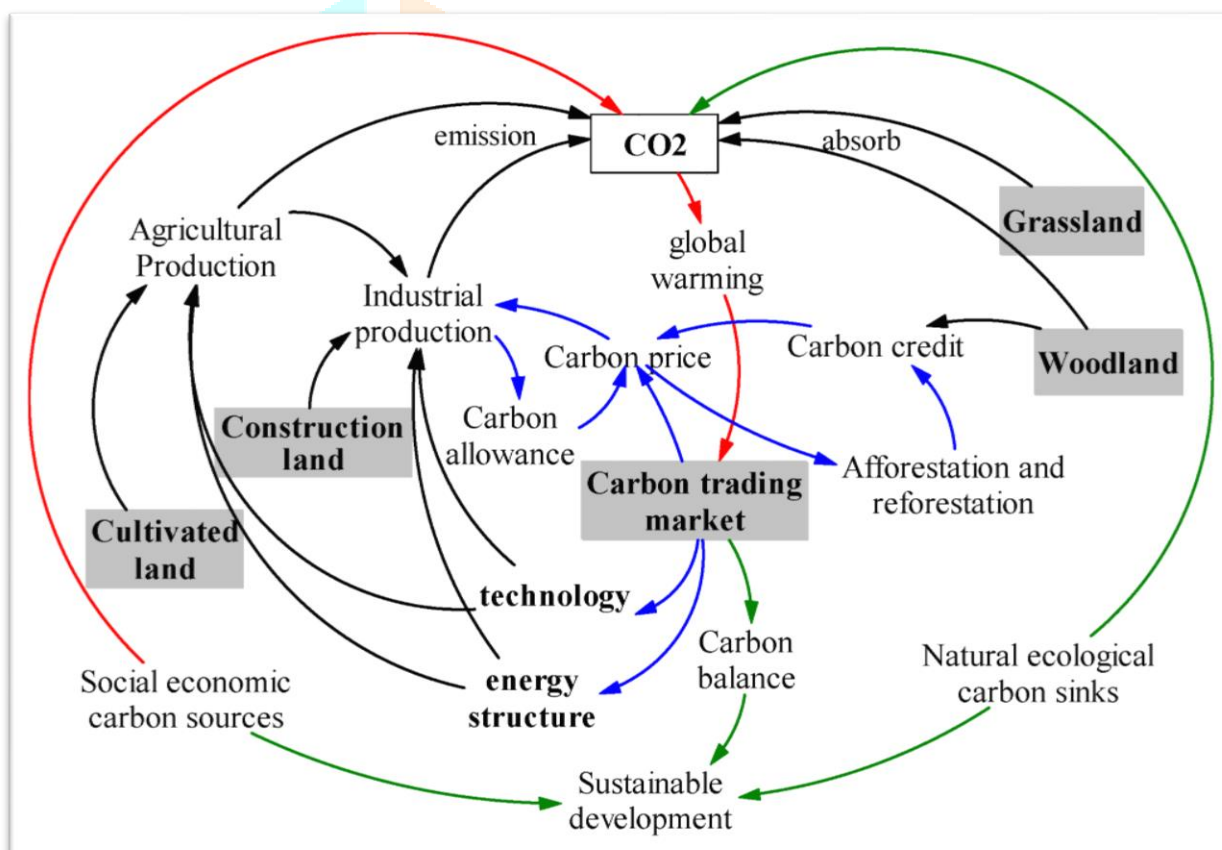
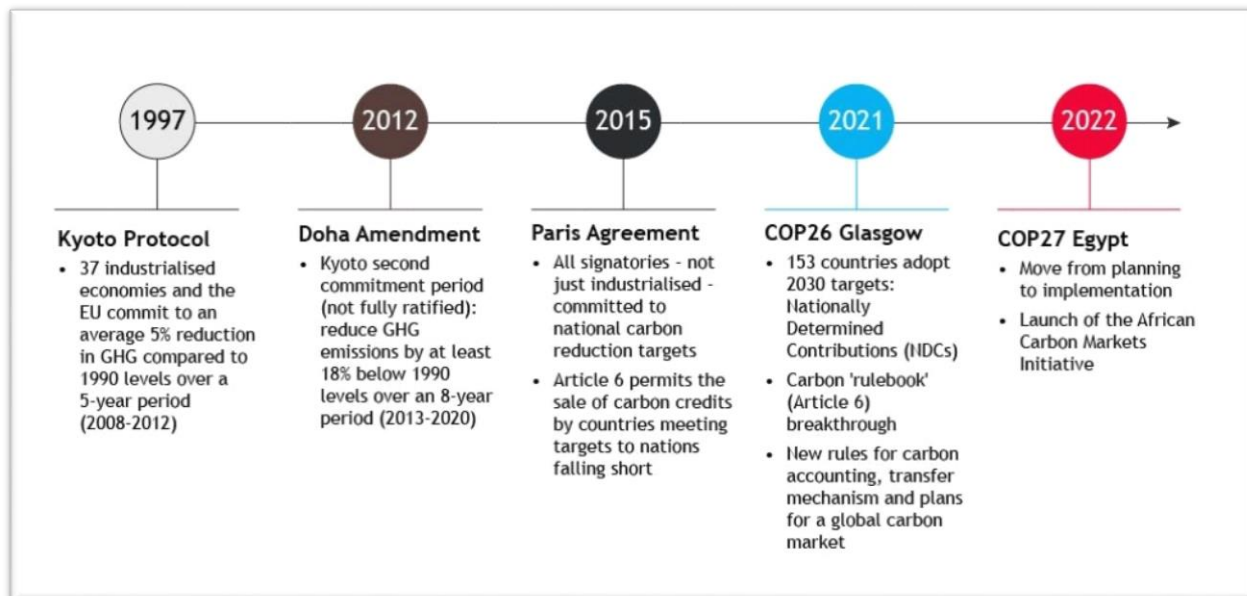
The management of carbon markets and trading under the Kyoto Protocols has seen significant developments by 2024. Here are some key points of comparison between 2024 and 2021:

Carbon Market and Trading in 2024:

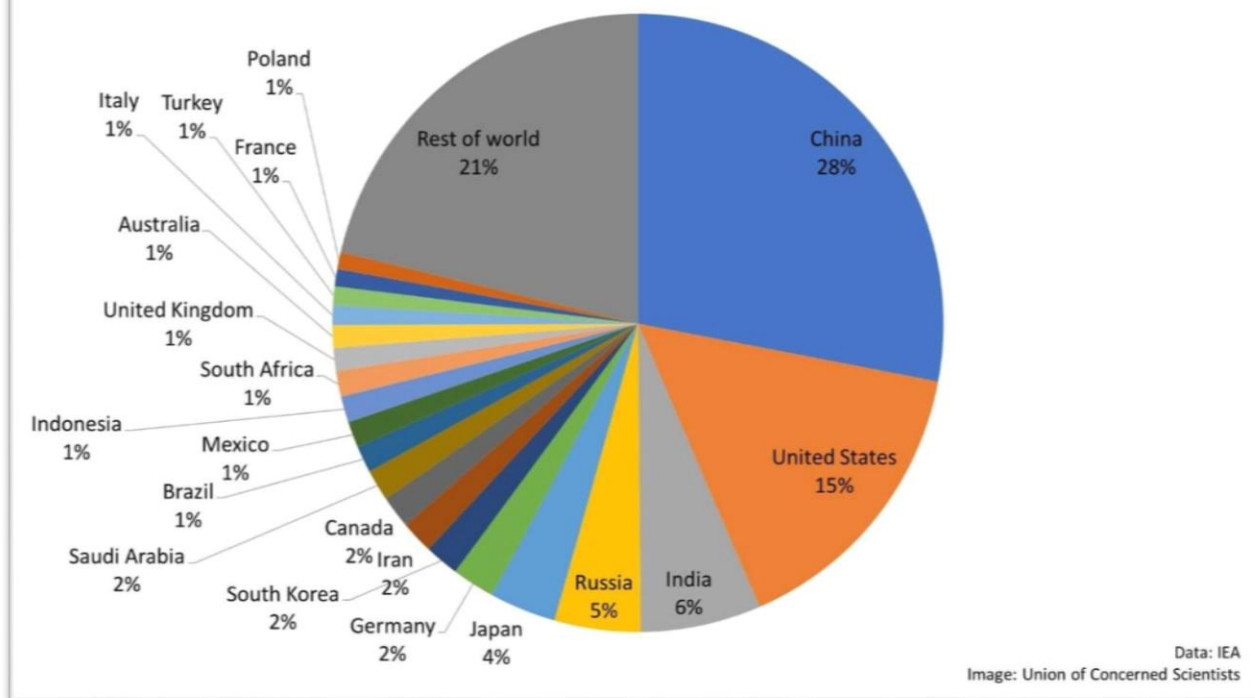
- **Emissions Trading Systems (ETS)**: As of 2024, emissions trading systems are increasingly being adopted worldwide, with jurisdictions representing 58% of global GDP using an ETS¹.
- **Number of Systems**: There are now 36 ETS in place, with an additional 22 under development or consideration¹.
- **Emerging Economies**: Emerging economies are turning to emissions trading, adapting the systems to local circumstances¹.
- **Global Revenue**: The global revenue from ETS surpassed USD 74 billion in 2023, indicating a record year.

Wealth Management in 2021:

- **Impact of COVID-19**: Discussions and decisions in wealth management were centred around the immediate impacts of the COVID-19 pandemic and recovery efforts².
- **Technology and Personalization**: The emergence of new technologies and ecological concerns, along with hyper-personalization, were identified as megatrends affecting the industry².
- **Advice Evolution**: Advice became progressively the core offering of the wealth management industry, evolving towards holistic advice across assets and client experiences².



Share of global carbon dioxide emissions from fuel combustion (2015)



2024 vs 2021 Wealth Management in the Carbon Market and Trading in India

The carbon market and trading in India have seen significant changes between 2021 and 2024. Here are some key points:

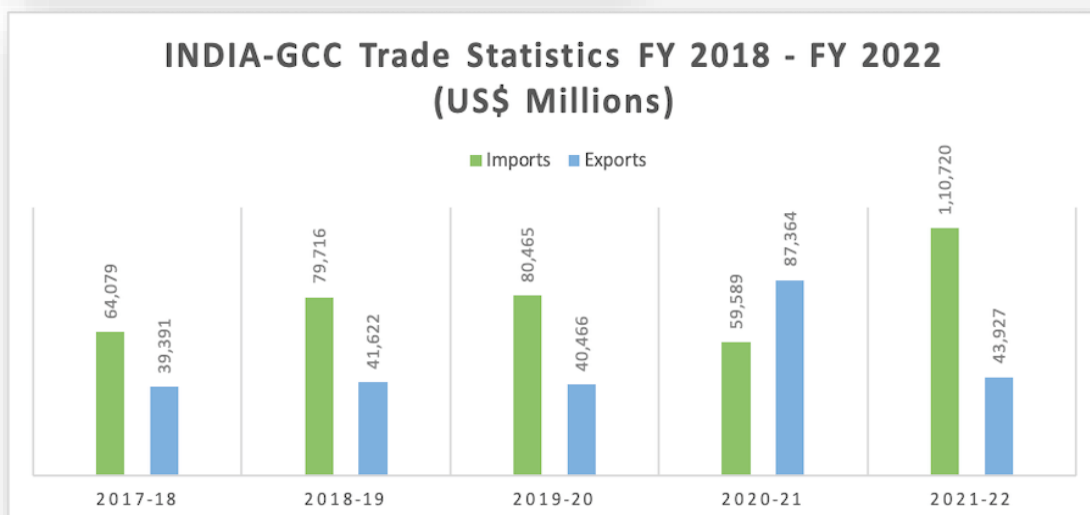
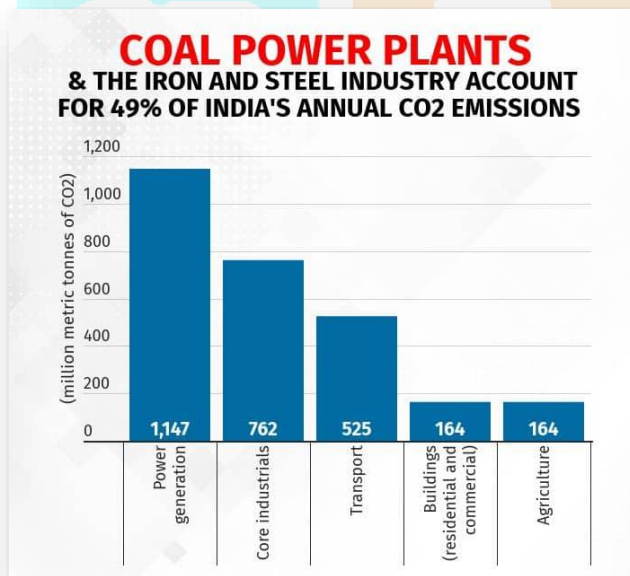
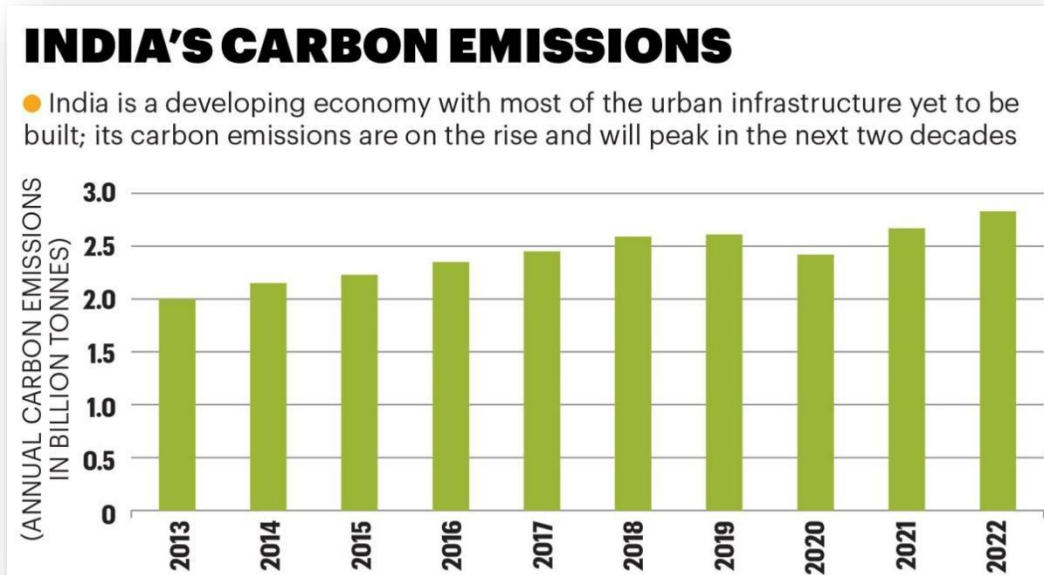
2021:

- In 2021, the average price of a carbon credit was \$4.
- India had a long-term low-carbon development strategy in place
- The strategy encompassed all carbon-emitting sectors of the economy and all available policy levers – fiscal, technology, regulatory, trade and monetary.
- The policy mix aimed to strike the right balance between a carbon tax, technology support for non-fossil fuel, green hydrogen, carbon capture and storage, standards for energy efficiency, regulatory tweaks incentivising the flow of adequate resources for green projects and adoption of energy saving appliances at home and in business establishments.

2023-2024:

- The Carbon Credit and Trading Scheme (CCTS) was notified on June 28, 2023³. This effectively created a whole system of mechanisms that would govern the Indian carbon and GHG emissions scenario in the coming few years.
- The domestic carbon market was expected to enable domestic companies to trade carbon credits efficiently and help push through the energy transition goals of the government to combat climate change.
- The new law was expected to prepare Indian companies for the looming carbon taxes in export markets.
- The Carbon Credit Scheme constituted a National Steering Committee which included members from various ministries such as the Ministry of Power, Ministry of Environment, Forest and Climate Change, Ministry of Finance, etc.

- The functions of the National Steering Committee involved recommending to the Bureau of Energy Efficiency concerning carbon credit certificates, Indian carbon market rules, regulations and procedures for the trading of carbon certificates and other related functions.



LEGACY FRANCHISES

The Kyoto Protocol established a legal framework for the carbon market and trading. Here are some key points:

- **Emissions Trading:**

As set out in Article 17 of the Kyoto Protocol, countries that have emission units to spare can sell this excess capacity to countries that are over their targets¹. This created a new commodity in the form of emission reductions or removals¹.

- **Carbon Market:**

Since carbon dioxide is the principal greenhouse gas, trading in carbon was established. Carbon is now tracked and traded like any other commodity, creating what is known as the "carbon market"¹.

- **Trading Units:**

More than actual emissions units can be traded and sold under the Kyoto Protocol's emissions trading scheme. The other units, each equal to one tonne of CO₂, may be in the form of a Removal Unit (RMU) based on land use, an Emission Reduction Unit (ERU) generated by a joint implementation project, or a Certified Emission Reduction (CER) generated from a clean development mechanism project activity¹.

- **Registry Systems:**

Transfers and acquisitions of these units are tracked and recorded through the registry systems under the Kyoto Protocol. An international transaction log ensures the secure transfer of emission reduction units between countries.

- **Commitment Period Reserve:**

Each Party is required to maintain a reserve of ERUs, CERs, AAUs and/or RMUs in its national registry. This reserve, known as the "commitment period reserve", should not drop below 90 per cent of the Party's assigned amount or 100 per cent of five times its most recently reviewed inventory, whichever is lowest¹.

- **Domestic and Regional Emissions Trading Schemes:**

Emissions trading schemes may be established as climate policy instruments at the national level and the regional level. Under such schemes, governments set emissions obligations to be reached by the participating entities¹.

Legal franchise of carbon market and trading of Kyoto Protocol in India

India has taken significant steps toward establishing a **domestic carbon market**. Let's delve into the details:

1. **Carbon Credit Trading Scheme, 2023 (CCTS 2023):**

- The Government of India notified the CCTS 2023 under the Energy Conservation Act, of 2001. This scheme aims to develop India's first-ever domestic carbon market.
- The CCTS 2023 sets GHG emission intensity reduction targets aligned with India's Nationally Determined Contributions (NDC) for selected entities.
- Key stakeholders include:
 - Bureau of Energy Efficiency (BEE): Responsible for developing GHG emissions trajectory and targets for obligated entities.
 - Grid Controller of India Limited: Maintains the ICM Registry and records transactions among obligated entities.
 - Central Electricity Regulatory Commission (CERC): Regulates carbon credit trading, safeguards interests, and ensures fair trading¹.

2. **Compliance Requirements:**

- The obligated entities must achieve the **GHG emission intensity targets** notified by the **Ministry of Environment, Forests and Climate Change (MoEF&CC)**.
- Overachievers receive **carbon credit certificates**, while those falling short can purchase certificates from the ICM.
- Each certificate represents **one tonne of CO₂e** (carbon dioxide equivalent)¹.

3. **Voluntary Carbon Market:**

- India's voluntary carbon market is growing exponentially, with prices ranging from **\$2 to \$10 per credit**.
- The market assigns value to every ton of **CO₂e reduced or avoided**, encouraging industries to contribute to emission reduction goals.

4. **Export Ban:**

- India revised its carbon credit policies in **August 2022**, banning the **export of carbon credits**.
- The focus is now on **domestic carbon trading** and incentivizing emission reduction actions.

Legal franchise of carbon market and trading of Kyoto Protocol in international

1. **Kyoto Protocol and Carbon Markets:**

- The Kyoto Protocol, an international treaty, aimed to combat climate change by reducing greenhouse gas (GHG) emissions.
- It introduced flexible mechanisms to facilitate emission reduction efforts across countries.
- These mechanisms include:
 - Clean Development Mechanism (CDM): Allows industrialized countries to invest in emission reduction projects in developing nations and receive carbon credits.
 - Joint Implementation (JI): Enables countries with emission reduction targets to collaborate on projects and exchange emission reduction units.
 - International Emissions Trading (IET): Permits countries to trade emission allowances or credits internationally.

2. **International Emissions Trading (IET):**

- Under Article 17 of the Kyoto Protocol, international emissions trading occurs among countries with quantified national emission commitments.
- Authorized legal entities can participate in this trading.
- The goal is to allow countries with excess emission units to sell them to countries exceeding their targets.
- These emission units represent reductions or removals of greenhouse gases.

3. **Lessons Learned and Building an International Carbon Market:**

- The partial international carbon market created by the Kyoto Protocol's mechanisms provides valuable insights for policymakers.
- As we transition to the Paris Agreement, which builds upon the Kyoto Protocol, understanding these lessons is crucial.
- Policymakers must consider the legal and policy implications of emissions trading and carbon finance in a global context.

4. **Acknowledgements:**

- The research and analysis presented here were prepared by experts from the World Bank and other contributors.
- Their work contributes to our understanding of carbon markets and their role in addressing climate change.

CHAPTER – IV

RESEARCH METHODOLOGY

Chapter Overview

This chapter deals with the research methodology, which provides a detailed framework for conducting sound research work. To accomplish the objectives of the study and test hypotheses, a rigorous methodological procedure is needed. This chapter presents a description of the research design, research instrument, sampling, data collection, and tools used for hypothesis testing. In the end, the limitations of the study have been discussed.

Overview of the carbon market and trading in the Kyoto Protocol

The Kyoto Protocol, adopted in 1997 and entered into force in 2005, introduced a carbon market as part of its strategy to reduce greenhouse gas emissions globally. Here's an overview of the carbon market and trading under the Kyoto Protocol:

- **Emissions Trading**: Article 17 of the Kyoto Protocol established emissions trading, allowing countries with surplus emission units (emissions permitted but not used) to sell this excess capacity to countries exceeding their targets¹.
- **Carbon Market**: This created a new commodity in the form of emission reductions or removals, commonly referred to as the "carbon market." Carbon dioxide, being the principal greenhouse gas, is tracked and traded like any other commodity¹.
- **Trading Units**: Besides actual emissions units, other units can be traded under the Kyoto Protocol's emissions trading scheme. These include:
 - **Removal Unit (RMU)**: Based on land use, land-use change, and forestry activities such as reforestation.
 - **Emission Reduction Unit (ERU)**: Generated by a joint implementation project.
 - **Certified Emission Reduction (CER)**: Generated from a clean development mechanism project activity¹.
- **Registry Systems**: Transfers and acquisitions of these units are tracked and recorded through registry systems under the Kyoto Protocol, with an international transaction log ensuring secure transfers between countries.
- **Commitment Period Reserve**: To prevent overselling of units, each Party must maintain a reserve of ERUs, CERs, AAUs, and/or RMUs in its national registry, known as the "commitment period reserve"¹.

- **Relationship to Domestic and Regional Schemes:** National and regional emissions trading schemes can be established as climate policy instruments, setting emissions obligations for participating entities. The European Union emissions trading scheme is the largest in operation.

Research methodology of the carbon market and trading in Kyoto Protocol previous 5 years

- **Carbon Market Systems Typology:** Research often categorizes carbon market systems to understand their structure and function. This includes examining the Kyoto Protocol's mechanisms like the Clean Development Mechanism (CDM), Joint Implementation (JI), and International Emissions Trading (IET).
- **Comparative Analysis:** Studies compare the Kyoto Mechanisms with the Paris Agreement Article 6 Mechanisms to identify what worked well and what didn't.
- **Empirical Evaluation:** Researchers use empirical methods to assess the effectiveness of the Kyoto Protocol on carbon emissions, often employing instrumental variables strategy for their analysis.

Trends in the Last Five Years:

- **Revenue Growth:** Revenues from carbon taxes and Emissions Trading Systems (ETS) have reached record highs, with the World Bank reporting nearly \$100 billion in 2023.
- **Market Coverage:** The coverage of global greenhouse gas emissions by direct carbon pricing instruments has increased significantly, covering almost a quarter of global emissions.
- **Voluntary Carbon Markets:** There has been rapid growth in voluntary carbon markets, although the growth has begun to slow due to policy shifts and concerns about credit eligibility.

CHAPTER - V

SUMMARY

EXECUTIVE SUMMARY

The Kyoto Protocol, established in 1997, introduced carbon market mechanisms as a way for countries to meet their greenhouse gas (GHG) emission reduction targets. Here's a summary of the carbon market and trading under the Kyoto Protocol:

Carbon Market Mechanisms:

- **Clean Development Mechanism (CDM):** Allows developed countries to invest in emission reduction projects in developing countries and earn Certified Emission Reduction (CER) credits.
- **Joint Implementation (JI):** Enables industrialized countries to carry out emission reduction projects in other developed countries, earning Emission Reduction Units (ERUs).
- **International Emissions Trading (IET):** Permits countries with excess emission allowances to sell them to countries that are over their targets.

Trading Dynamics:

- **Emission Reductions:** The trading of CERs and ERUs has facilitated the transfer of sustainable technology and fostered emission reductions.

- **Market Fluctuations:** The carbon market has experienced fluctuations in price and demand, influenced by economic factors and policy changes.
- **Compliance and Verification:** Rigorous monitoring and verification processes ensure the integrity of emission reductions claimed by participating countries.

Challenges and Developments:

- **Market Stability:** The stability of carbon markets has been a concern, with prices affected by supply and demand dynamics.
- **Transition to the Paris Agreement:** The future of the Kyoto Protocol's mechanisms is being re-evaluated as the world transitions to the Paris Agreement's framework.

Summary of the carbon market and trading in Kyoto Protocol in 2024

In 2024, the carbon market and trading under the Kyoto Protocol have continued to evolve, reflecting the global shift towards more robust climate action. Here's a concise summary of the current state:

Carbon Market Mechanisms:

- The **Clean Development Mechanism (CDM)**, **Joint Implementation (JI)**, and **International Emissions Trading (IET)** remain the core mechanisms facilitating carbon trading under the Kyoto Protocol.
- These mechanisms have been instrumental in promoting sustainable development and technology transfer between countries.

Current Trends:

- There has been a significant increase in the integration of carbon markets globally, with more countries participating in carbon trading schemes.
- The prices of carbon credits have become more stable, reflecting a maturing market and better regulatory frameworks.

Challenges and Adaptations:

- The transition from the Kyoto Protocol to the Paris Agreement's framework has led to the development of new mechanisms, which are expected to enhance international cooperation on emission reductions.
- The carbon market is adapting to these changes, with an emphasis on ensuring the environmental integrity and transparency of carbon trading.

Outlook for the Future:

- The focus is on strengthening the linkages between national carbon markets and the emerging global carbon market framework under the Paris Agreement.
- Innovations in carbon market mechanisms are anticipated, aiming to increase efficiency and accessibility for all stakeholders involved.

Summary of the carbon market and trading in Kyoto Protocol in 2021

In 2021, the carbon market and trading under the Kyoto Protocol were characterized by the following key points:

Emissions Trading:

- Countries with surplus emission units, which are allowed emissions not used, could sell this excess capacity to countries over their targets. This created a new commodity in the form of emission reductions or removals.

Mechanisms:

- The **Clean Development Mechanism (CDM)** allowed emission-reduction projects in developing countries to earn Certified Emission Reduction (CER) credits, which could be traded and sold.
- Joint Implementation (JI) and International Emissions Trading (IET) were also significant parts of the carbon market under the Kyoto Protocol.

Market Dynamics:

- Carbon was tracked and traded like any other commodity, known as the “carbon market.” Other trading units in the carbon market included Removal Units (RMUs) based on land use and forestry activities, Emission Reduction Units (ERUs) from joint implementation projects, and CERs from clean development mechanism project activities.

Regulatory Framework:

- A commitment period reserve was required to prevent countries from overselling units, ensuring they could meet their own emissions targets¹.

Transition and Future Outlook:

- The Kyoto Protocol’s mechanisms were being re-evaluated as the world transitioned to the Paris Agreement’s framework, which started to take effect after the end of the Kyoto Protocol’s second commitment period in 2020.