

Setting the scene: Shared understanding of carbon market

Infuse Kick-Off Workshop
12 August 2024



Agenda

- 1 Definition and Types of Carbon Markets
- 2 How Carbon Markets Work
Compliance allowance markets
- 3 How International Carbon Markets Work I
Article 6
- 4 How International Carbon Markets Work II
Voluntary carbon markets
- 5 Carbon Credits in ETS and Carbon Tax Schemes
- 6 Lessons Learned and Global Trends

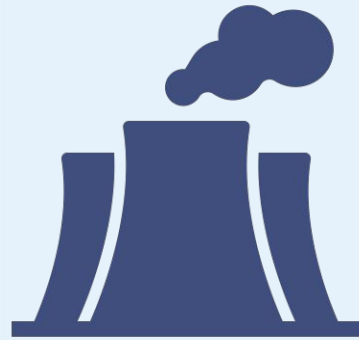


Definition and Types of Carbon Markets

The Climate Challenge



Need for collective
action to reduce
carbon emissions



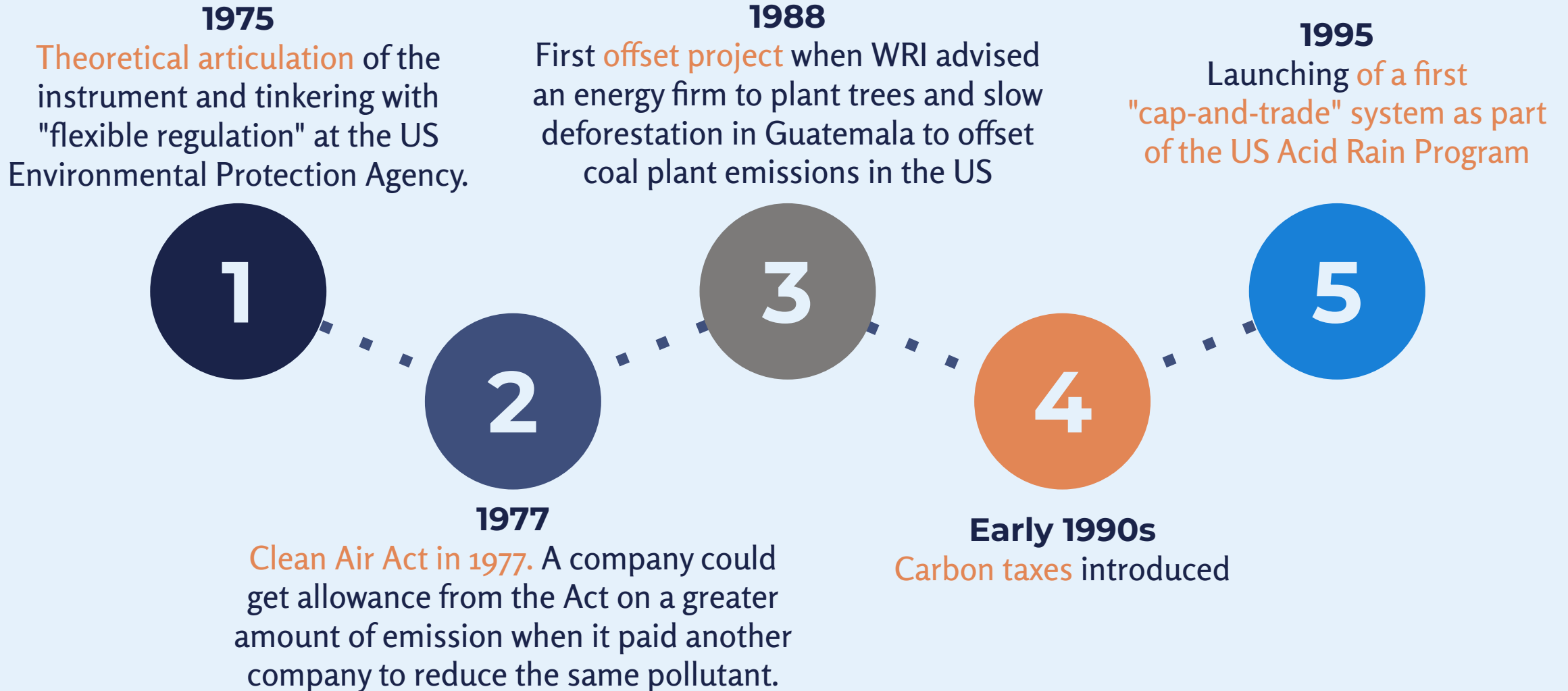
Externalities as a
market failure



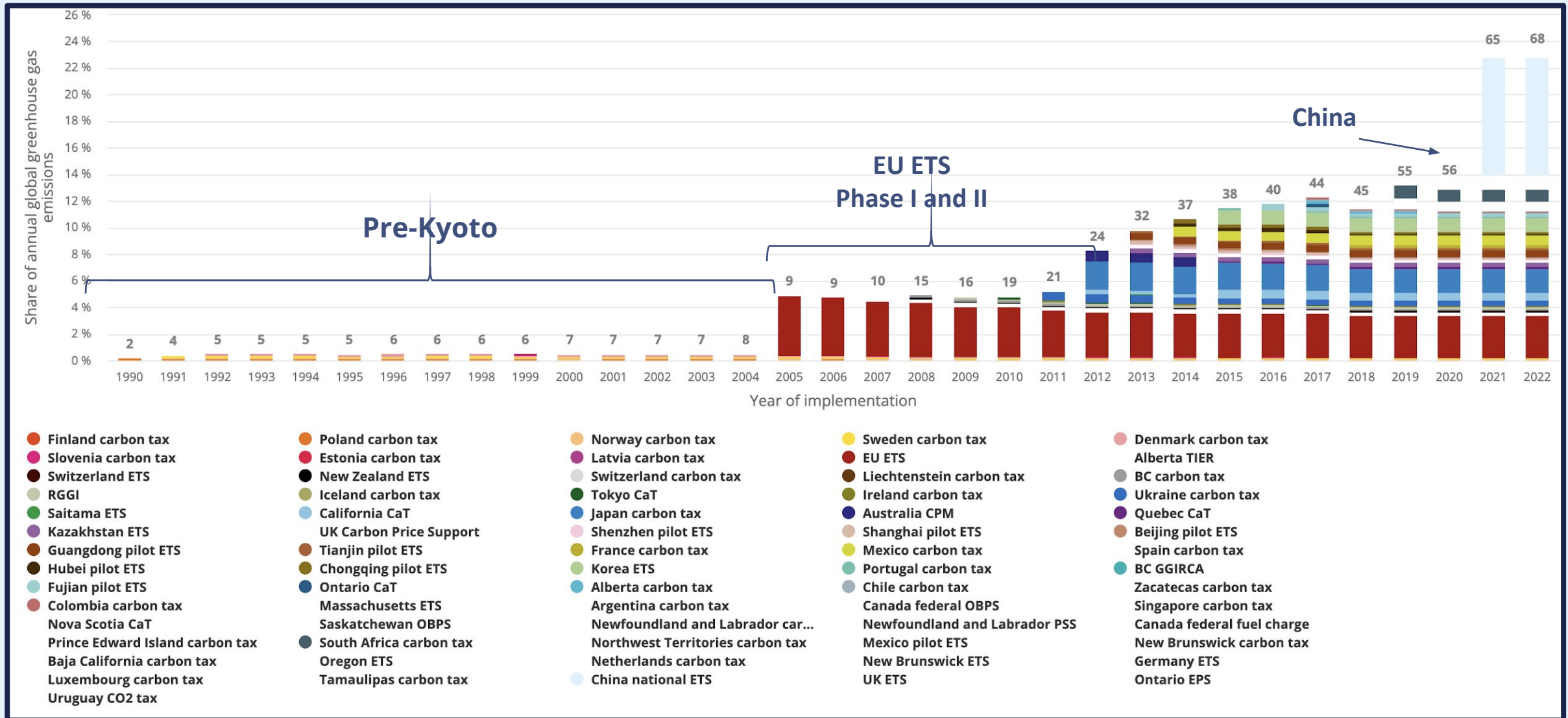
Role of
public policy



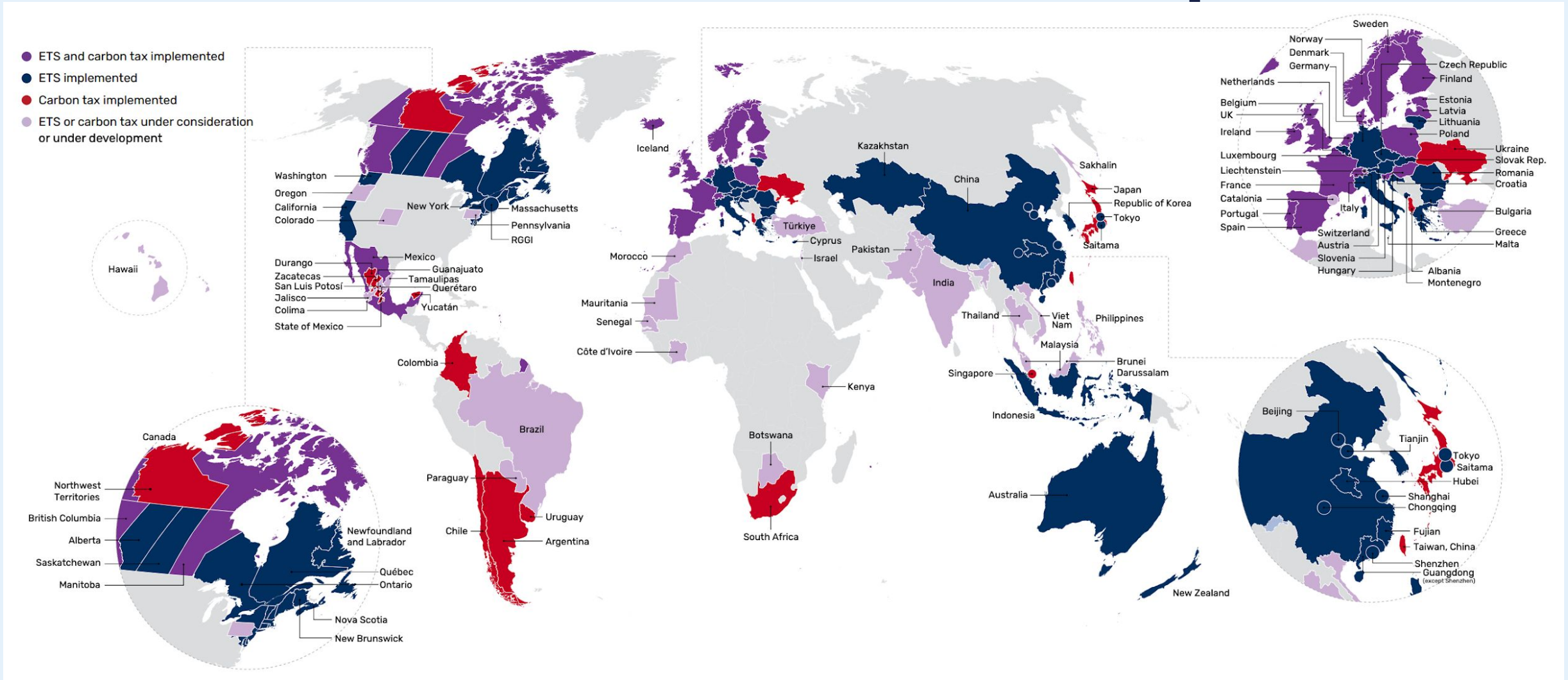
How Did it All Start?



History of Carbon Markets

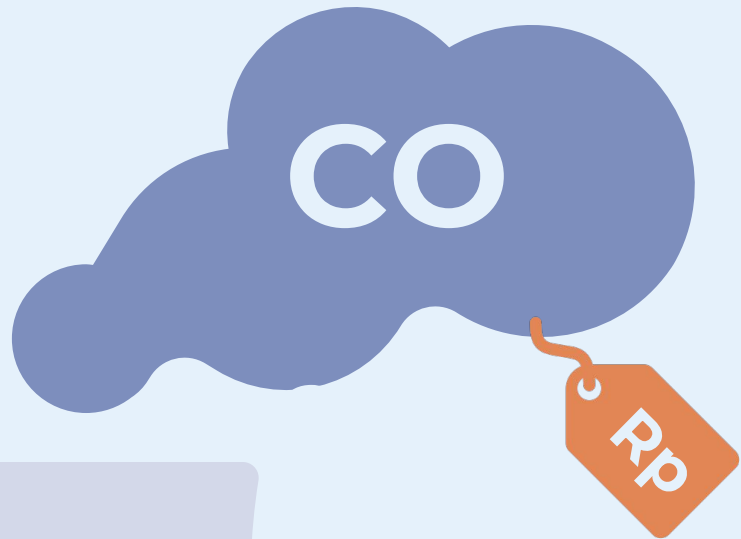


Global Carbon Market Landscape



Source: World Bank, 2024, *State and Trends of Carbon Pricing*.

Carbon Pricing



Carbon pricing creates a **direct price** on carbon dioxide and/or other greenhouse gas emissions

- **Indirect or implicit carbon prices** can be generated through instruments that affect emissions through a proxy variable, such as taxes on fuel use based on carbon content
- By making pollution more expensive, economic actors are incentivized to **account for emission costs** when making commercial decisions.
- Businesses will treat these costs like any other costs and **aim to reduce them** to increase profit margins and/or gain market share.



How to Price Carbon?

Two economic instruments target the negative externality of climate change:



**Carbon
taxes**



**Cap-and-trade
instruments**



What are Cap-and-Trade Instruments?

- **Cap-and-trade** involves the commoditization of CO₂ as credits or allowances, which can then be traded in a market.
- There are different approaches to cap and trade:
 - Emissions Trading Systems (ETS)
 - Baseline-and-crediting systems
- For both, entities with **emissions abatement costs** lower cost than the market price for allowances/credits can mitigate and sell allowances/credits to entities with higher abatement costs
- Baseline-and-crediting mechanisms can be used in conjunction with ETS and carbon taxes.



Types of Carbon Markets

COMPLIANCE

Compliance Allowance Markets

- Regulated mechanisms that permit trading of emissions allowances
- Coverage of a defined number of entities that must submit allowances to cover their emissions
- Price determined by policy and scheme design

Compliance Offsets

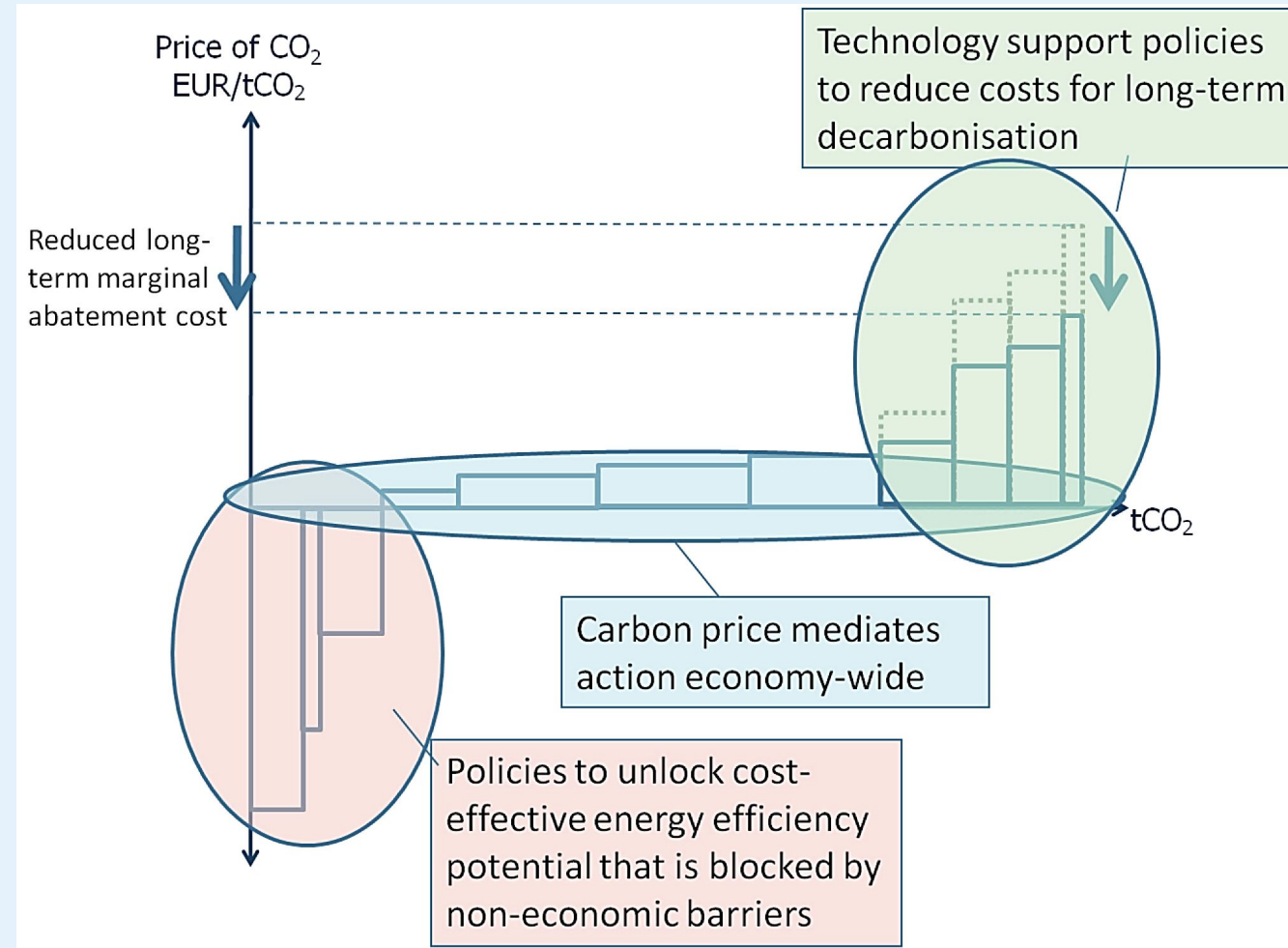
- Trade in certified emission reductions approved by independent accreditors
- Project-based, with validation and verification dependent on 'additionality' of the project
- Price determined by the design of the compliance scheme, its linkage with the offset market, and the balance of supply and demand

VOLUNTARY

Voluntary Offsets

- Trade in certified emission reductions approved by independent accreditation initiatives
- Project-based, with validation and verification dependent on 'additionality' of the project
- Price determined by **willingness to pay of the corporate buyer and perceived branding value**

Carbon Markets vs Other Policies



Other Benefits of Carbon Pricing

- **Revenue generation**

Carbon pricing creates a new source of income for governments that can be used to finance tax reforms, innovation in low-carbon technologies, support vulnerable households, etc.

- **Environmental co-benefits beyond climate**

Reducing emissions often lead to reduced pollution, better air quality, health benefits and so on.

- **Facilitate innovation and a shift toward low-carbon investments**

A carbon price makes carbon-intensive products and processes more expensive – spurring businesses to invest in low-carbon alternatives.

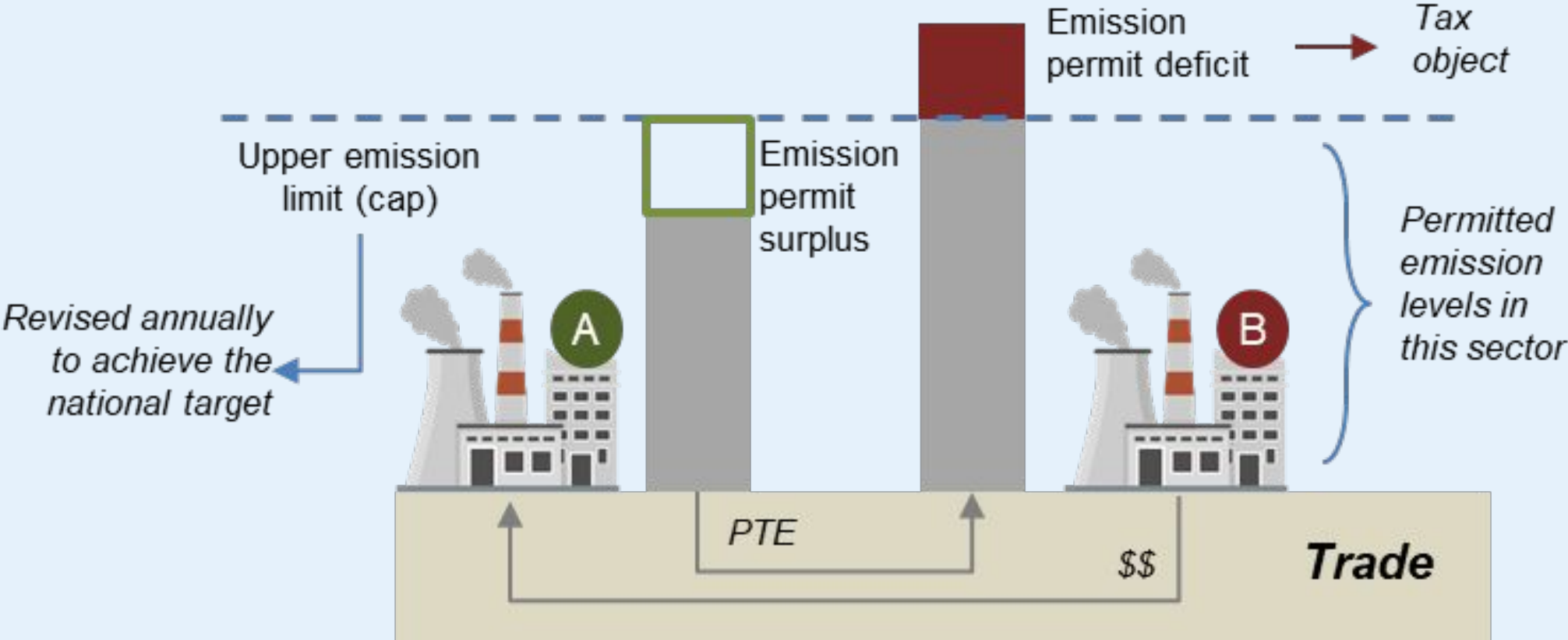




How Carbon Markets Work

Compliance allowance markets

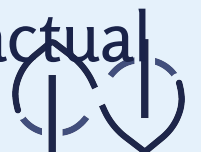
The Emissions Trading System (ETS)



Source: [IDXCarbon](#).

Absolute vs Intensity Targets

- To create scarcity and abatement incentives, policy makers could set an
 - **absolute emissions reduction target** (absolute cap) to fix the maximum amount of emissions in the system, or set a
 - **relative emissions reduction target** (e.g. as in standard crediting systems and intensity targets) that is framed in relative form, i.e. the amount of greenhouse gases emitted per unit of GDP or output.
- A cap-and trade system (e.g. the EU ETS) is only concerned with the quantity of emissions while an ETS designed to ensure an **intensity target** (e.g., the China ETS) considers two variables simultaneously, the quantity of emissions and GDP. When an ETS relies on a relative target, the pre-defined cap is not fixed and may be ex post adjusted when the actual economic growth deviated from the projected.



Stringency of the Cap

- Based on the absolute/relative emissions target and ex post adjustment within an ETS, the stringency of a cap can be evaluated.
- The stringency of a cap may vary among different ETSs and will directly affect the scarcity of allowances and hence the carbon price.
- A high allowance price, *ceteris paribus*, incentivizes covered entities to invest in technological innovation, research and development, provided the price signal is credible. To ensure the stringency and a sufficiently high price, a binding cap can be set by estimating variables such as business-as-usual emissions and abatement potential.
- An intensity-based cap would in addition require the prediction of an additional parameter such as GDP.

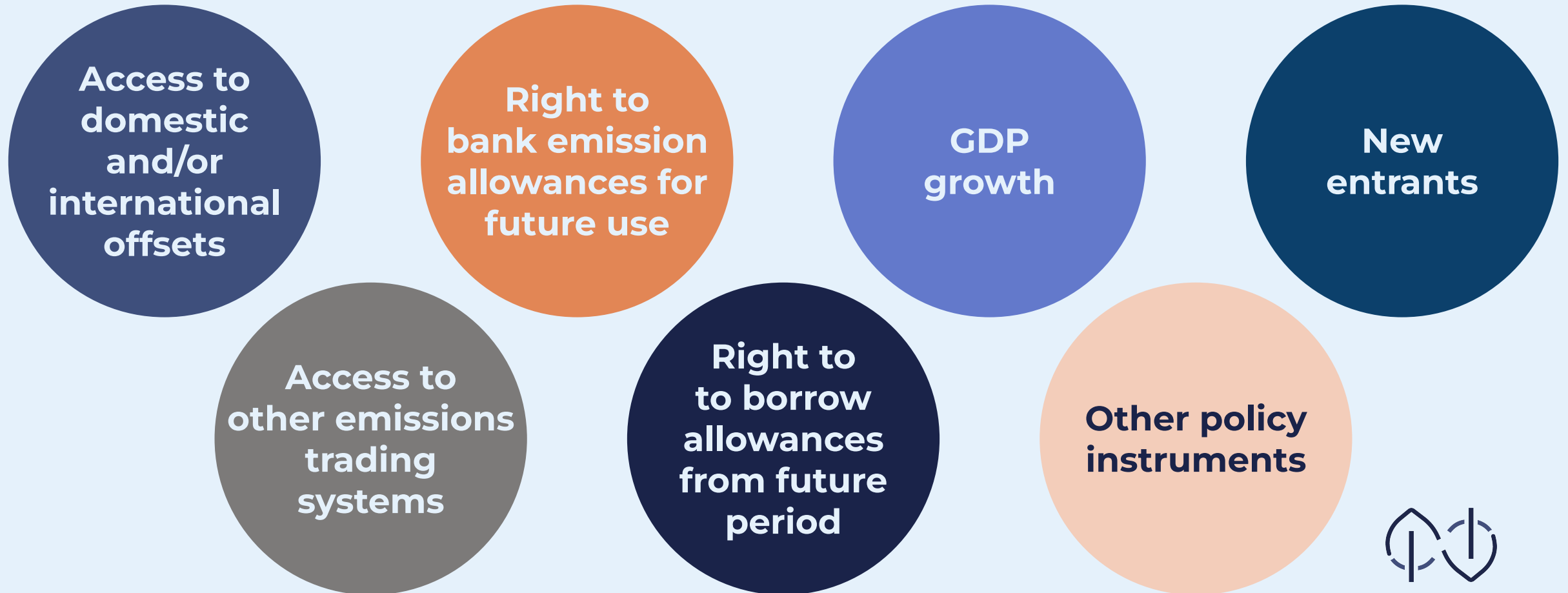


Share of Capped and Un-capped Sectors

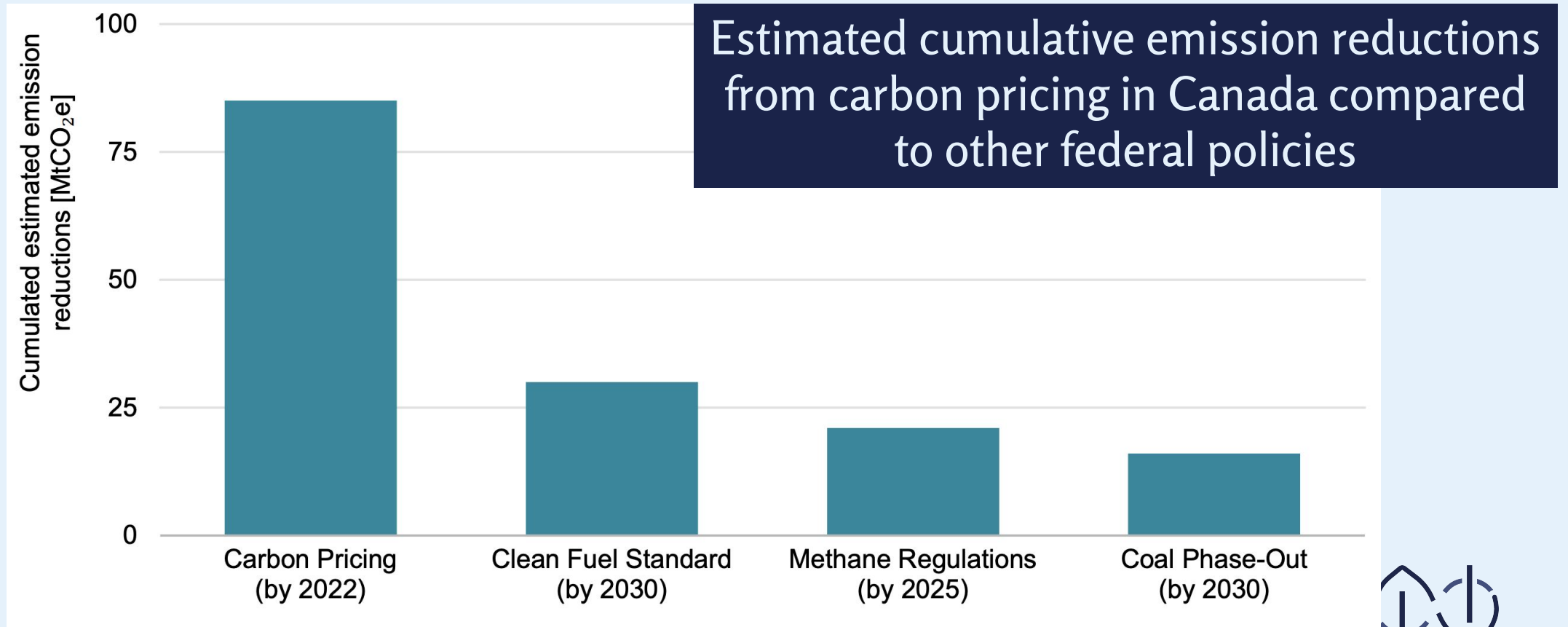
- Where there is an economy-wide emissions reduction target, determining the ambition for the sectors within the ETS with a limited scope has important consequences for the intended mitigation from uncapped sectors.
- The government may want to consider the equity, efficiency, and political implications of decisions on the share of mitigation responsibility borne by capped and uncapped sectors.
- The decision on how much mitigation responsibility to assign to the capped sectors could consider the relative capacity of capped and uncapped sectors to reduce emissions.
- If marginal abatement costs are relatively low within the uncapped sectors, firms could be permitted to access these lower-cost units through domestic offsets.



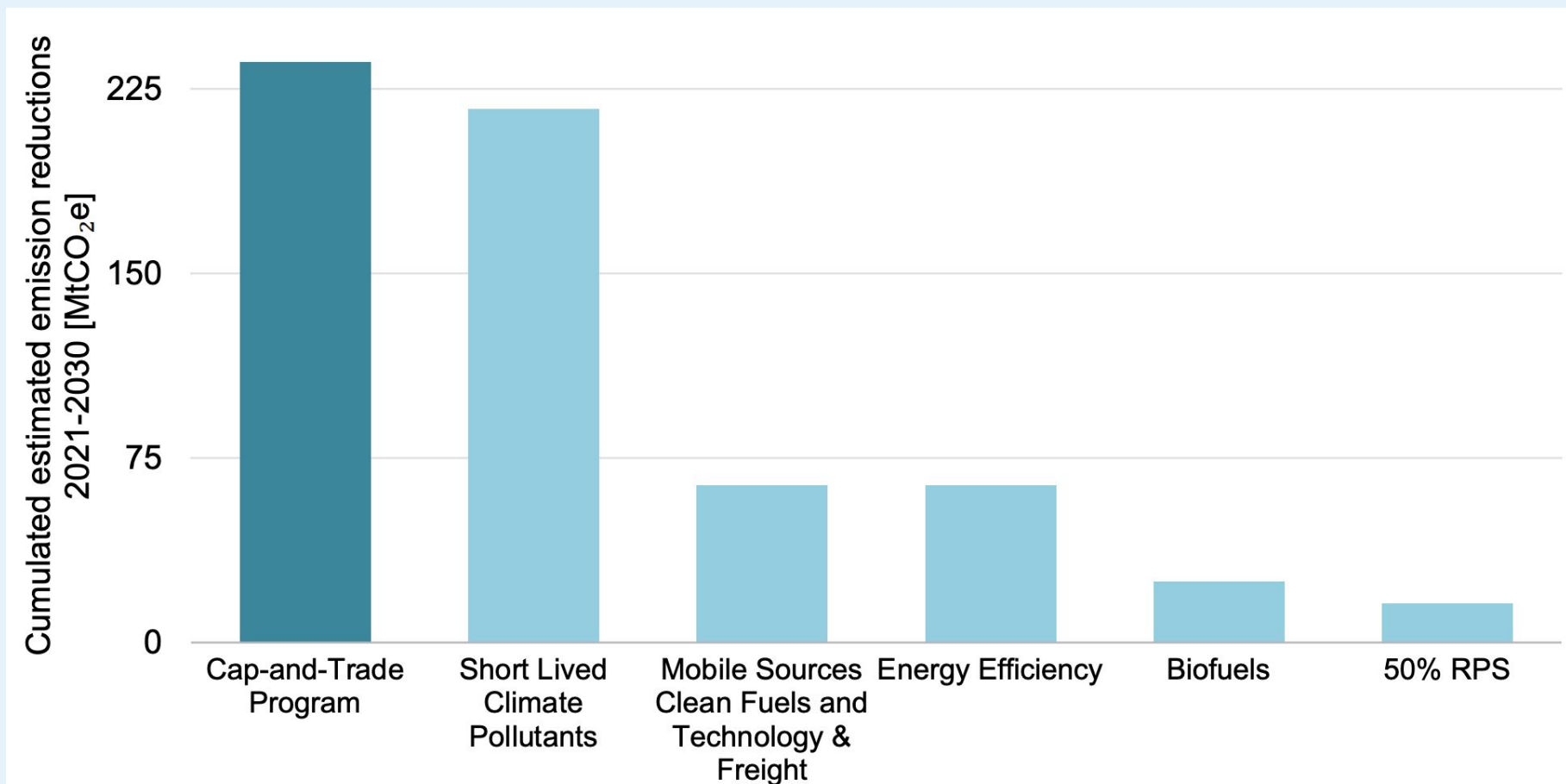
Factors Affects Cap Stringency



Impacts on Emission Reductions



Impacts on Emission Reductions



Note: RPS = Renewables Portfolio Standard.





How International Carbon Markets Work I

Article 6

Article 6: Cooperative approaches

Countries can voluntarily cooperate to achieve their Nationally Determined Contributions.

Article 6 of the Paris Agreement provides different options of cooperation:

Article

6.2

Cooperative Approaches

A decentralized approach with basic guidance from the Parties (CMA), “an accounting mechanism”, type of cooperation not defined

Article

6.4

The New Mechanism

A centralized approach, similar to the Clean Development Mechanism, baseline-and-crediting mechanism. Subject to UNFCCC governance

Article

6.8

Non-Market Approaches

Promoting mitigation and adaptation cooperation that does not involve the transfer of mitigation outcomes



Article 6 for Developing Countries

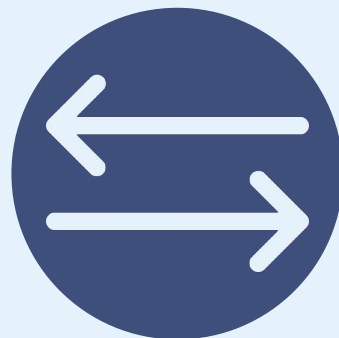
- Developing countries have targets through their NDCs and can participate as **sellors or buyers** of mitigation outcomes.
- Countries are expected to report to the UNFCCC ex post how mitigation actions
 - contribute to the NDCs of host and partner countries and
 - are consistent with sustainable development and environmental integrity requirements
- Countries will have to **regulate Article 6 implementation domestically**, adopting not just procedural rules, but also content.



Article 6 Participation Requirements



be a Party to the Paris Agreement



has arrangements in place for tracking ITMOs



has prepared, communicated and is maintaining an NDC



has provided the most recent national inventory report required



has arrangements in place for authorizing the use of ITMOs towards achievement of NDCs



Its participation contributes to the implementation of its NDC and long-term low-emission development strategy, if it has submitted one, and the long-term goals of the Paris Agreement.

Opportunities

Bilateral Agreements

86 bilateral agreements

11 buyer countries

44 host countries

140 projects have

119 Japan's Joint Crediting Mechanism (JCM)

Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)

- International aviation is **not included in countries' emissions inventories nor their NDCs**.
- In 2016, the ICAO Assembly **adopted a global market-based measure scheme for international aviation**.
- A technical committee under ICAO has determined eligibility criteria for carbon credits allowing **independent carbon crediting programs, the PACM and domestic carbon crediting programs** to generate carbon credits.





How International Carbon Markets Work II

Voluntary carbon markets

The Voluntary Carbon Market

- Private individuals, corporations and other players **issue, buy, and sell carbon credits**, typically because of a carbon neutrality target or a net-zero target.
- Operates **outside of regulated or compliance carbon pricing instruments**.
- Most of the supply of carbon credits is generated in developing countries and most of the demand for carbon credits is in developed countries.



Voluntary Buyers

- Buyers typically have either a **carbon neutrality target** or a **net-zero target**.

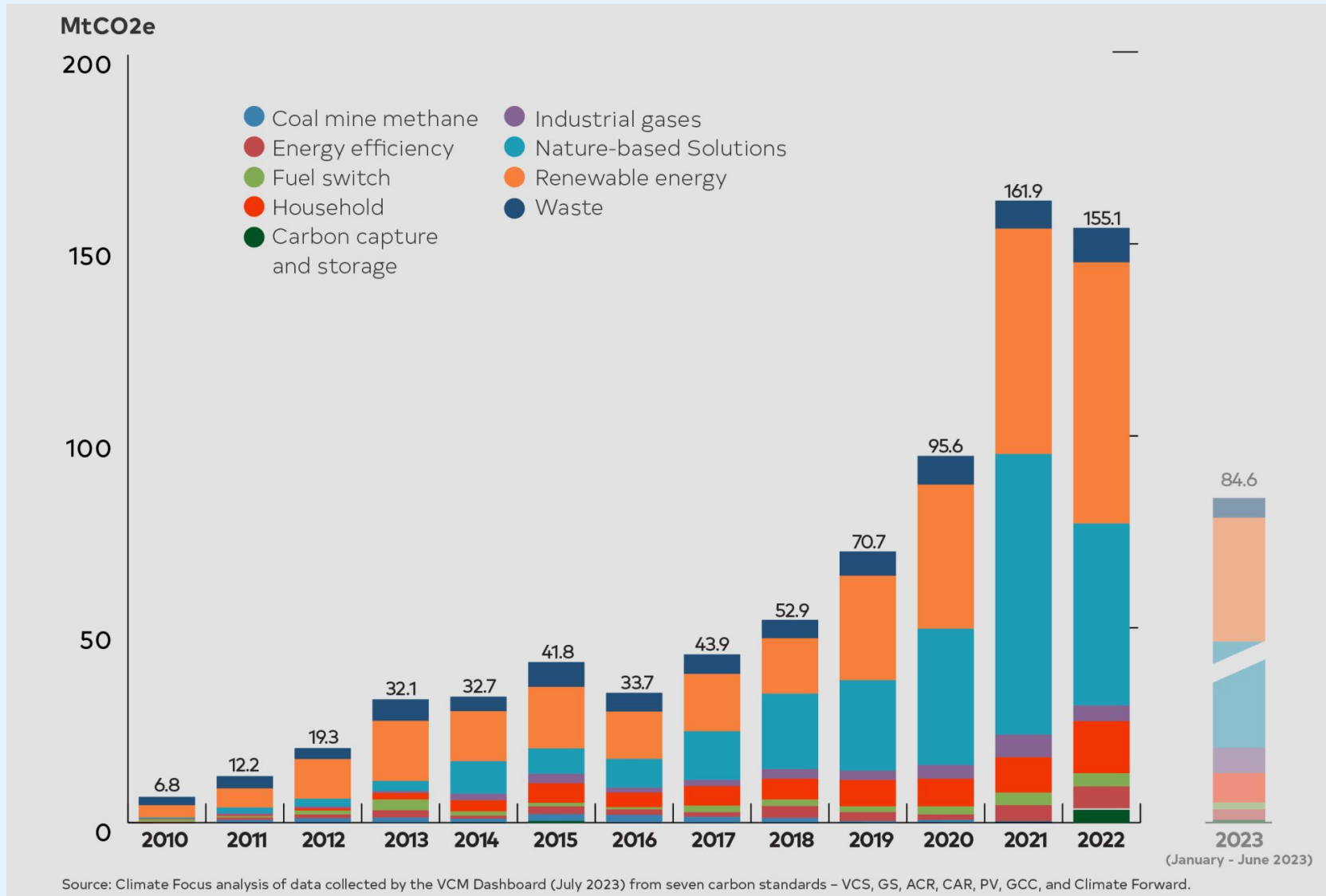
CARBON NEUTRALITY

- Means not adding new GHG emissions to the atmosphere.
- Where emissions continue, they must be offset by absorbing an equivalent amount from the atmosphere

NET-ZERO

- Means reducing absolute emissions across the whole supply chain, to support the target to limit global temperature increases to 1.5°C, as agreed in the Paris Agreement

Project Types on the VCM

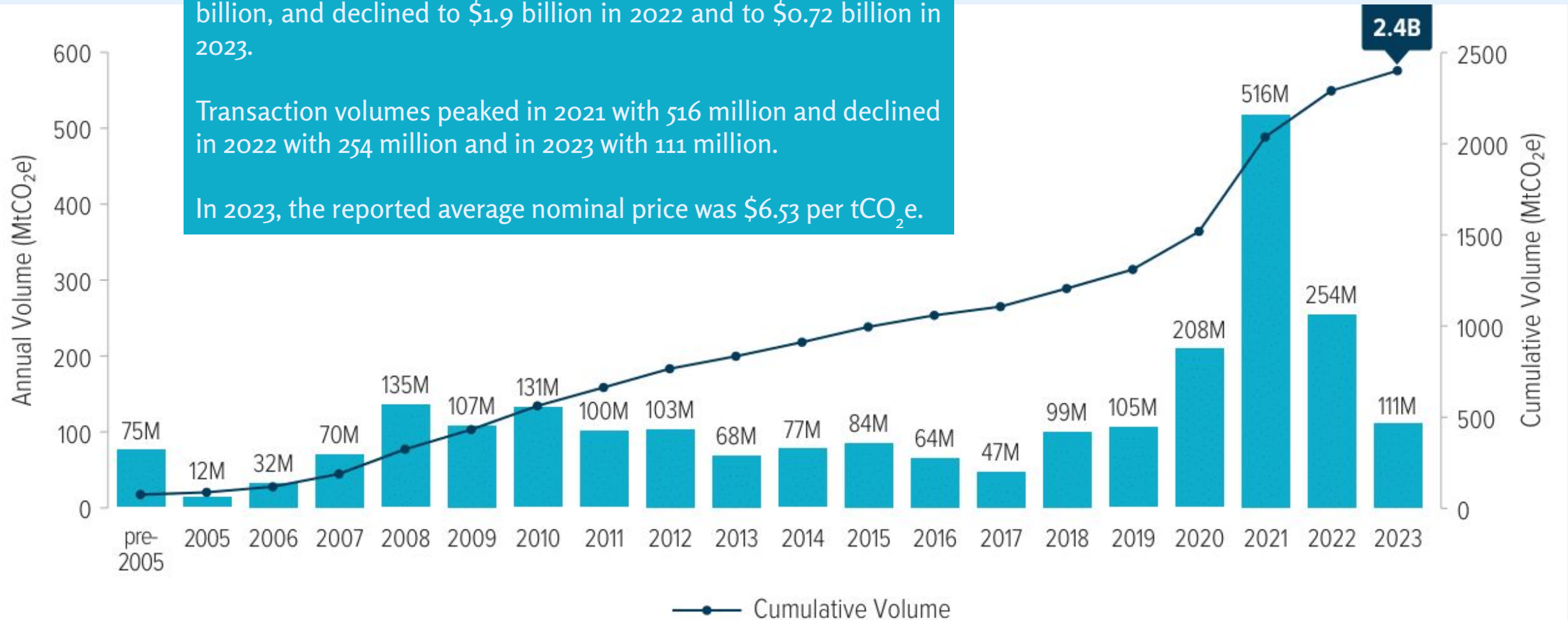


Traded Volume on the VCM

The total trading value peaked in 2021, reaching about \$2.1 billion, and declined to \$1.9 billion in 2022 and to \$0.72 billion in 2023.

Transaction volumes peaked in 2021 with 516 million and declined in 2022 with 254 million and in 2023 with 111 million.

In 2023, the reported average nominal price was \$6.53 per tCO₂e.

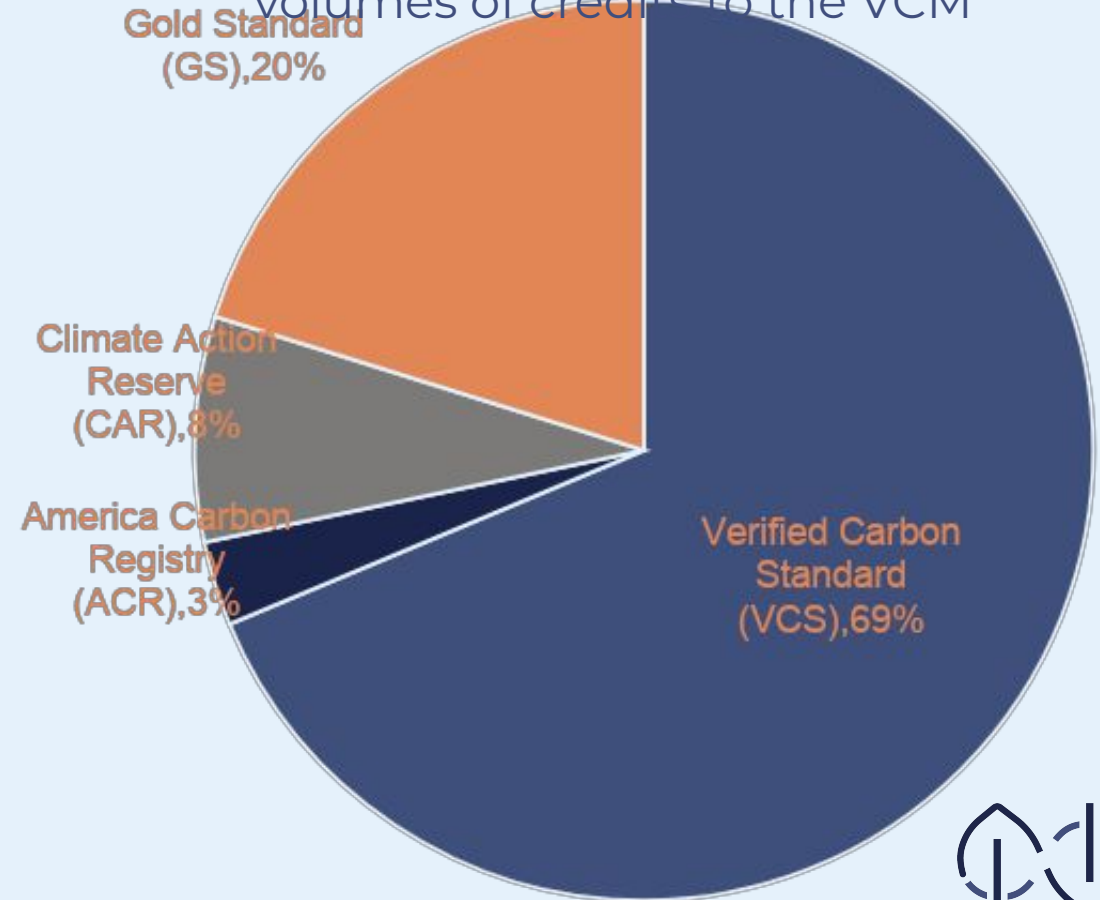


Source: Carbon Credits, 2024, [Why The Voluntary Carbon Market Took a Hit in 2023](#).

Independent Carbon Market Programs

- Carbon standards are private organizations that **provide requirements and rules to guide project developers** in the design of emission reduction or GHG removal activities.
- Most of the transactions are currently happening in private conversations and over-the-counter deals
- Some exchanges are also emerging, such as the New York-based Xpansiv CBL and Singapore based AirCarbon Exchange (ACX).

Largest standards contributing the greatest volumes of credits to the VCM



Carbon Credit Quality

- There is a **demand for better standardization and coordination.**
- In 2021, major developments started to drive consensus on quality standards for the VCM, with **potentially transformative impacts on the market as both supply and demand sides of the equation are being redefined.**
- Some of these initiatives were spurred by efforts that began as the **Taskforce on Scaling Voluntary Carbon Markets.**
 - Integrity Council for the VCM (ICVCM)
 - The Voluntary Carbon Markets Integrity Initiative (VCMI)





When Carbon Markets do not Work

What Drives the Price?

- **Fundamental analysis**, in accounting and finance, is the analysis of a business's financial statements (usually to analyze the business's assets, liabilities, and earnings); health; competitors and markets
- **Fundamentals theory** in carbon trading is an analysis based on the allowance price, the wholesale electricity price, and fuel prices (coal, natural gas).
- **Switching** is a short-term option of abatement for power producers that can decide on the order coal-or gas-fired plants are put into operation.
- The **switching price** is fundamental to allowance pricing in that the marginal cost of an allowance should in theory follow the switching price. The cost of fuel switching is determined by the (relative) prices of fossil fuels. In an efficient market, the allowance price should react to changes in these prices.
- With increasing allowance prices, more and more power producers will decide to switch.



What Drives the Price?

Example: Early EU ETS period reflects fundamentals

weather impact on power demand

precipitation levels, wind speed

production levels

relative fuel prices

macro economic development

Later period, evidence shows a different picture

- switching price is a poor indicator of EUA price, and fundamentals theory alone does not capture the workings of the EAU price
- Marginal costs are still considered to determine the movements in demand, but supply is largely determined by political decisions.

*Source: Knopf et al, 2014, *The EU ETS: Ex-Post Analysis, the Market Stability Reserve and Options for a Carbon Price Floor*

**Source: Koch et al, 2014. *Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything? – New evidence* *


Does the Price Really Drive Reductions? I

- **Example EU ETS**

- Emission levels stayed below the cap during 2009 – 2013, with a reduction in the range of 1,152 and 1,324 Million tons

- **Several drivers**

- The EU 2020 Energy Package may have reduced emissions by 766 – 805 million tons, main reduction from renewables, and a small share from energy efficiency
- Economic crisis reduced with 296-346 million tons

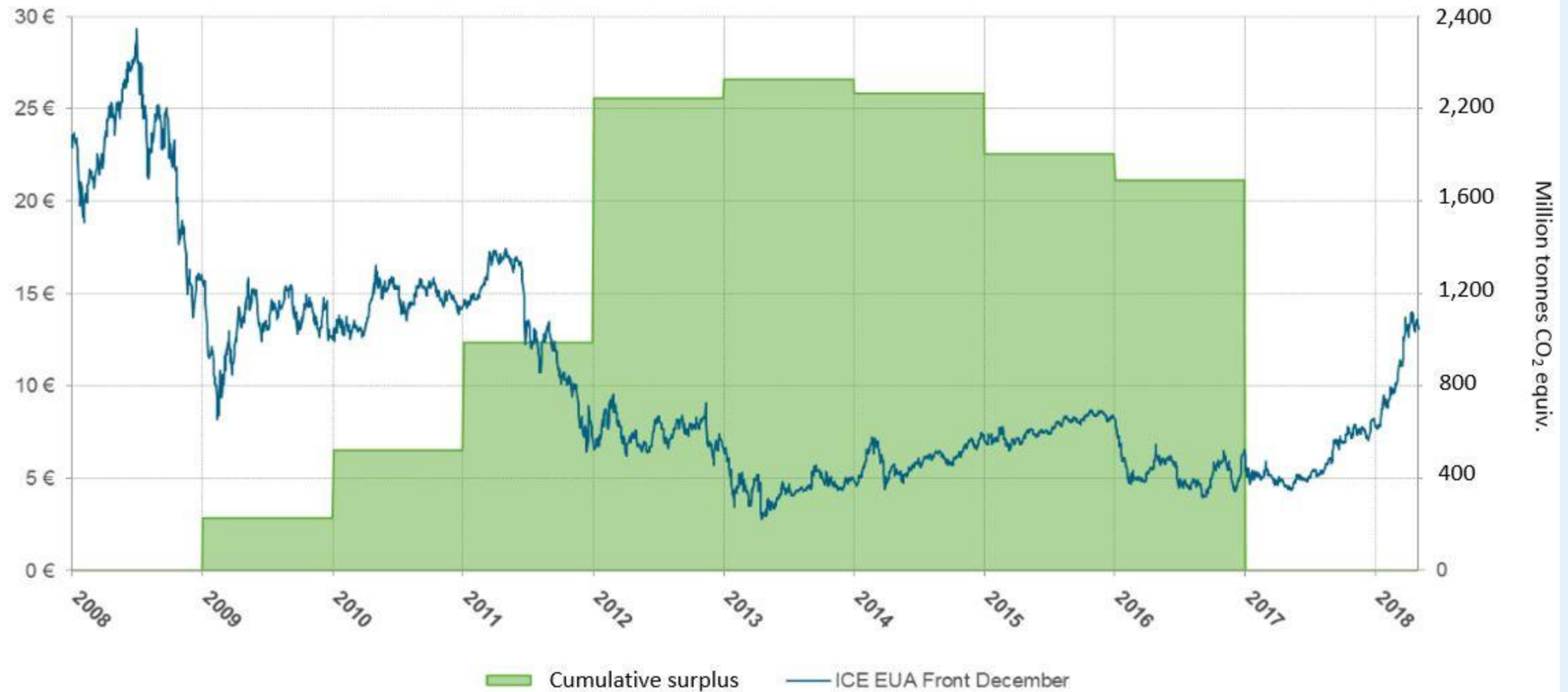
- **Overachievement, was not caused by the price?**
Overlapping policies, no need for power producers or industry to undertake additional abatement measures 

Does the Price Really Drive Reductions?

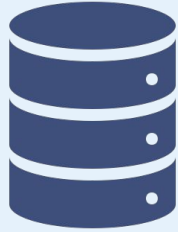
- Example EU ETS
 - Emission levels stayed below the cap during 2009 – 2013, with a reduction in the range of 1,152 and 1,324 Million tons
- Several drivers
 - The EU 2020 Energy Package may have reduced emissions by 766 – 805 million tons, main reduction from renewables, and a small share from energy efficiency
 - Economic crisis reduced with 296-346 million tons
- Overachievement, was not caused by the price? Overlapping policies, no need for power producers or industry to undertake additional abatement measures



Price development and surplus in the EU ETS



Market Interventions



Cap
Adjustment



Auctioning
Timing



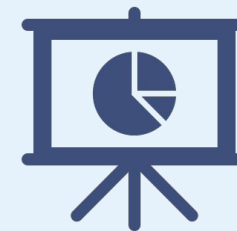
Central Reserve
(Central Bank)



Floor Price

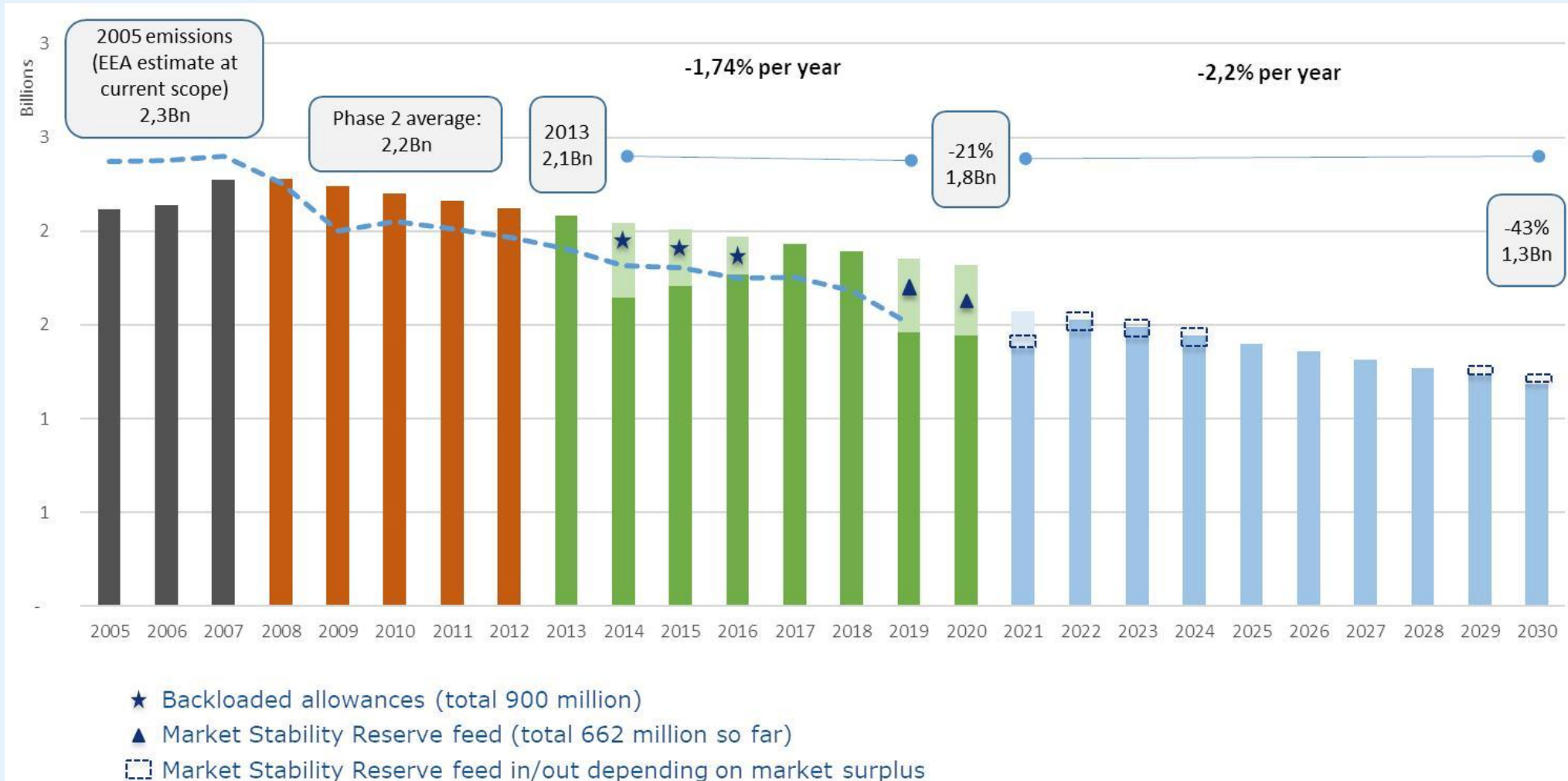


Ceiling Price



Price Corridor

Example of caps and long-term trajectory



Market Stability Reserve

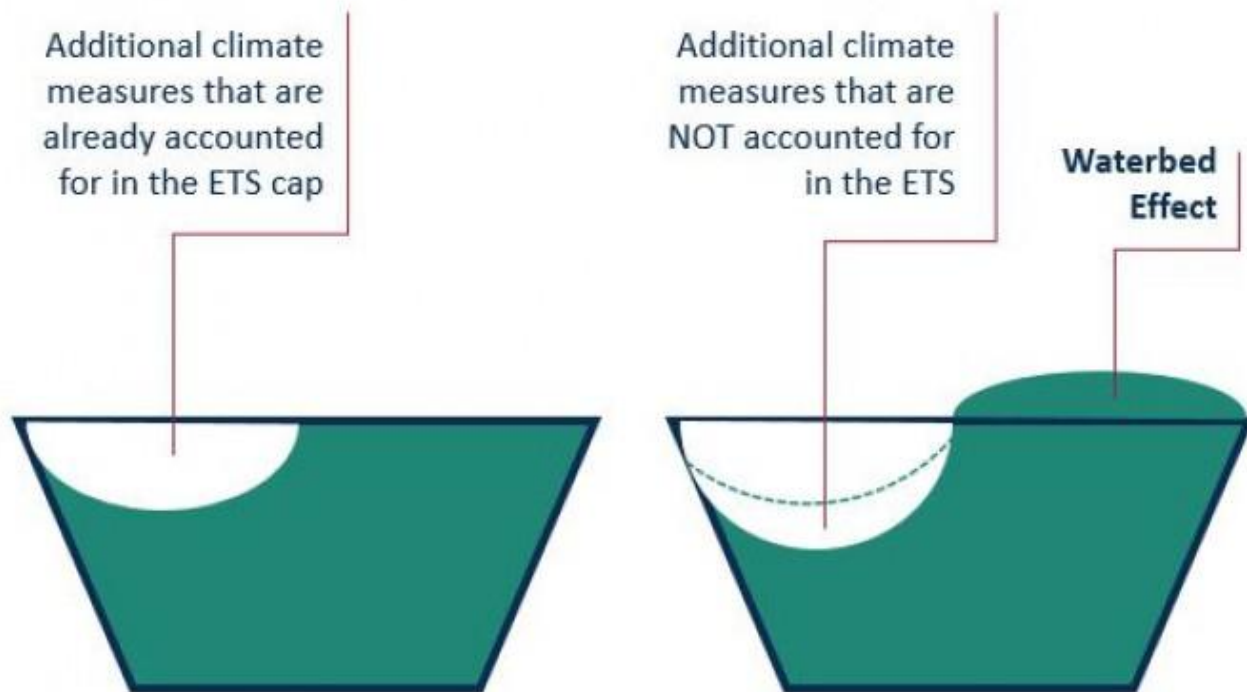
Reducing the allowances (EUAs) surplus in the ETS as of 2019:
How the Market Stability Reserve (MSR) and cancellation mechanism work.



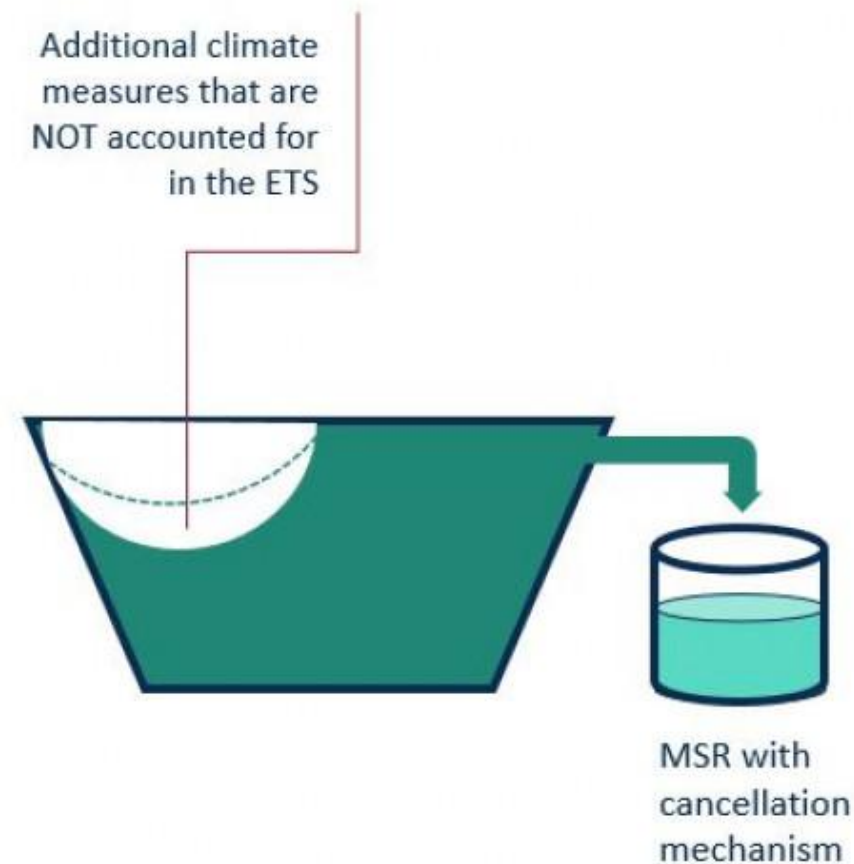
Reducing the 'waterbed effect' in the ETS with the Market Stability Reserve (MSR) and cancellation mechanism.

Source: Adapted from Agora Energiewende, 2018.

ETS *before* reform



ETS with MSR *after* reform

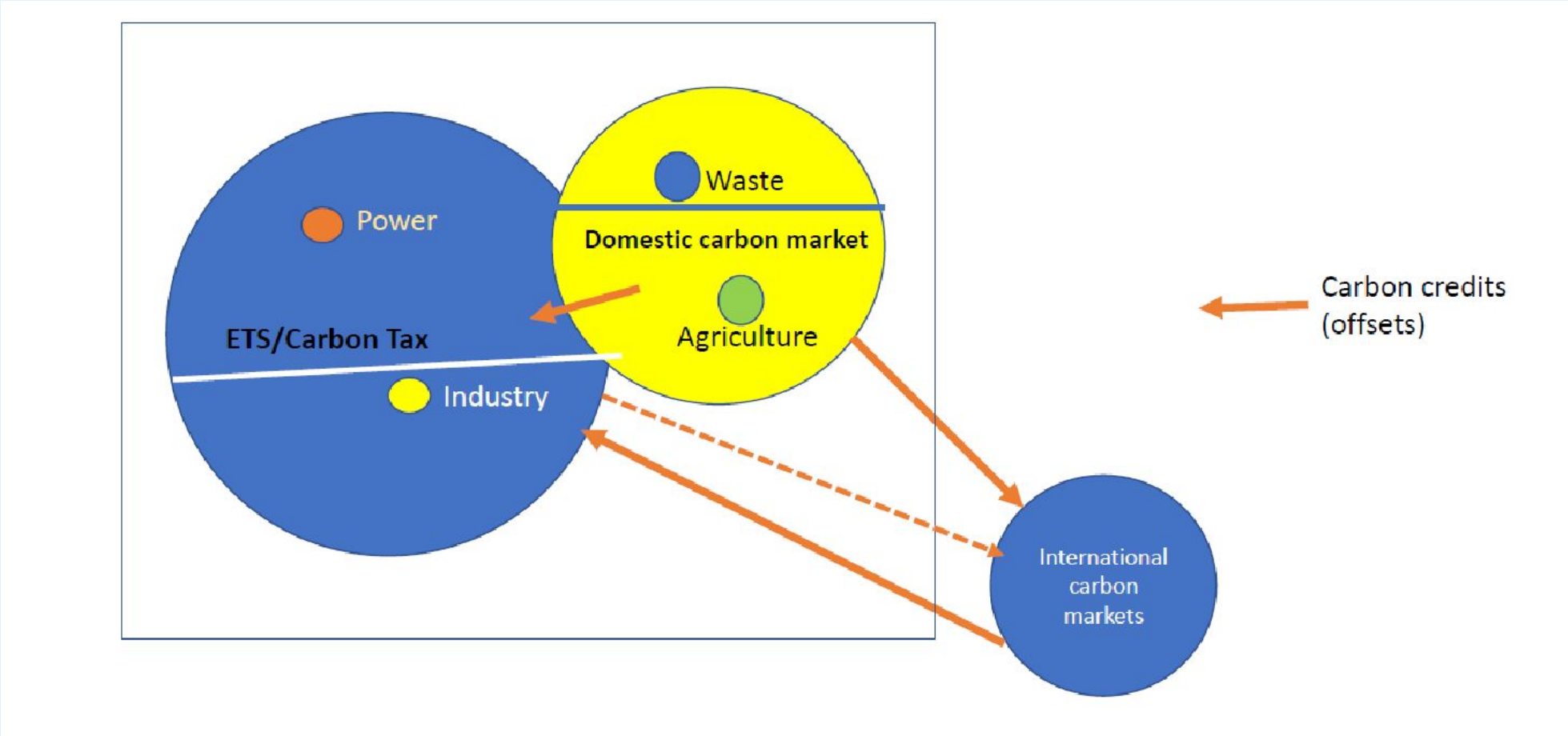




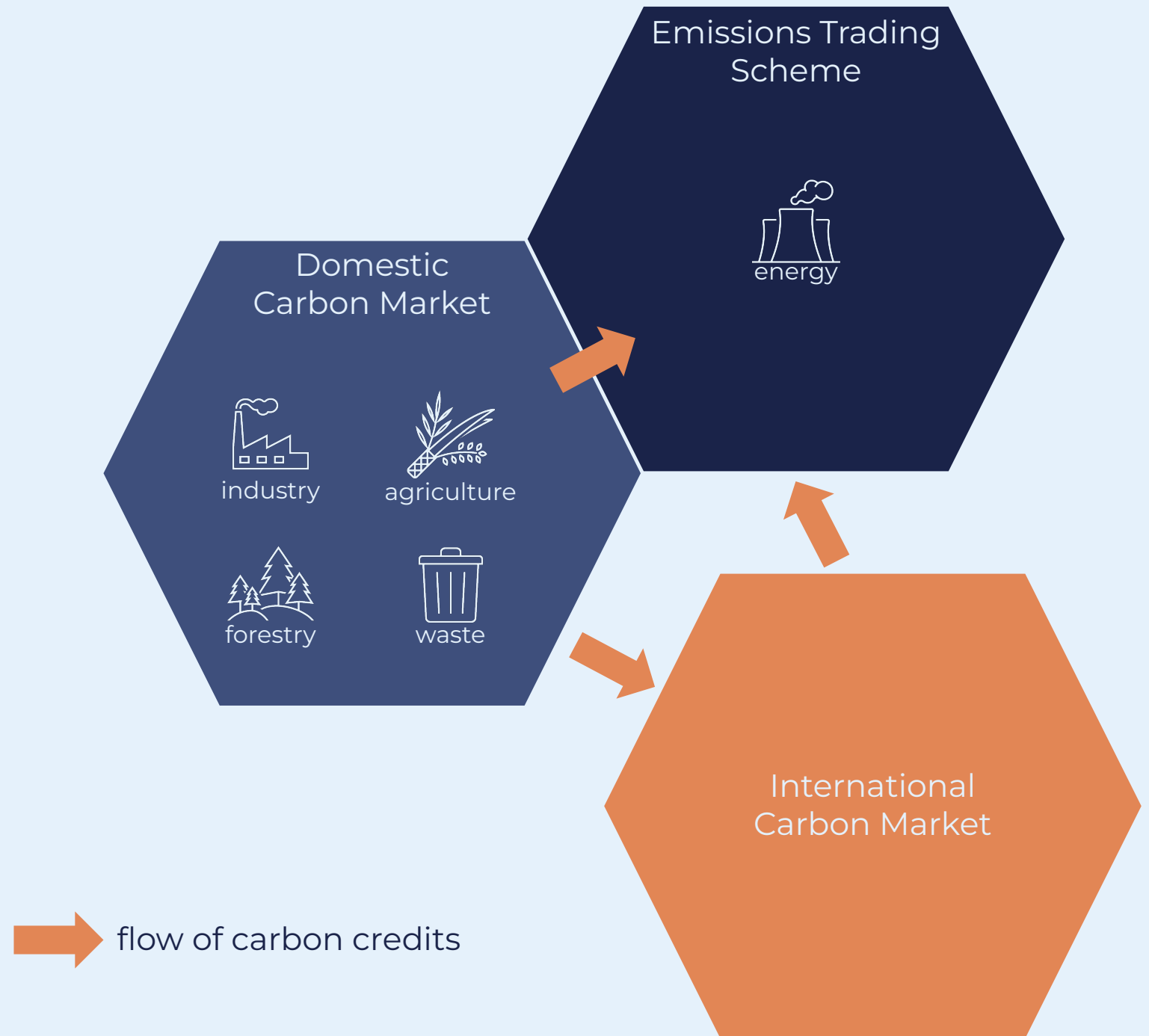
Carbon credits in ETS and carbon tax schemes

International Outlook

The Linkage between Domestic and International Carbon Markets



Linkages between Carbon Markets




ETS with Carbon Offsets

System	Type of offsets admitted	Regional scope	Approved offset methodologies and qualitative criteria	Quantitative limits and share of surrendered offsets
California (WCI)	Offset credits issued under the California Compliance Offset Program. Offsets issued by Québec are also accepted.	United States	Currently six domestic offset project types ('protocols') covering agriculture, forestry, mine methane capture and avoidance of ozone depleting substances.	2021-2025: up to 4% per year of each entity's compliance obligation, increasing to 6% for 2026-2030. No more than half of the quantitative usage limit may be sourced from projects that do not provide DEBS.
China national ETS	CCERs	China	~200 methodologies, the largest share of which originate from CDM. CCERs must not come from emission reduction projects included in the national carbon market (covered entities may not generate CCERs for their own use).	Covered entities can use CCERs for up to 5% of the annual compliance obligation.
EU ETS	From Phase 4 (2021-2030), no offsets are admitted.	N/A	N/A	N/A
Kazakhstan ETS	Domestic offsets	Kazakhstan	GHG reduction or absorption activities in all economic sectors; IPCC methodologies and rules developed by the Ministry of Ecology, Geology and Natural Resources	None



ETS with Carbon Offsets

System	Type of offsets admitted	Regional scope	Approved offset methodologies and qualitative criteria	Quantitative limits and share of surrendered offsets
Korea ETS	Phase 3 (2021-25): Domestic and international (including CDM credits)	South Korea and international	Up to 50% of offsets in the ETS can be international, but only from projects minimum 20% owned/funded by Korean firms.	In Phase 3, limited to 5% of each entity's compliance obligation. No separate limit for international offsets applies.
Mexico	Domestic program of mitigation activities and early action mitigation activities	Domestic	Not yet published. For offsets: domestic projects that have been validated and verified under internationally or domestically recognized protocols (still to be specified). Emission reductions related to all GHGs will be eligible, except for those related to direct CO ₂ emissions. Early action: National mitigation activities that received credits before the start of the Pilot from programs recognized by SEMARNAT. SEMARNAT is currently working on the regulations to operationalize the offset and early action provisions in the Pilot ETS.	Quantitative limit: Up to 10% of the compliance obligation. Share of surrendered offsets: N/A
New Zealand	As of 1 June 2015, international units are not eligible for surrender in the NZ ETS. International offsets may be allowed as part of the government's 2030 strategy.	N/A	N/A	Currently no offsets are allowed. 

Source: La Hoz Theuer, S., Hall, M., Eden, A., Krause, E., Haug, C., De Clara, S. (2023). Offset Use Across Emissions Trading Systems. Berlin: ICAP. Data as of August 2022

Singapore Carbon Tax

1 January 2019

- Introduced Carbon tax through **Carbon Pricing Act (CPA)**
- Including their accompanying regulations

8 November 2022

- CPA had been amended and passed in Parliament to support country climate ambition in **achieving NZE 2050**
- Carbon tax is applied to all industrial facilities with an annual direct GHG emissions of 25,000 tCO_{2e}

2019 - 2023

- Gradual rise of carbon tax to provide business to adjust
- 2019 – 2023: \$5/tonne
- 2024 – 2025: \$25/tonne
- 2026 – 2027: \$45/tonne
- 2030: \$50-80/tonne

Carbon tax revenue are used to support decarbonization efforts, green economy transition, and to cushion the impact on business and households

Singapore Government-to-Government Agreements

- **Legally binding Implementation Agreement (IA)**
 - Overarching G2G framework for Article 6 carbon credit cooperation
 - Includes (i) roles and responsibilities of relevant government agencies; (ii) rules and processes for issuance of ITMOs corresponding adjustment, and (iii) guidelines for environmental integrity criteria and project types
- **Legally binding project contracts under the IA framework**
 - Specific to project, and include detailed commercial terms of transactions
 - Terms and conditions within the IA shall apply
 - Can be signed between non-government entities



Singapore Approach

High environmental integrity so that units transacted will be seen as **credible**

Delivering mitigation in global emission through cancelling emission reduction credits (2% OMGE)

Involvement of local stakeholders and support local adaptation (5% Share of Proceeds)

Leverage existing standards where possible

Bring onboard expertise in finance, technology, and capacity building



Case Study: South Africa

A carbon tax was introduced in South Africa in 2019

carbon offset allowance

Sectors eligible for offsetting included public transport, agriculture, forestry and other land use (AFOLU), and waste

Eligible carbon offset standards:
Clean Development Mechanism (CDM);
Verified Carbon Standard (VCS)
Gold Standard (GS)

Only offsets from within South Africa



Case Study: Colombia

A carbon tax was introduced in Colombia in 2016

upstream tax that applies to producers of fossil fuels for the domestic market and direct importers of fossil fuels

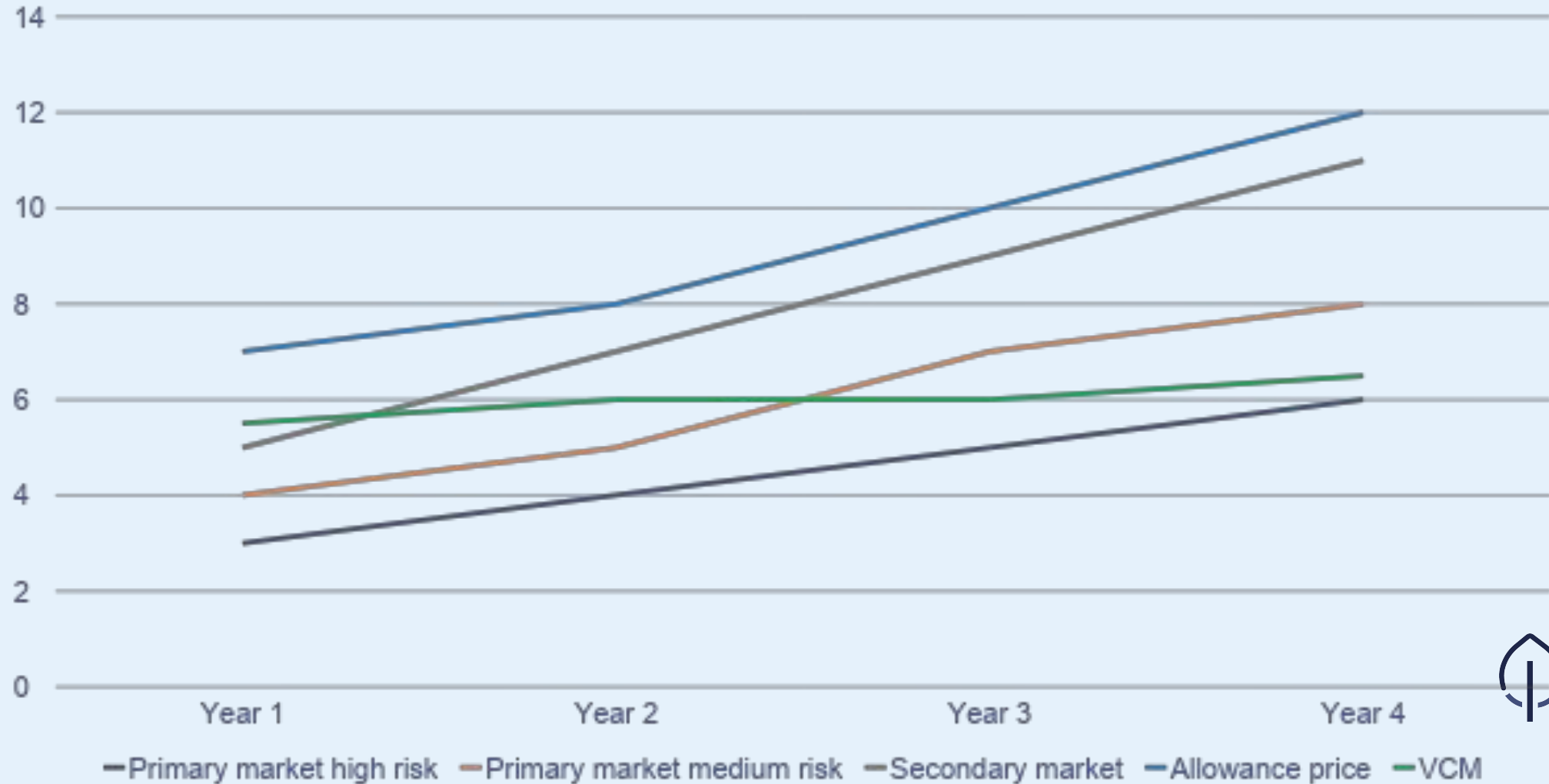
To reduce the tax burden, entities could claim waivers if they submitted carbon offset certificates

Criteria included accreditation by UNFCCC, Colombia's National Accreditation Body, or a member of the International Accreditation Forum

Since January 2023, the carbon tax has had a value of COP 20,500 pesos (USD 4.53) per ton of CO₂e



Carbon Credit vs. Allowance Price





Lessons Learned and Global Trends

Lessons Learned

Predicting future price levels is difficult

- Overlapping policies may distort expected price impacts on propensity to take further abatement measures.
- Integration with other policies needed.
- Indonesia: renewable energy policies, energy transition measures



Global Trends

1

There is a trend to regulate price levels through price floors and price ceilings in actioning.

2

Emissions trading schemes are being combined with carbon taxes.

3

More and more ETSs are turning to domestic offsets, especially in developing countries.



Lessons Learned in Carbon Pricing

- Carbon pricing systems will only be able to live up to their theoretical potential if they are **properly designed** and **implemented**.
- Flaws in carbon pricing systems have resulted in **perverse incentives** such as windfall profits for companies receiving free allocation, **negative policy interactions** such as the waterbed effect, or incidence of **criminal and abusive** market behavior (e.g., all experienced in the EU ETS).
- An ETS is a **long-term engagement**.



Q&A



NEUYEN

Breathing forth innovation