

A pair of hands is shown holding a small green seedling with soil, symbolizing environmental care and growth. The background is a soft-focus green, suggesting a natural setting. The text is overlaid on the image.

MARKET DESIGN FOR THE ENVIRONMENT

Estelle Cantillon and Aurélie Slechten

New Directions in Market Design Conference

Washington, May 2023

AGENDA

What ?

- Nature of problem differs across applications

Zoom on carbon cap-and-trade schemes

- Range of market design dimensions
- Dynamic considerations
- Carbon pricing in a globalized world

Voluntary carbon markets

- What should be traded and how ?

WHAT ARE WE TALKING ABOUT ?

Nature provides a number of essential services that support our lives and economies ... all subject to externalities.

Common pool resources

(non-excludable, subject to congestion)

Privately-owned natural resources

Ensuring sustainable
exploitation

Fisheries, water resources, hunting

Limiting the pollution that
impacts their quality

Pollutants at different scales (NO_x,
SO₂, CO₂, toxic effluents, ...)

Encouraging their
maintenance

Biodiversity, carbon sequestration,
other ecosystemic services

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Primary concern is total cap and efficiency

Cost effectiveness (abatement) and redistributive consequences

Cost effectiveness

Private or public governance

Public governance

Public and private governance

WHAT KIND OF MARKETS?

Ensuring sustainable exploitation

- Auctioning of drawing rights to those who value resource the most
- Allocation of tradable rights (ITQ)
- Water rights in Chile, Australia, ...
- Fish in NZ

Limiting the pollution that impacts their quality

- Allocation or assignment of tradable allowances
- Baseline and credit schemes
- SO₂: Clean Air Act, RECLAIM
- NO_x: Budget program, RECLAIM
- Carbon: CA, EU, China, Korea, ..

Encouraging their maintenance

- Project finance: Matching those seeking to compensate their emissions with those capturing carbon
- Payments for ecosystem services
- Existing VCMs
- Int'l crediting mechanisms (CDMs)

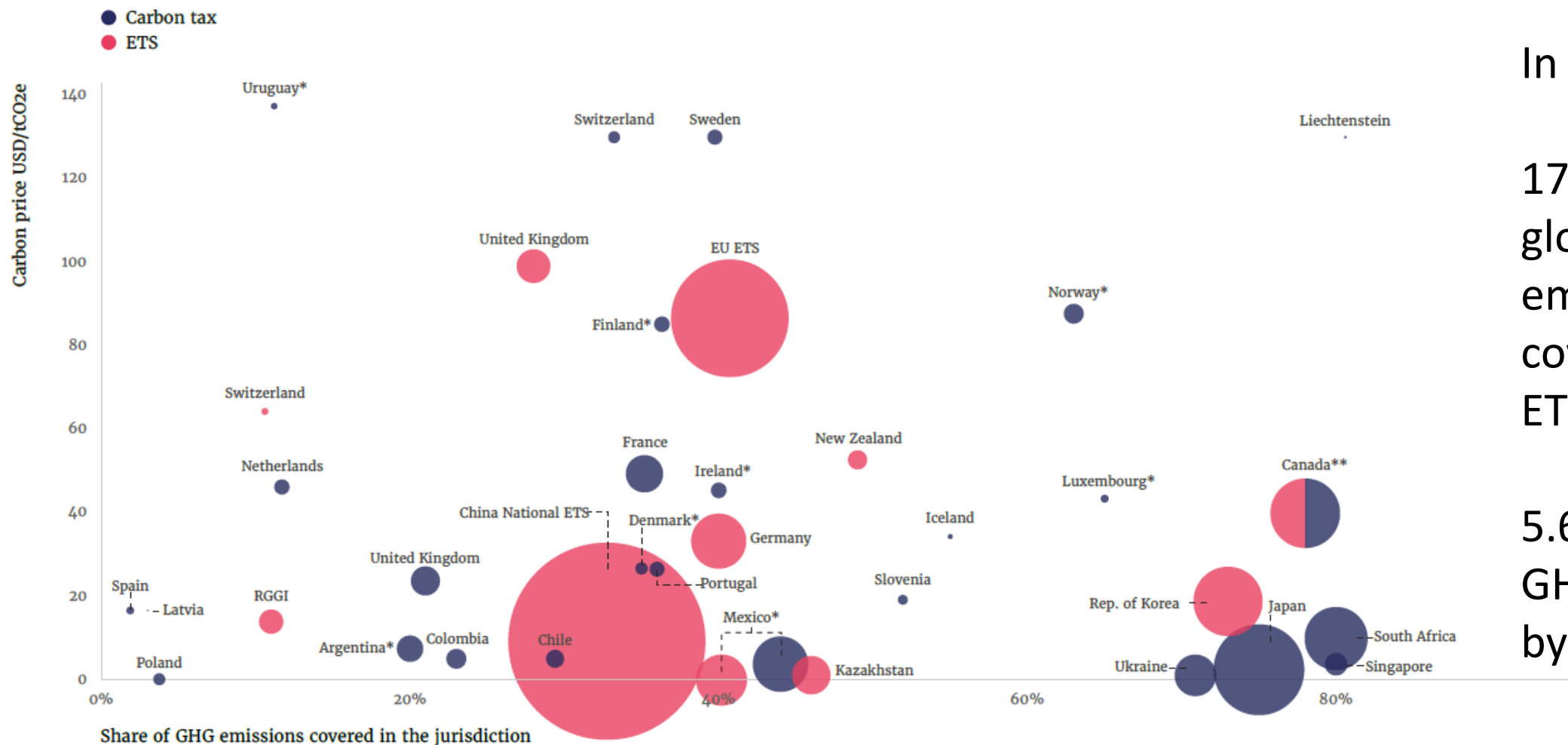


CARBON MARKETS

With an application to the EU
ETS

FIGURE 3

Absolute emissions coverage, share of emissions covered, and prices for CPIs across jurisdictions



In 2022:

17.55% of
global GHG
emissions
covered by an
ETS

5.66% of global
GHG covered
by a carbon tax

Source: World Bank (2022)

ETS: A RANGE OF MARKET DESIGN CONSIDERATIONS

- **Market scope:**
 - Sectors and Gas
 - Size limits
 - Jurisdiction (linkages)
 - Time (banking and borrowing)
- **Cap** including cap adjustment mechanisms, cost containment reserves, MSR
- **Allocation of allowances:** auctions vs free allocation, allocation criteria
- **Compliance:** frequency, penalties, use of offsets
- **Market organisation:** Who can trade? Where ? What? Limits on trading ? ▶▶

Prime policy
objective:
Cost efficiency



Informative and stable
price signal

Other considerations:

Geo dispersion (hot spots),
employment & industrial activity,
implementation costs,
accountability and governance

A BRIEF HISTORY OF THE EU ETS — MARKET DESIGN MATTERS



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Phase I 2005-07

Scope: EU, 5 industrial sectors

Cap: EC guidelines, nat'l choice

Nat'l registries

Allocation: grandfathered allowances

Bankability and limited borrowability within

Phase II 2008-2012

Scope: Norway, Iceland and Liechtenstein, CDM and JI

Allowances can be banked for the future

Hacking events, VAT fraud
Economic crisis creates a market glut

Phase III 2013-20

Scope: Integration of aviation, new gases added (N₂O and PFCs)

Cap: Top-down cap setting

Single EU registry

Default allocation is auctions. Free allocation based on benchmarking

Backloading of allowances
Market stability reserve (2019)

Market regulated under MiFID

Phase IV 2021-30

Scope: Phase-in of maritime transport (2024), separate ETS for buildings & road transport (2007)

Cap: Accelerated decrease in cap

Phase-out of free allowances (phase-in of CBAM starting in 2026)

Fit-for-55 reforms (2023)

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WHAT DRIVES PRICES ?

Market fundamentals:

- Abatement costs (technology)
- BAU emissions: economic activity, overlapping policies
- Cap, timing of allocation and constraints on borrowing and banking

Eqm predictions without further frictions predict **relatively stable prices** (martingale property, shocks are spread out)

- ESSENTIAL to drive LT investment !

IS THE EU ETS DELIVERING THE RIGHT PRICE SIGNAL ?

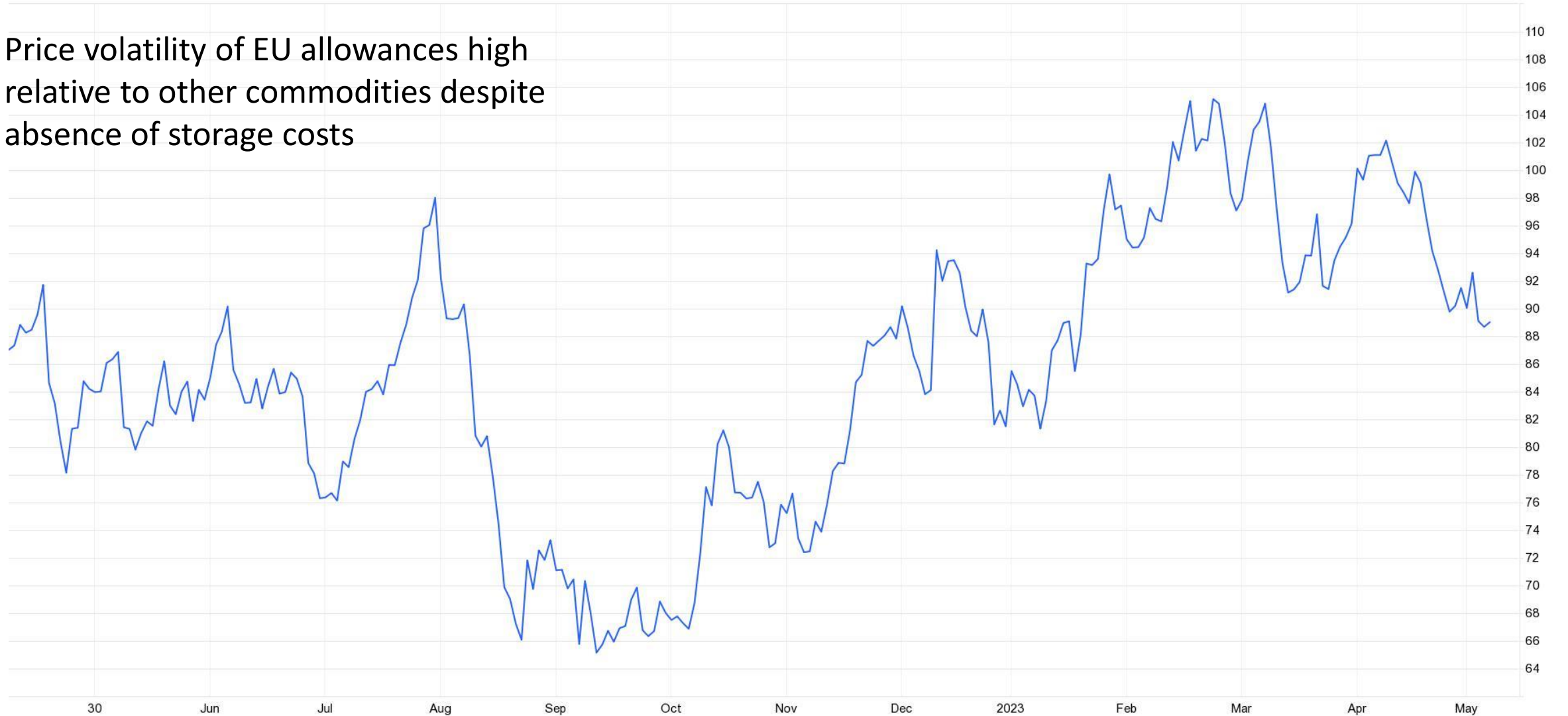


source: tradingeconomics.com

EXCESS VOLATILITY ?

EU Carbon Permits

Price volatility of EU allowances high relative to other commodities despite absence of storage costs



WHY THIS EXCESS VOLATILITY ? MARKET DESIGN IMPLICATIONS

Risk management practices and/or short-sightedness of compliance firms (Quemin and Trotignon, 2021)	Support long-term markets for hedging ? Impact on cap adjustment?
Overlapping policies lead to large shocks in BAU emissions (SO2, Borenstein et al., 2019)	How should the cap be adjusted ?
Financialisation of the ETS (Cheng and Xiong, 2014)	Who should participate ?
Thin markets / compliance cycle	Lower the frequency of the market ? Staggered compliance cycles ?
Market fragmentation and opacity (Cantillon and Slechten, 2023)	Centralize trading ? Market makers ?

TWO TYPE OF PRICE STABILISATION MECHANISMS

Price collars (hybrid mechanism):

- Lose either quantity target or cost efficiency (due to rationing)
- Used in California, NZ

Dynamic cap adjustments:

- Can trigger feedback loops that disrupt the normal operation of the market in the presence of tightening caps (Chaton et al. 2018, Bruninx et al, 2020)
- Market stability reserve in the EU: allowance removal when allowances in circulation above a threshold, allowance injection when allowances in circulation below a threshold

EMISSION TRADING IN A GLOBALIZED WORLD

- Carbon is a global pollutant
- Linking decreases costs
 - Requires sufficiently compatible ambitions
 - California + Québec, EU + Switzerland
- In absence of linking, concerns about carbon leakage
 - Protective measures (free allowances)
 - Evidence is that have reduced incentives for abatement
 - Border adjustment mechanisms
 - Key challenges are traceability and avoiding regulatory arbitrage



VOLUNTARY MARKETS

VOLUNTARY MARKETS 101

Standards

Gold Standard
Climate Security & Sustainable Development

 **Verified Carbon
Standard**

Third-
party
certifiers

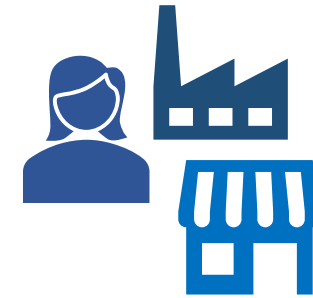
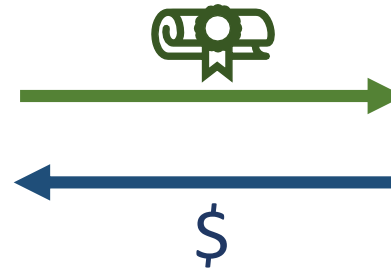
Registries

Market
platforms and
intermediaries

- **Additionality**
- **Permanence**
- **Baseline accuracy**
(avoiding over-crediting)
- **Traceability**
(avoidance of double-counting)



Project that reduces
carbon emissions
relative to BAU or
removes carbon



Individual or company
eager to compensate
their emissions

HUGE POTENTIAL BUT MARKET PLAGUED BY LOW TRUST

Thomson Reuters Foundation News

Can new global guidance for carbon market stop greenwashing?

Efforts are underway to boost the quality of carbon credits by setting a higher threshold and make it easier for corporations to know what...

21 Jul 2022



The Guardian

Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows

Investigation into Verra carbon standard finds most are 'phantom credits' and may worsen global heating.

18 Jan 2023



Eco-Business.com

APAC regulators signal closer look into carbon markets amid Verra controversy

Governments and bourses across the Asia Pacific dealing in voluntary carbon markets say they are studying claims that Verra,...

15 Feb 2023



Mongabay

Carbon credits from award-winning Kenyan offset suspended by Verra

The carbon offset certifier Verra told Mongabay it had initiated a "quality control review" of the Northern Kenya Grassland Carbon Project,...

1 month ago



Grantham Research Institute
on Climate Change
and the Environment



Centre for
Climate Change
Economics and Policy

Do carbon offsets offset carbon?

Raphael Calel, Jonathan Colmer, Antoine Dechezleprêtre and Matthieu Glachant

« At least 52% of approved carbon offsets were allocated to projects that would very likely have been built anyway. In addition to wasting scarce resources, we estimate that the sale of these offsets to regulated polluters has substantially increased global carbon dioxide emissions»

Cooking the books: Pervasive over-crediting from cookstoves offset methodologies

Annelise Gill-Wiehl¹ [ORCID](#) [Email](#)

Daniel Kammen¹ [ORCID](#)

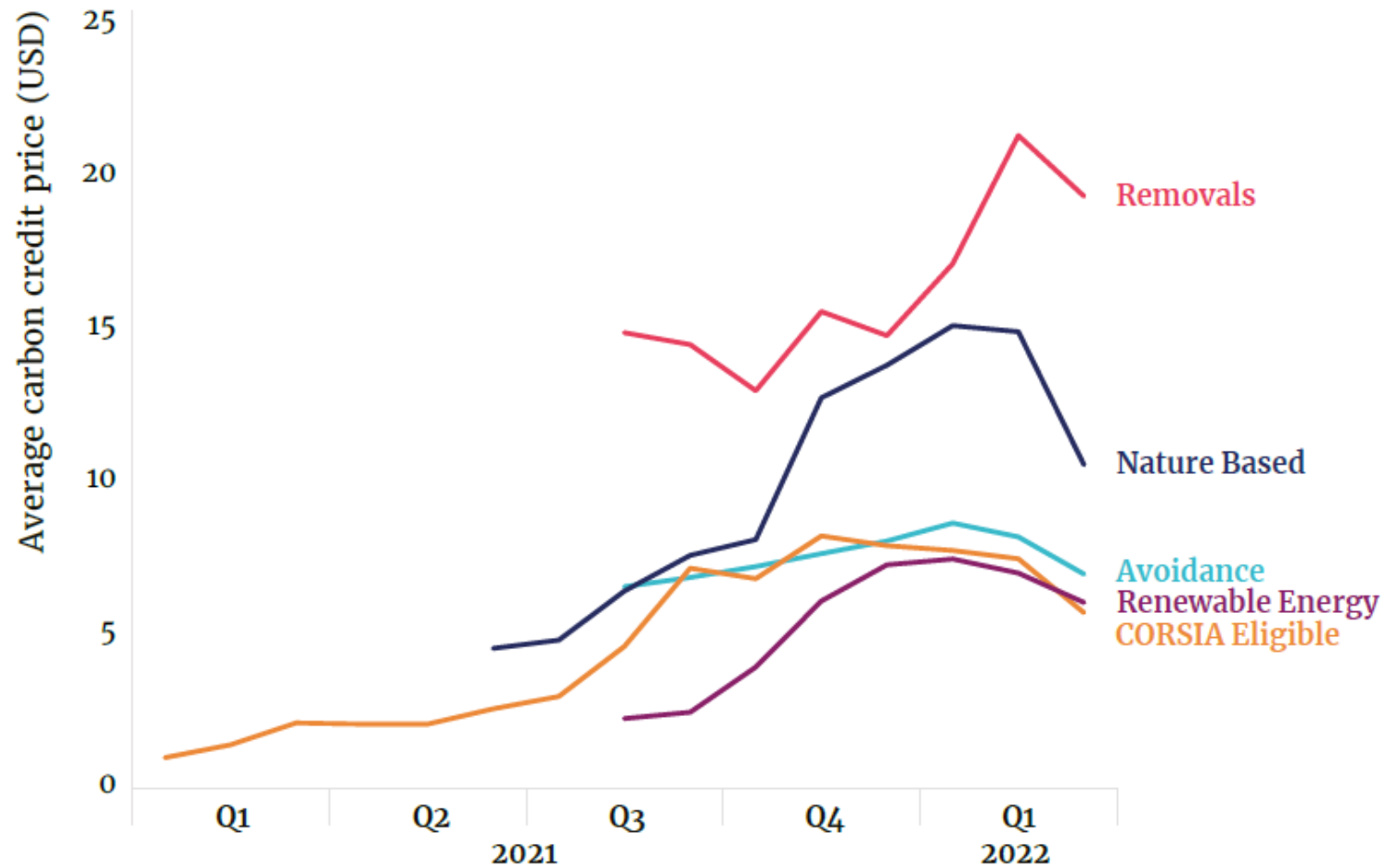
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FRAGMENTATION OF VOLUNTARY MARKET

Prices of standardized carbon credit contracts^{xliv}



^{xliv} Source: Based on data from S&P Global Platts, 2022 by S&P Global Inc.

Source: World Bank, 2022



RECENT DEVELOPMENTS AND OPEN MARKET DESIGN QUESTIONS

Recent developments

- **Technological advances** (satellite imagery, block chain) reducing the costs of monitoring and control (traceability)
- Industry-wide efforts to revamp and harmonize **standards**
- Demand for carbon offsets will not decrease any time soon (Beyond-Value-Chain-Mitigation + Biodiversity)

Open market design questions

- What's the **primary objective** of a market here ?
 - Project finance in jurisdictions without a carbon price?
 - Payment for ecosystem services ?
- Beyond different accounting rules, should the **design** be the same for all types of projects ?
- Should the market be **decentralized** ?

Trust

CONCLUDING COMMENTS

- Wide-open area for research, huge societal impact
- Fundamental questions about the nature of product traded, behavior, the proper governance of these markets
- Market design questions at the macro and micro-structure levels

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BIG INCREASE IN VALUE OF GLOBAL VOLUNTARY CARBON MARKETS

Figure 1. Voluntary Carbon Market Size by Value of Traded Carbon Credits, pre-2005 to 31 Dec. 2021



Volume and price effect: Average price in 2021 around 4 USD/ton versus 2.52 USD/ton in 2020

Source: Ecosystem Marketplace, a Forest Trends Initiative.



SHOULD REGULATORS WORRY ABOUT HOW ALLOWANCES ARE TRADED?

The European Commission took a laid-back view on this question, which contrasted with the US approach under the Clean Air Act:

*“The legal framework of the ETS **does not lay down how and where trading in allowances should take place.** Companies and other participants in the market may trade directly with each other or buy and sell via a broker, exchange or any other type of market intermediary that may spring up to take advantage of a new market of significant size. **The price of allowances will be determined by supply and demand as in any other market**”*

European Commission (2004)

CARBON MARKETS AS FINANCIAL MARKETS — CHOICES AROUND THE WORLD

	California ETS (2012)	Korea ETS (2015)	China ETS (2021)	EU ETS (2005)
Coverage	500+ entities, 74% of GHG	680+ entities, 74% of GHG	2,100+ entities, 40% of GHG	10,000+ entities, 39% of GHG
Status of allowances	Limited tradable authorisations	Not defined	Physical asset	Financial instrument
Primary market	Quarterly auctions	Free allocations + some auctions	Free allocations	Daily auctions
Secondary market	OTC	OTC and KRX	Shanghai EEE	OTC + EEX, ICE and Nasdaq
Derivative market	ICE and CME	-	-	EEX, ICE and Nasdaq
Participation in physical market	Compliance traders, holders of offset projects and firms offering clearing services	Compliance traders, authorized market makers, brokers (position limit)	Only compliance entities	Compliance traders + others (investors, brokers, other service providers)



CARBON MARKETS AS FINANCIAL MARKETS — CURRENT POLICY ISSUES

EU Carbon Permits



Carbon Pulse

Brussels commissions study into how emitters trade, barriers to participation in EU ETS

Published 16:10 on September 5, 2022 / Last updated at 16:10 on September 5, 2022 / Bavardage, EMEA, EU ETS / No Comments

The European Commission is analysing how emitters partake in the EU ETS in order to better understand their motivations for using certain trading channels and to identify any barriers to participation.

[Read More](#)

 The Corner

There's A Massive Bubble In The Price Of Carbon – And Yet It ...

There's A Massive Bubble In The Price Of Carbon – And Yet It Won't Bring Down Emissions Any Faster. TOPICS:carbon emissionsCO2 prices.

05 Feb 2022

 Bloomberg.com

Key EU Lawmaker Proposes New Way to Tame Carbon Price ...

Liese, a German member of the European Parliament, is seeking to strengthen a mechanism preventing excessive price growth as part of a...

16 Feb 2022

 Bloomberg.com

EU Lawmakers Seek Carbon Market Restrictions to Curb ...

EU Lawmakers Seek CO2 Market Restrictions to Cut Speculation ... The reform of the EU ETS, proposed by the Commission in July,...

11 May 2022

 EURACTIV.com

Restricting market access will damage the EU ETS

The intention behind this proposal was to curb speculation blamed for a steep carbon price increase observed in the last 16 months.

03 Jun 2022

