NACAO

Nature-based Carbon Offsets

CARBON MARKETS EMISSIONS OFFSET MECHANISMS

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Liken Carbon Hub

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Once upon a time

Externalities: It's not you, it's me

Carbon Pricing

- Compliance Carbon Markets
- Voluntary Carbon Markets

Project Based Mechanisms

at the beginning...

οἰκονομική

Oikonomia

Resource management.

χρηματιστική

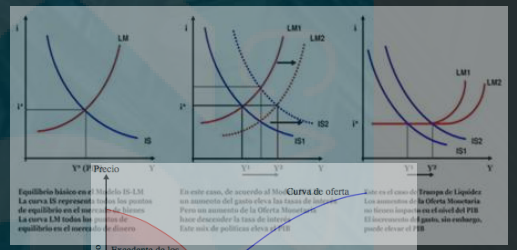
Chremastique

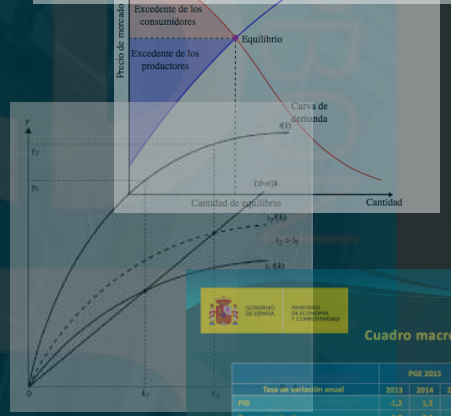
Functional Part: Acquisition of Exchange Goods (price formation)

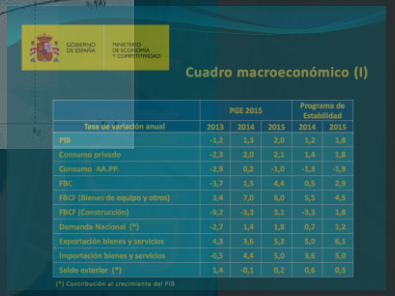
Unnatural: ‘the art of getting rich’.

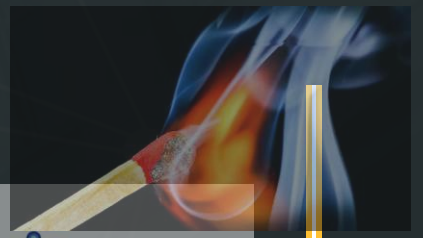
at the end...

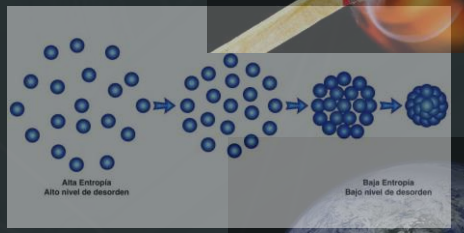
¿Economy and/vs Environment?

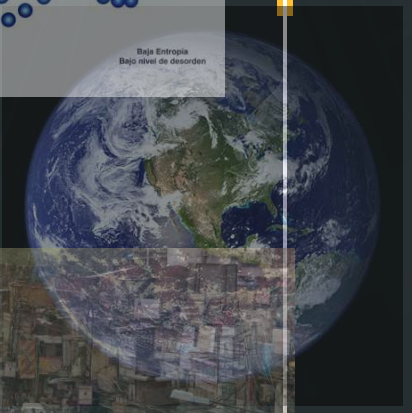












Market failure, Environmental Externality

Externality

An externality occurs if "the production or consumption decisions of one agent have an impact on the utility or profit of another agent **unintentionally**, and when **there is no compensation/payment** made by the generator of the impact to the affected party

Positive

Negative

Production

Consumption

Market failure, externality

Consequence

The Market does not respond correctly by not internalizing the price

- Public Goods
- Asymmetric Information
- Economic Rationality (Chrematistics)
- Imperfect Competition

Climate Change: The Most Critical Externality

Global Impact

Affects all nations and ecosystems

Compounding Effects

Triggers multiple other environmental crises

Irreversible Damage

Many consequences cannot be undone

Long term effects / Intergenerational Harm

Affects future generations disproportionately

Systemic Economic Risk

Threatens global financial stability

Climate change represents the most significant market failure in history. Its economic costs are projected to reach into trillions of pounds annually, disrupting supply chains, reducing agricultural productivity, damaging infrastructure, and creating climate refugees. Unlike other externalities, its effects transcend borders and persist across centuries.

Combating Externalities

Two main Approaches

Combating Externalities

Command and Control Regulations

Direct governmental restrictions on pollution levels, emissions standards, and waste management requirements. These establish clear boundaries but can be inflexible and costly to implement and monitor.

Environmental Taxation

Imposing taxes on environmentally harmful activities to reflect their true social cost. These taxes generate revenue while discouraging pollution but require careful calibration to achieve the desired effect.

ETS/Cap-and-Trade Systems

Setting an overall limit on pollution while allowing companies to buy and sell emission permits. This creates a market mechanism that finds the most cost-effective ways to reduce pollution.

International Environmental Agreements

Coordinated action between nations to address cross-border externalities. These agreements establish shared responsibilities but face challenges in enforcement and commitment levels.

Introduction to Carbon Pricing

Principle

Assigning costs to carbon emissions

Mechanism

Internalising environmental costs

Goal

Redirecting economic incentives

Philosophy

Polluter pays for damage caused

Carbon pricing represents a market-based approach to tackling climate change by placing an explicit price on carbon dioxide emissions. By making pollution costly, it transforms an invisible externality into a visible business expense that influences decision-making throughout the economy.

This approach aims to harness market forces to drive emissions reductions while allowing flexibility in how those reductions are achieved. It creates a rational economic pathway toward decarbonisation by making cleaner alternatives more financially attractive.

Carbon Pricing vs. Other Approaches

1

Market-Based Flexibility

Unlike rigid regulations that prescribe specific technologies or methods, carbon pricing sets a cost for emissions but allows businesses to decide how best to reduce them—whether through efficiency improvements, fuel switching, or other innovations.

2

Innovation Catalyst

By establishing a predictable cost trajectory for carbon emissions, pricing mechanisms create long-term incentives for research and development in clean technologies, potentially accelerating breakthroughs more effectively than targeted subsidies.

3

Revenue Generation

Unlike many environmental regulations, carbon pricing generates funds that can be reinvested in climate solutions, returned to citizens as dividends, or used to reduce other taxes—creating opportunities for economic co-benefits beyond emissions reduction.

Challenges of Carbon Pricing

1

Political Resistance

Carbon pricing faces opposition from affected industries and concerns about energy costs for consumers. Overcoming political barriers requires careful policy design, transparent communication, and strategies to protect vulnerable populations from price increases.

2

International Competitiveness

Countries implementing ambitious carbon prices worry about putting their industries at a disadvantage in global markets. Border carbon adjustments and international coordination can address these concerns but add complexity to implementation.

3

Distributional Impacts

Carbon pricing can disproportionately affect lower-income households who spend a larger share of income on energy. Addressing equity concerns through revenue recycling, targeted support, or progressive fee structures is essential for sustainable policy.

4

Implementation Complexity

Designing effective carbon pricing systems requires sophisticated monitoring, reporting and verification systems, particularly for emissions trading schemes. Administrative capacity and technical expertise present barriers for many jurisdictions.

Why Carbon Pricing is Relevant

- EXCEPTIONAL "TRANSLATOR"
- COST-EFFECTIVE INSTRUMENT
- INTRODUCES PRICE SIGNALS ALONG THE DECISION CHAIN
- CONTRIBUTES TO MODIFYING SUPPLY AND DEMAND PATTERNS
- POTENTIAL TO GENERATE IMPLICIT BENEFITS (CO-BENEFITS)
  - Health
  - Competitiveness
  - R+D+i
  - Improving environmental quality

Carbon Pricing Instruments

Carbon Tax

Direct tariff on CO2 emissions that incentivises the reduction of polluting gases.

Emissions Trading

Permit trading system that establishes a maximum limit of permitted emissions.

Offset Mechanisms

Projects that reduce emissions in other sectors to balance the carbon footprint.

Result Based Carbon Finance RBCF

Climate finance conditional on obtaining verifiable reduction results.

Shade Price

Hypothetical value of carbon used by companies to assess investments and risks.

Internal Rate

Cost applied within organizations to incentivize energy efficiency.

Understanding Mandatory Emissions Markets

1

Regulatory Foundation

Mandatory emissions markets, also known as compliance markets, operate under legally binding frameworks established by governments or international agreements. These systems require specific entities to limit their greenhouse gas emissions to predetermined levels.

2

Cap-and-Trade Mechanism

Most mandatory systems utilise a 'cap-and-trade' approach where a regulatory body sets a maximum limit (cap) on total emissions. Allowances representing the right to emit are then distributed or auctioned to participants who can trade them based on their needs.

3

Compliance Requirements

Entities covered by these schemes must surrender allowances equal to their actual emissions. Non-compliance typically results in significant financial penalties, creating a strong economic incentive for emission reductions.

Understanding Voluntary Carbon Markets

Private Sector Initiative

Voluntary carbon markets operate outside regulatory compliance requirements. They enable businesses, organisations, and individuals to voluntarily offset their carbon footprint by purchasing emission reduction credits from projects that reduce, avoid, or sequester greenhouse gases.

Driving Factors

Entities participate in voluntary markets due to corporate social responsibility commitments, consumer and investor pressure, preparation for future regulations, or to achieve climate neutrality claims. These markets have grown significantly as climate awareness has increased.

Market Structure

Transactions occur between project developers who generate carbon credits and buyers seeking to offset their emissions. Intermediaries like brokers, retailers, and exchanges facilitate these transfers, with standards bodies providing certification.

Emissions vs. Emission Reductions: Key Differences

Emissions

Emissions represent the actual release of greenhouse gases into the atmosphere from human activities. These are typically measured in tonnes of CO2 equivalent (tCO2e) and form the basis of carbon accounting and inventory processes.

In mandatory markets, participants receive or purchase allowances that permit them to emit specific quantities of greenhouse gases. These allowances represent a 'right to pollute' and are created by regulatory authorities.

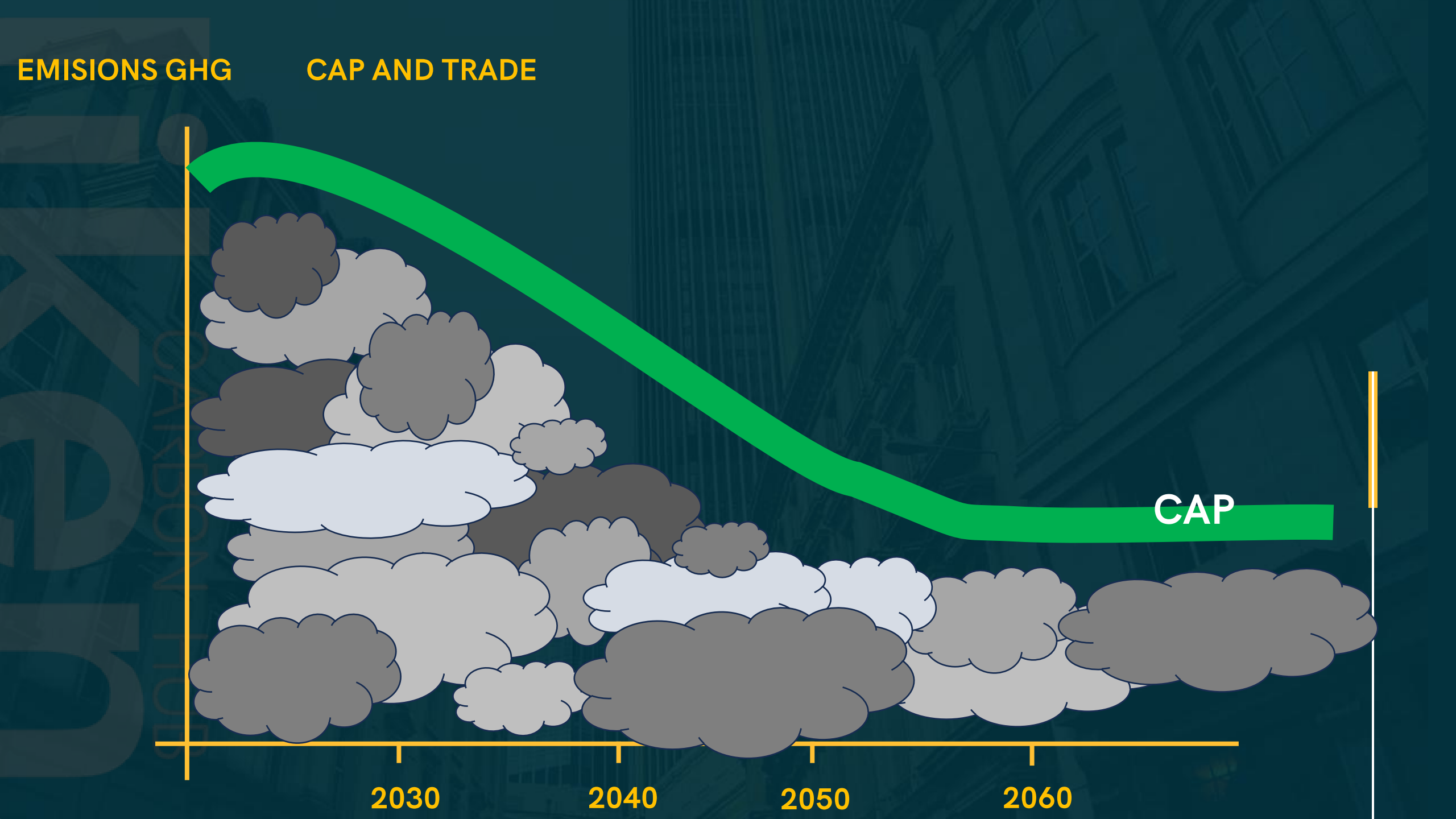
Emission Reductions

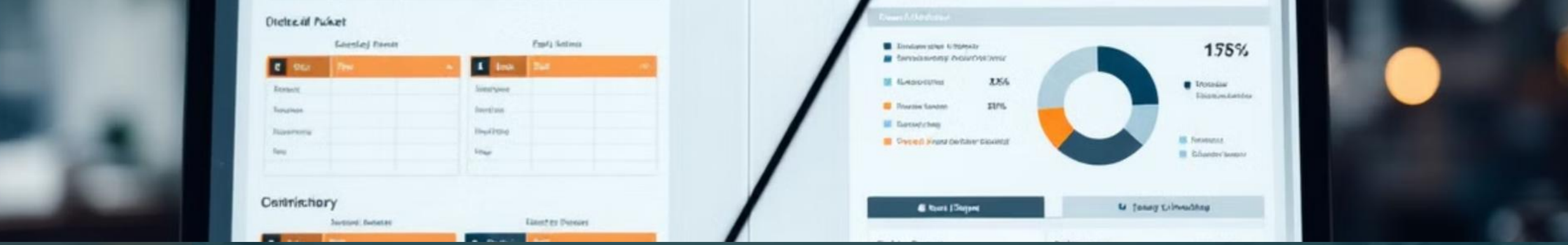
Emission reductions occur when activities result in fewer greenhouse gases being released compared to what would have happened in a business-as-usual scenario. These reductions generate carbon credits representing the avoided emissions.

Carbon credits in voluntary markets represent a verified reduction or removal of greenhouse gases from the atmosphere, typically through projects like renewable energy installation, forest conservation, or methane capture.

Compliance Markets

- An Emissions Trading System (ETS) is a system where issuers can exchange emission units to meet their emission targets.
  - Cap-and-trade schemes, which apply an absolute limit or limit to emissions within the ETS and allowances, are distributed, usually free of charge or through auctions, for the amount of emissions equivalent to the cap.


EMISIONS GHG
CAP AND TRADE
CAP
2030
2040
2050
2060



Technical Distinctions

Feature	Compliance Markets	Voluntary Markets
Market Structure	Cap-and-trade with absolute limits	Offsetting without systemic caps
Credit Generation	Pre-issued allowances by regulators	Project-based using various methodologies
Pricing Mechanisms	Market-driven with regulatory influences	Project-specific with quality premiums
Verification Process	Government oversight with standardised MRV	Third-party standards with variable rigour

The technical infrastructure supporting these markets also differs significantly. Compliance markets typically utilise government-managed registries with standardised reporting protocols, while voluntary markets rely on a patchwork of private registries with varying transparency requirements and interoperability challenges.

Chapter II

Voluntary Markets

Project based mechanisms

Project based mechanisms (I)

Project-based mechanisms are **regulated systems** in which project activities and its operation leads to

- reductions in greenhouse gas emissions and/or
- increases in atmospheric carbon dioxide removals,

compared to those that would NOT occur in the absence of the project activity.

Project-based mechanisms are created and organized by a public entity - supranational, national or regional - or by a private entity.

First reference to a climate change project-based mechanism: **Activities Implemented Jointly, AIJ**, UNFCCC COP 1 (Berlin, 1995) as a pilot phase between 1995 and 1999.

UNFCCC project-based mechanisms:

- Joint Implementation, JI (Kyoto Protocol art. 6)
- Clean Development Mechanism, CDM (Kyoto Protocol art. 12)
- Paris Agreement Crediting Mechanism, SDM (Paris Agreement art. 6.4.)

Project based mechanisms and carbon crediting mechanisms could be considered as synonymous (although not always 100% the same)

How are project-based mechanisms organized?

Project based mechanisms (II)

Supported by a **technical platform** that provides validation and verification for greenhouse gas emission reduction projects. It ensures that projects meet rigorous national and/or sectoral and/or international standards, offering transparency and credibility to stakeholders.

"Carbon credits" are the units that are generated, subject of national and/or international transactions to offset GHG emissions created by the buyer

Carbon credits can represent **emission reductions or emission avoidance**.

Carbon credits can also represent **emission removals from the atmosphere**, such as sequestering carbon through afforestation or directly capturing carbon from the air and storing it.

Each carbon credit represents **1 tCO_2e reduced or 1 tCO_2 removed.**

Project based mechanisms (III)

Supply of carbon credits is delivered by three main categories of crediting mechanisms:

- **International crediting mechanisms**: administered or managed by an international organization that is established with authority of national governments, such as UNFCCC. This category includes mechanisms established under the Kyoto Protocol (including CDM) and Article 6 of the Paris Agreement.
- **Governmental crediting mechanisms:** administered by one or more governments, such as the Californian Compliance Offset Program, the Australian Carbon Credit Unit (ACCU) Scheme, or the CLIMA projects in Spain
- **Independent crediting mechanisms:** those administered by a nongovernmental private organization, such as VERRA (Verified Carbon Standard) , Gold Standard, American Carbon Registry, Canadian CSA Clean Projects Registry, Puro Earth, Global Carbon Council, etc.

Project based mechanisms (IV)

Common elements are:

Regulatory body: establishes, reviews and publishes the 'rules of the game' (rules and procedures). It registers projects and issues carbon credits.

Project developer: private or public entity that submits the project and its mitigation results to the Regulatory Body.

Project validation: process of assessing the project's compliance with all the rules that the regulatory body has established. The validated project is entered into a register (usually a public register).

Project verification: the process of verifying the correctness of the mitigation/absorption quantities generated by the project and its performance, after a monitoring, reporting and verification process.

Validation and/or verification body: entity accredited according to ISO/IEC 17029:2019 and ISO 14064-3:2019 by a national accreditation body, or accredited by the regulatory body according to its own standards and requirements, which carries out the validation and/or verification of the project as an independent third party.

Sectoral scopes: typology or classes in which abatement or absorption projects are classified and framed (e.g., there are 16 sectoral scopes in the CDM).

Project based mechanisms (V)

Common elements are (cont.):

Baseline: situation without project, in which GHG emissions occur according to the 'business as usual' situation.

Baseline calculation methodology: technical document that provides for the process of calculating the emissions that occur in the absence of the project, as a 'business as usual' scenario.

Emission reductions: are those produced by the project after its commissioning and activity over a period of time, and which are identified and quantified by the application of a standardized monitoring system.

Emission reduction calculation methodology: technical document that includes the process of calculating emission reductions (or increase in net removals of atmospheric carbon dioxide) during a monitoring period, in application of the monitoring system of parameters and values established by the methodology.

(Methodologies to be used in each project based mechanism are approved by the regulatory body, are public, and are published).

Monitoring, reporting and verification (MRV): process of monitoring, quantification and verification of the GHG emission reductions / removals achieved by the project, involving the **developer** (monitoring and reporting), the **verification entity** (verification and certification) and the **regulatory body** (final approval and issuance of certified units as carbon credits). Standardized and approved reporting formats and calculation tools are used.

Project based mechanisms (VI)

Typology of markets for carbon credits generated by project-based mechanisms

1. International compliance: (a) **countries** voluntarily purchasing/utilizing credits or "mitigation outcomes" recognized under international agreements (Kyoto Protocol, Paris Agreeement) to help meet their GHG mitigation commitments; and (b) **airlines** buying credits eligible for meeting their obligations under CORSIA.

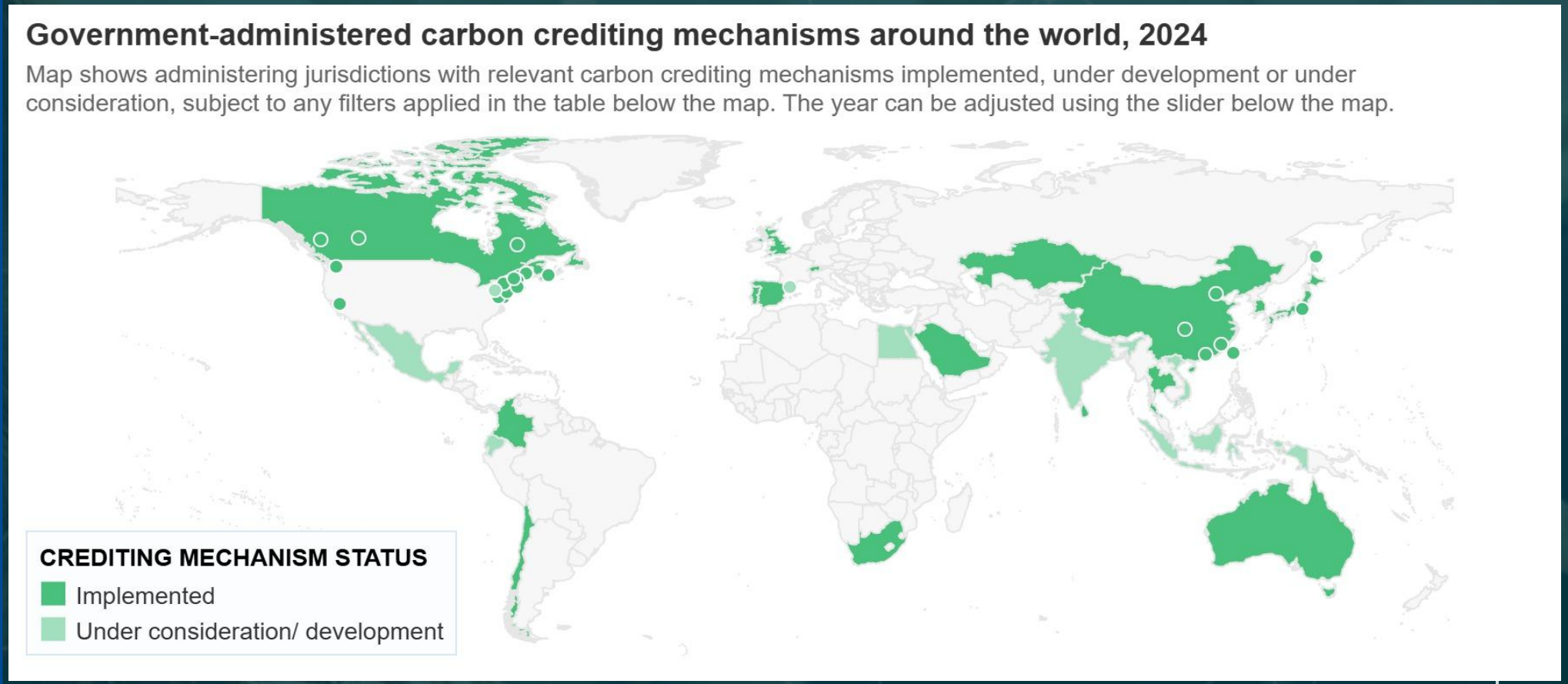
2. Domestic compliance: companies (but not only) purchasing credits that are eligible for meeting their **obligations under domestic law**, usually an ETS or a carbon tax. These may include credits issued under international, governmental, or independent crediting mechanisms, depending on the rules established by respective governments.

3. Voluntary, which consists of (mostly **private**) **entities** purchasing carbon credits for the purpose of complying with voluntary mitigation commitments. These entities buys primarily credits issued under independent crediting standards; some entities also purchase those issued under international or governmental crediting mechanisms.

4. Results-based finance refers to purchases of carbon credits by governments or international organizations for the purpose of incentivizing climate change mitigation or helping host countries meet national targets. Results-based finance can also refer to payments in return for the achievement of emission reductions or removals, without any transfer of credits or other ownership.

Goverment-admistrated carbon crediting mechanisms, year 2024

Project based mechanisms (VII)



World Bank "State and trends of carbon pricing, 2024". https://openknowledge.worldbank.org/entities/publication/b0d66765-299c-4fb8-921f-61f6bb979087

Additionality and double counting (I)

Additionality

The **additionality** of an emission reduction project or a project to increase removals is always **a 'hot issue'** for the project-based mechanisms, and a frequent source of controversy and discussion on the adequacy of approved projects by NGOs and Academia.

Additionality is defined in **Article 12 of the Kyoto Protocol** as 'Emission reductions that are additional to those that would occur in the absence of the certified project activity'.

No mention of additionality of emission reductions or enhancement of removals in the Paris Agreement.

Additionality is ultimately a basic eligibility condition for a project set by the regulatory body, and basically refers to:

- **the project is not done under a legal obligation**
- **the project should bring a technical advance to the host country.**
- **the project would not be carried out without the existence of the project-based mechanism that it benefits from**

Additionality and double counting (II)

Additionality (cont)

As an example, **additionality in the definition of Clean Development Mechanism**:

"A CDM project must provide emission reductions that are additional to what would otherwise have occurred. The projects must qualify through a rigorous and public registration and issuance process. Approval is given by the Designated National Authorities. Public funding for CDM project activities must not result in the diversion of official development assistance.

In the Clean Development Mechanism of the Kyoto Protocol, additionality is demonstrated as:

- Technological additionality: positive listing of technologies
- Financial additionality: the project is not financially attractive, and revenues from carbon credits help to take the "go ahead" decision
- Additionality due to barriers that the project must overcome: institutional, investment, lack of capacity, new technology in a social environment, etc.

A project may be automatically additional and therefore eligible depending on the per capita income of the country or region (LDC) where it will be developed.

(Tool for the demonstration and assessment of additionality Version 07.0.0: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf)

Additionality (cont)

Additionality and double counting (III)

Additionality criteria of a Nature Based Solution (NBS) or Direct Air Capture project as set out by MICROSOFT in 'Criteria for High-Quality Carbon Dioxide Removal, 2024 edition': "Removals are additional if they would not have occurred without carbon finance. The baseline of a project is a conservative estimate of the carbon and other GHG impacts that would have occurred without carbon finance…"

"Project developers must:

- Show that they require carbon finance to implement the project.
- When multiple finance streams support a project, projects are considered additional if revenue from the sale of carbon credits is required to initiate project activities.
- Show that the project is not required by existing and enforced laws, regulations, or other binding obligations.
- Show that project activities are not "common practice," even in the absence of financial or regulatory incentives.
- Quantify the removals claimed relative to the most plausible baseline for carbon stocks and flows, i.e., the counterfactual in the absence of carbon finance.
- Baselines must account for both recent and projected changes in carbon and other GHG stocks and flows.
- Baselines must be conservative and site specific.
- Provide full project financial information to demonstrate financial additionality, particularly where multiple revenue streams are present."

Additionality and double counting (IV)

Double counting

Platforms that support project-based mechanisms must ensure that **a carbon credit is used as an offset only once** by a single buyer, avoiding double or multiple use of the same unit by several agents.

It is essential to **create, and properly operate, a carbon credit registry** that basically lists the project, the country of origin, the developer, the carbon credits generated in each year, the unique identification of each credit and the buyer of each of the credits that have been transferred.

- **Double claiming:** The same unit is claimed by different agents/actors.
- **Double issuance:** the same unit is issued in different schemes.

The issue of the "Zero Sum Game":

The Clean Development Mechanism (art. 12 Kyoto Protocol): it is not a 'zero-sum' system.

The Sustainable Development Mechanism (art 6.4 Paris Agreement): is a zero-sum system as it uses a 'corresponding adjustment'.

Thank you very much for your kind attention

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