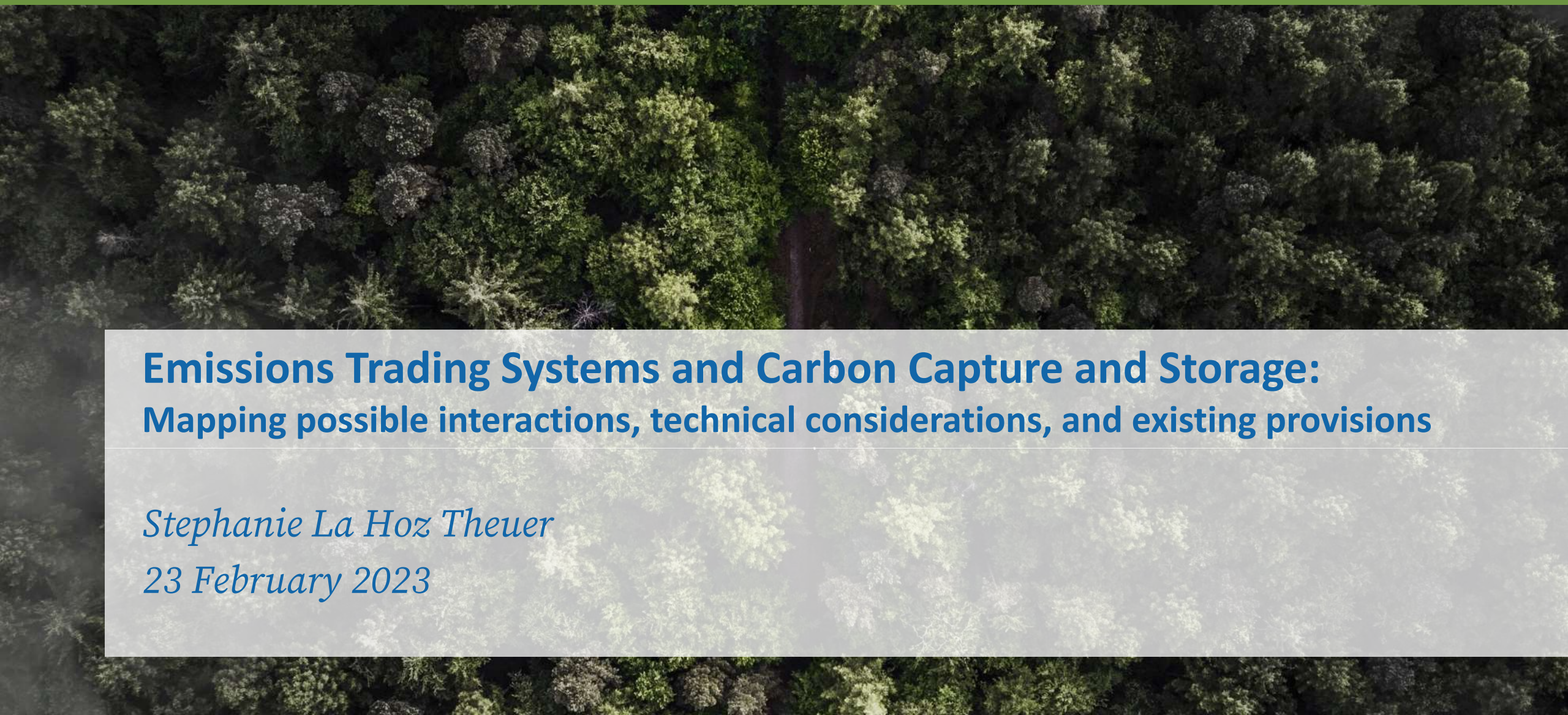
International Carbon Action Partnership



Emissions Trading Systems and Carbon Capture and Storage:
Mapping possible interactions, technical considerations, and existing provisions

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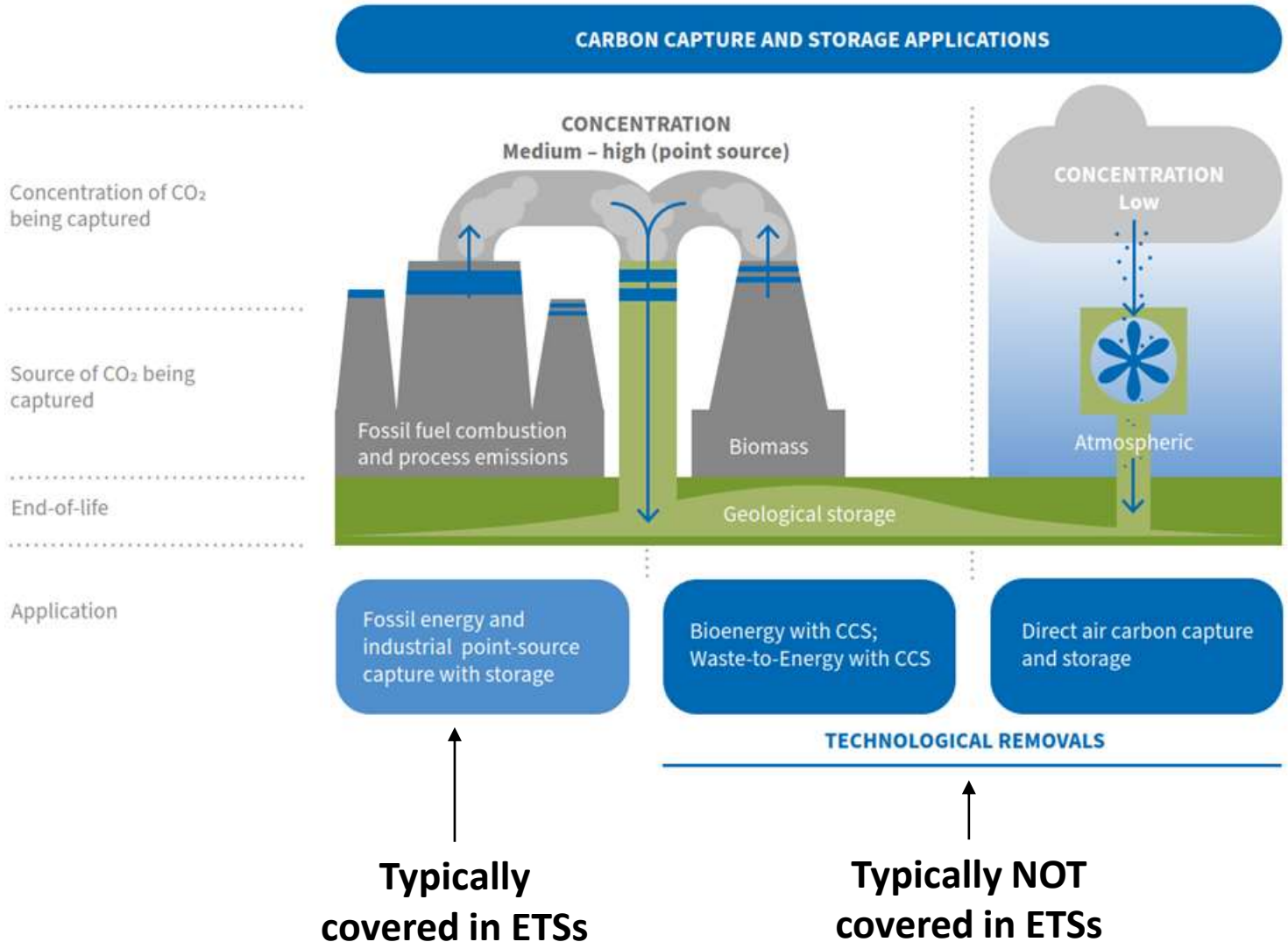
Definitions

Carbon Capture and Storage (CCS): technologies that capture and geologically store CO2.

Note: MOST CCS applications do NOT lead to "removals"!

Carbon Dioxide Removal (CDR): anthropogenic activities that remove CO2 from the atmosphere and durably store it in geological, terrestrial, or ocean reservoirs, or in products

CCU: same sources as in CCS, but CO2 is used in a product



CCS applications matter for ETSs

Sectoral overlap: CCS shows the most promise in energy and industrial sectors, which are often covered by ETSs.

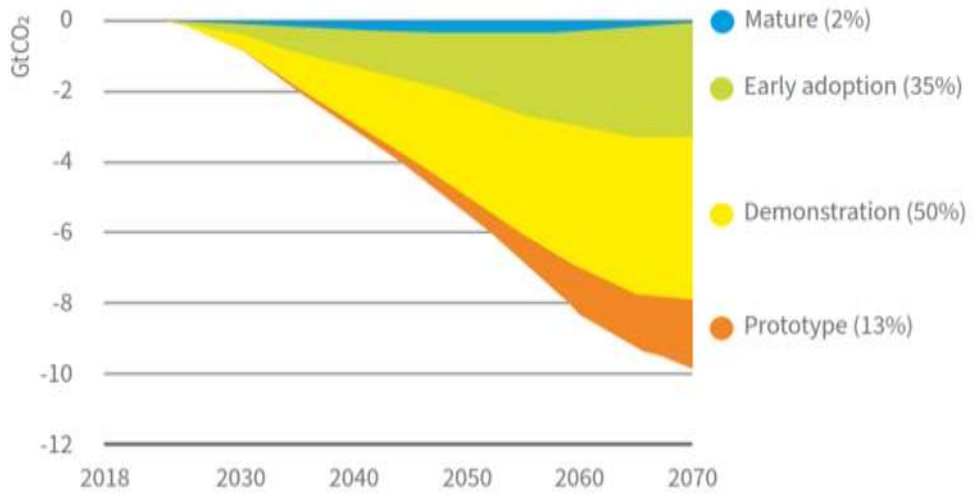
~13% of energy sector emissions reductions by 2050

36% of cement sector emission reductions by 2050

Most jurisdictions that have ETSs in force and under development plan to make use of CCS applications

However:

World CO2 emissions reductions from CCS and CCU by technology readiness

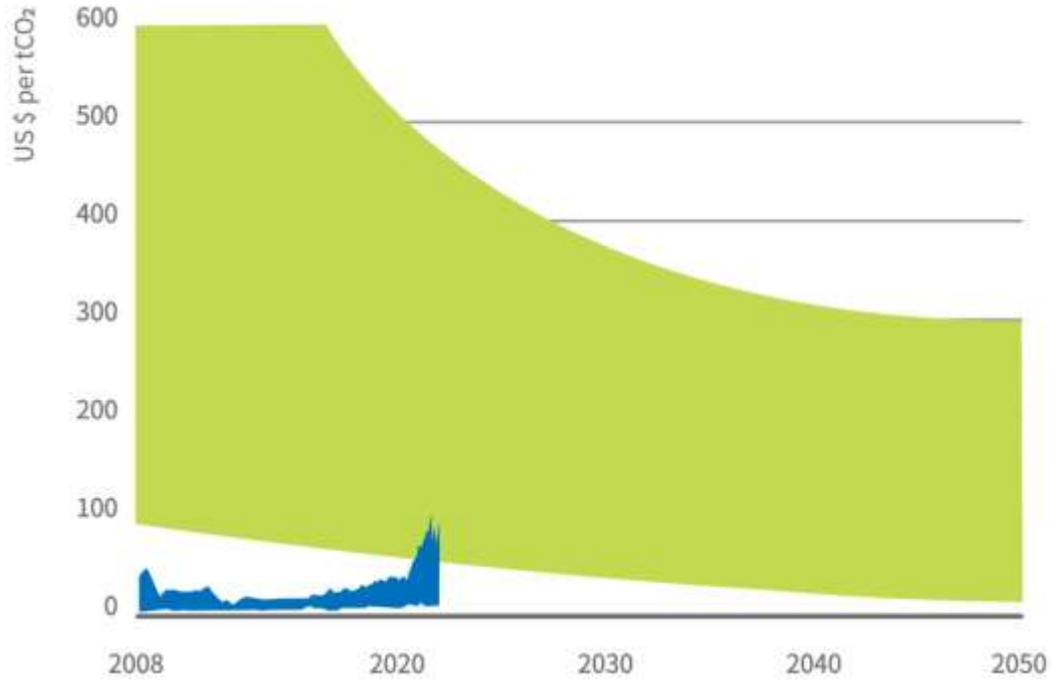


Source: adapted from IEA (2020)

ETSs matter for CCS applications

In short: a price signal for CO2

However:



Range of observed ETS allowance prices
Includes prices from the ETSs in California, China, European Union, Germany, Korea, New Zealand, Nova Scotia, Québec, RGGI, and the UK.

Range of values observed in studies estimating / forecasting cost of CO_2 capture.
Range of values for CO_2 capture (that is, excluding transportation and storage costs). Broadly speaking, direct air capture costs determine the upper end of the range, while fossil energy and industrial point-source capture costs determine the lower end.

- **High price differentials**
- **Most ETS lack a framework to reward emission reductions from CCS**
- **Most CCS applications still in R&D**

A combination of policies will be necessary to support CCS development and deployment

Broader considerations and concerns

Image credit: DALL-E

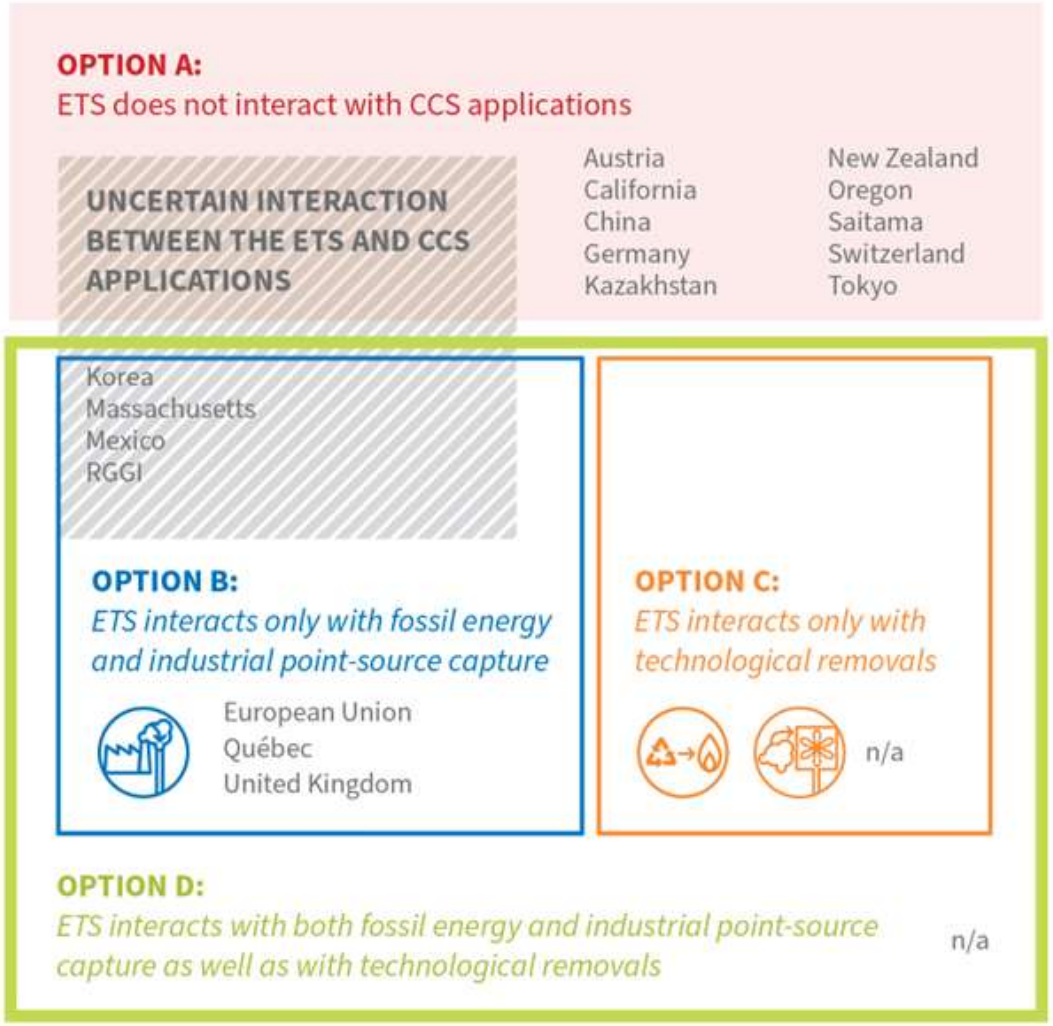
- Concerns over legitimization of business as usual (notably **fossil fuel**) activities
- **Underperformance** of the technology so far & doubts over ability to deliver reductions and removals at scale
- Concerns over CO2 **leakage** from storage sites
- Concerns over **social and environmental impacts** of large-scale adoption (Eg BECCS – land, biomass, water, food)

Policymakers must **weigh these aspects** when considering the role of CCS in decarbonization pathways, taking into account the **importance of public acceptance** in achieving mitigation goals.

ETS and CCS: to interact or not to interact (and with what)

Option A: No interaction	• No reduction in compliance obligation through CCS; no tech removals • No additional flexibility for ETS entities; No direct incentives to CCS through ETS; Risk of missed abatement opportunities.
Option B: Fossil energy and industrial point source capture only	• E.g. Regulated entities reduce compliance obligations through CCS • Possibly reduced compliance costs; Provides economic incentive to CCS applications that reduce CO2 emissions
Option C: Technological removals only	• E.g. upstream ETS with provisions for offsets from technological removals. • Enables the cap to be zero or negative in the long run; Can improve market functioning as the cap approaches zero; Price/cost differentials are a challenge; Risk of high-carbon lock-in
Option D: All	• Broader incentive to CCS applications • More flexibility within the system; Risk of high-carbon lock-in
Uncertain interaction	• Systems may not fall clearly within any of the categories above, e.g. where there is no explicit regulation but MRV regulation could in principle reflect CO2 capture in regulated entities • Regulatory uncertainty significantly weakens the strength of the incentive

ETS and CCS: Current interactions



- **Most jurisdictions have no framework to reflect CO2 capture in compliance obligations**
- **California has some CCS-related provisions, but still falls in option A**
- **New Zealand reflects removals from forestry and has some CCU provisions; CCS provisions are not in force**
- **EU ETS and UK ETS have the most complete set of CCS-related regulations**
- **To our knowledge, only Québec has facilities that are reducing ETS compliance obligations through CCS**

LOTS of technical considerations (full details in the paper!)

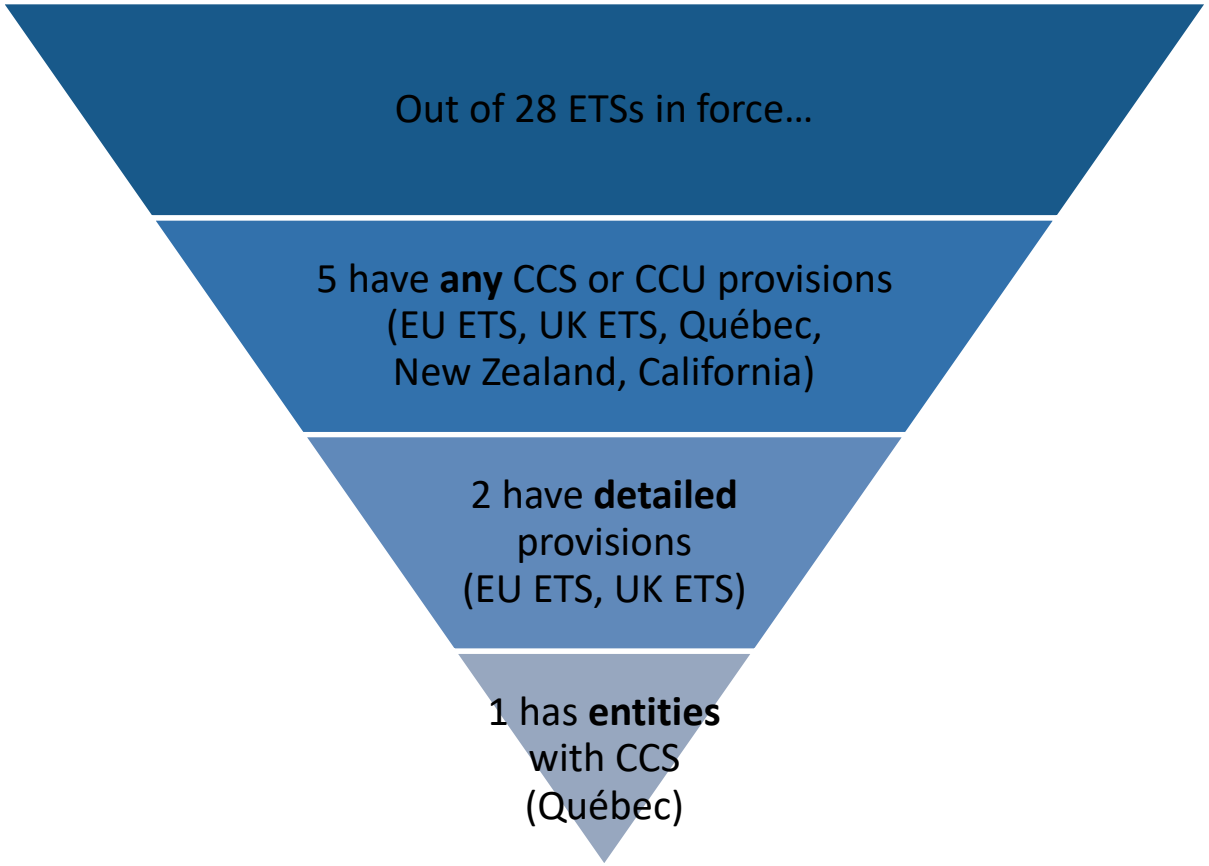
- **ETS sectoral scope and mechanics of the CCS interaction**: ETSs can interact with CCS both inside and outside the ETS scope. E.g. simply reducing compliance obligations and/or awarding units (allowances or credits).
- **Cap-setting**: if units are allocated to capturing activities, what is the relationship with the cap?
- **Free allocation**: can be impacted by reductions in reported emissions from entities capturing CO2.
- **Defining renewable biomass**: critical to establish environmental effect of CO2 captured from biomass combustion (emission reduction or removal?).
- **CO2 leaks out of storage**: should storage facilities be inside or outside the scope of the ETS? Relates to MRV and liability provisions. Complications in case of transboundary storage.
- **Transboundary storage**: some ETSs can reflect storage outside their borders, others cannot.
- **MRV**: interactions between ETS and IPCC rules.

… etc…

- **Also -- CCU**: when is CCU an emission reduction? When is it a removal? What are the interfaces with ETSs?
- **Also -- Description of CCS and CCU regulations in the five relevant systems**

Conclusions

- We are only in the beginning.
- Much remains to be understood, and regulatory frameworks must accommodate for fast pace of innovation and technological developments.
- Growing CCS pipeline will increase pressure on policymaking.
- Watch this space!



Thank you very much!

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