



Danish Ministry of Climate,  
Energy and Utilities



# **Seminar on markets for voluntary carbon credits in CCS projects**

## **November 29<sup>th</sup>, 2023**

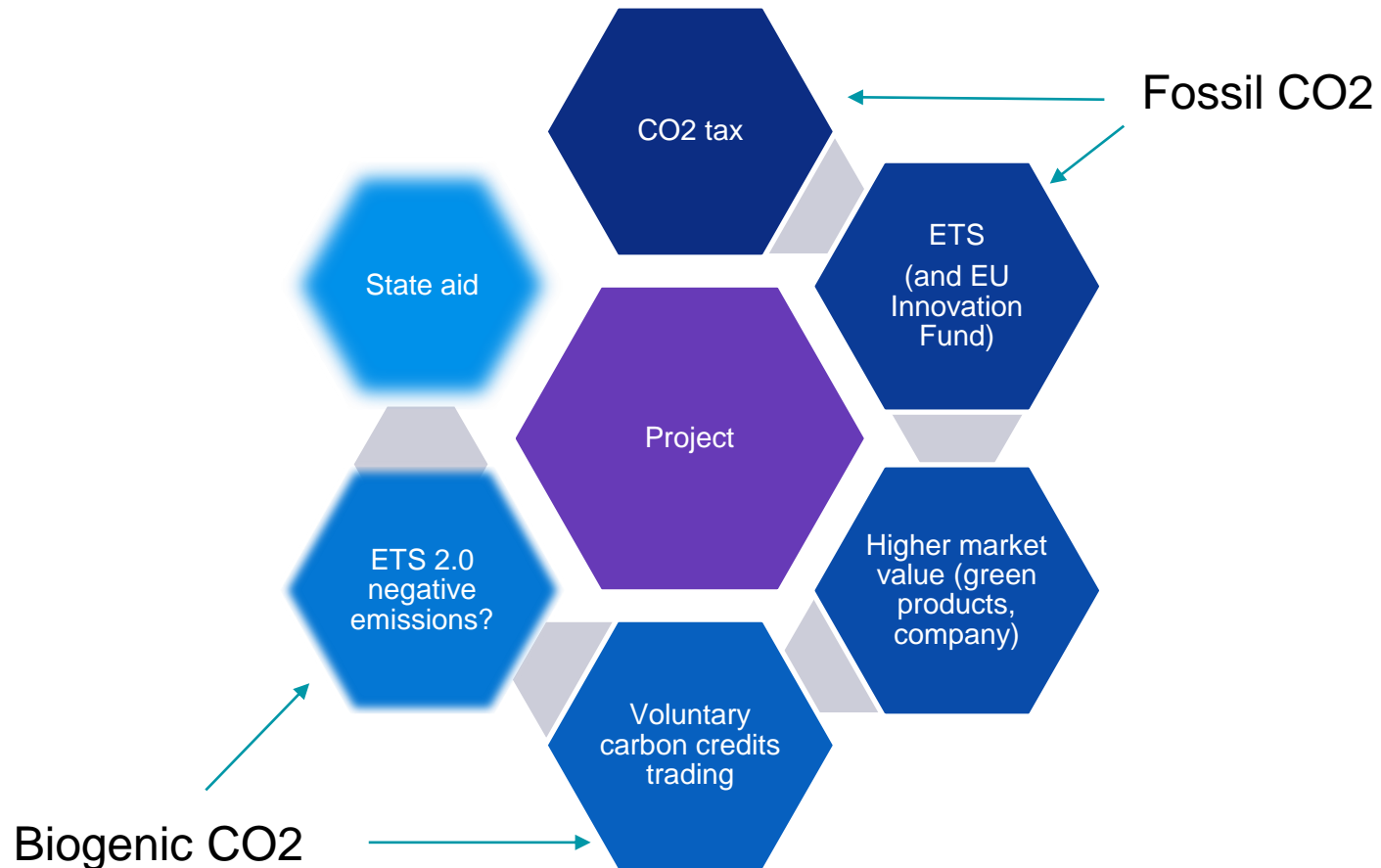


Danish Ministry of Climate,  
Energy and Utilities

# Welcome

Anders Hoffmann, Deputy Permanent Secretary

# Market-based development of CCS



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# SEMINAR PROGRAM

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Welcome. *Anders Hoffmann, Ministry of Climate, Energy and Utilities*

Presentation of program. *Finn Lauritzen, Axcelfuture, moderator*

Funding schemes and certificates. EU's certification platform for carbon removals and emission accounting principles. *Morten Boje Blarke, Ministry of Climate, Energy and Utilities*

Ørsted's experience. How can we proceed? *Lars Bruun Sørensen, head of CCS, Ørsted*

The global view. *Rafael Broze, Microsoft.*

Market makers' point of view. *Katja Grothe-Eberhardt and Simon Bager, Klimate; Kaja Voss, Inherit and Julio Friedmann, Carbon Direct.*

General discussion



# Voluntary carbon credits

## State aid and credits, certification and additionality

Morten Boje Blarke, Chief Advisor

# Summary

- Denmark's state aid regimes supports the market for voluntary carbon credits
- EU regulation underway for centralized issuing and registry of carbon credits trading in EU
- UNFCCC mechanism under development for centralized issuing and registry of carbon credits exchange globally.
- Emissions accounting is unequivocally territorial until UNFCCC mechanism is in place

# Denmark's CCS subsidy schemes/auctions

Est. 3.2  
MTA in  
2030

## CC(U)S

- 1 call (completed in May 2023 with Ørsted's BECCS project awarded 20-year contract)
- 0.43 MTA in 2030
- Scope: combustion-based

## NECCS

- 1 call (announced)
- Est. 0.5 MTA in 2030
- 15-year contracts
- Scope: CDR ie. BECCS, BioCCS (biogas), DACCS

## CCS

- 2 calls (expected mid-2024, mid-2025)
- Est. 2.3 MTA in 2030
- 15-year contracts
- Scope: All CCS

# Financial conditions for voluntary carbon credits (VCC)

## CC(U)S

- Revenue from VCC included as income in bid -> competitive bid.
- Any subsequent revenue from VCC is regulated 90 % towards reducing subsidies to avoid overcompensation.

## NECCS

- Revenue from VCC included as income in bid -> competitive bid.
- Any subsequent revenue from VCC is not regulated.

## CCS

- TBD



# EU certification framework for carbon removals

Proposal ready for negotiations with EP  
Implementation 2025?

“Based on the QU.A.L.ITY criteria, the Commission, supported by an Expert Group, will develop tailored certification methodologies for the different types of carbon removal activities.”



## Quantification

- Baseline – activity-specific (or standard)

## Additionality

- Beyond operator’s statutory requirements
- Due to the incentive effect of the income from certification

# COP 28 – the work continues on Art. 6.2, 6.4 (Paris)

Art. 6: Countries may cooperate in fulfilling NDCs (*Nationally Determined Contributions*)

Art. 6.2: Countries may bilaterally cooperate and “trade” *Internationally Transferred Mitigation Outcomes* (ITMOs).

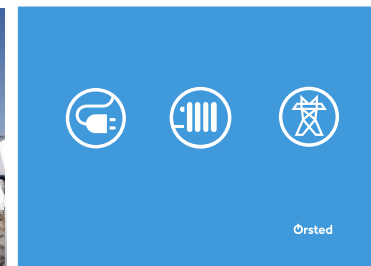
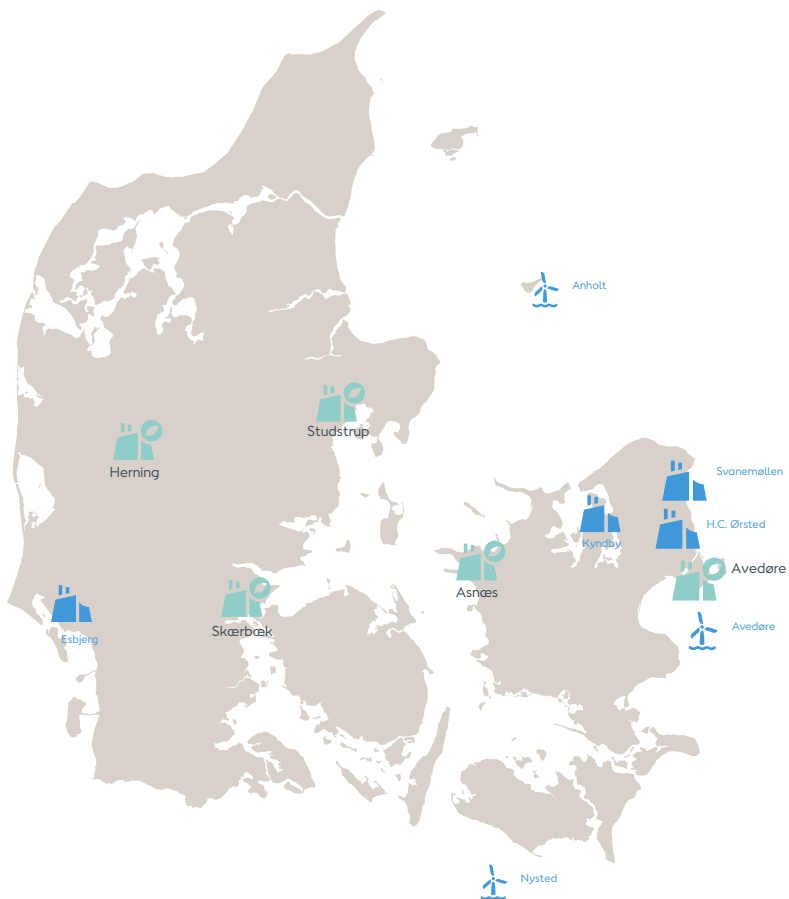
Art. 6.4: “Baseline-and-crediting mechanism” to be certified and controlled centrally by UNFCCC. Transition from CDM. Open to countries, companies, individuals.

# The market for CO<sub>2</sub> credits: How can we proceed?

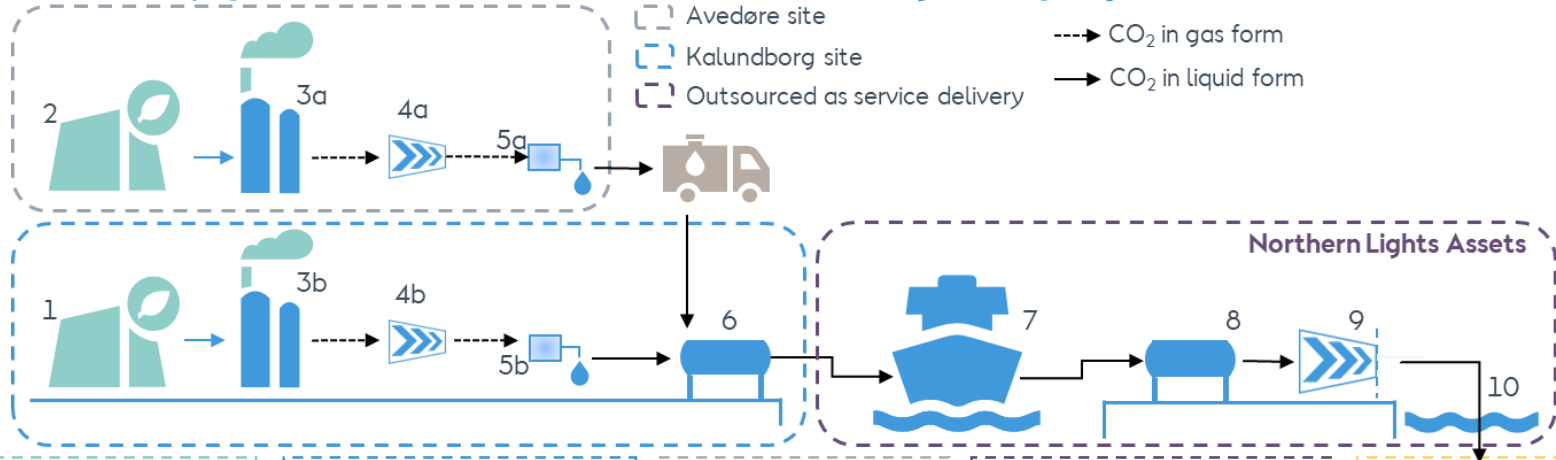
Lars Bruun Sørensen, Head of CCx



# Introduction to Ørsted Bioenergy and our coming CCUS activities



# Ørsted's key partners in the Ørsted Kalundborg Hub project



Description

The solution is based on a concept with the two point sources:

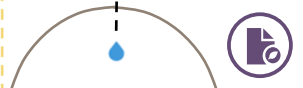
- (1) Asnæsværket unit 6 (ASV6)
- (2) Avedørværket, unit 55 Straw Boiler

CO<sub>2</sub> is captured from five carbon capture modules (3) before it is liquefied by compression and cooling (4). The liquid CO<sub>2</sub> streams are joined in the shared intermediate storage and shipping terminal, awaiting transport (5)

Transportation of captured CO<sub>2</sub> from AVV to ASV via truck (6)  
At ASV terminal the CO<sub>2</sub> is loaded to intermediate storage tanks (7)

Transport is performed by ship (8), at a rate consistent to the operation of the two CC units. Liquid CO<sub>2</sub> is delivered to onshore intermediate storage terminal (9) ahead of transfer and injection into offshore permanent geological reservoir (10) 2,600 m

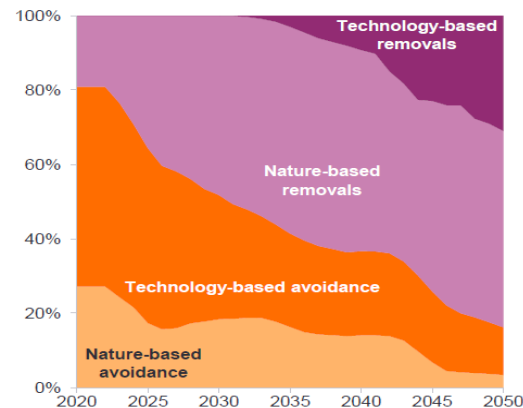
Carbon removal certificates (11) from BECCS at ASV and AVV can be sold through bilateral offtake agreements and commodity trading platforms



# The VCM is an emerging source of financing for BECCS projects

- Carbon credits exist in four fundamental categories, depending on two parameters:
  - Method: Natural or Engineered
  - Type: Avoided Emissions or Carbon Removals
- Depending on the category, Carbon Credits can have different advantages and disadvantages
  - Natural credit production is difficult to measure and document, but may benefit local environments and biodiversity
  - Engineered credit production can easily be measured, are highly documentable, which may provide for high transparency, but relies on the erection of industrial facilities
  - Avoided emissions are credits created based upon the avoidance of expected emissions, meaning that the achieved climate impact can be highly uncertain
  - Carbon Removals are net negative emissions created through the technical or natural absorption of CO<sub>2</sub> from the atmosphere
- Due to the combination of high measurability, transparency and their net negative climate impact, Engineered Carbon Removals are considered best-in-class in the market.

Carbon Credit types	Avoided Emissions	Carbon Removals
<b>Natural</b>	Avoided deforestation	Forestry
<b>Engineered</b>	Substituting fossil technology	BECCS, DAC



# The logic of GHG accounting

Countries and companies emissions are governed by separate regimes and accounted in separate systems

**1** Ørsted capture and store **1 tCO<sub>2</sub>** in Denmark. Any emission activity within Danish territory, will appear in the Danish emission inventories

**2** Ørsted has reduced its emissions with **-1 tCO<sub>2</sub>** and can count it in its Voluntary reporting<sup>1</sup>.

**Companies**

Ørsted's project reduces Danish emissions with **-1 tCO<sub>2</sub>** which will appear in the **Host country (DK)** inventories.

**Countries**

**3** Ørsted sells the **-1 tCO<sub>2</sub>** removal claim to **Microsoft** for use towards its voluntary reporting. Ørsted no longer claims the **-1 tCO<sub>2</sub>**.

There is **no transfer** between countries. The **-1 tCO<sub>2</sub>** will **only count once** towards **global emissions** through the Danish inventories.

1.) Such as Science Based Target initiative (SBTi), Green House Gas Protocol etc.

# Ørsted seeks certification to ensure the value of our carbon removals

Ørsted's industry-leading and comprehensive certification process will lower future transaction costs of BECCS credits while withholding product value



## Access to Markets

The certification creates a product which can be the basis for offtake agreement and to ease sales



## Trust in Our Removals

By working with recognized certification schemes, customers can trust the climate integrity of our carbon removals



## Ensure Price Premium

When being certified by an ambitious and technology specific standard you can guarantee the qualities of your specific product and reflect it in the price

*Certification will usually cover the entire value chain, which includes the collaboration with our partners in the Ørsted Kalundborg Hub*



# Private funding is needed to realise BECCS projects

Carbon removal certificates will help to ensure level playing between fossil CCS and BECCS and lower public subsidy cost

Private funding has been key aspect of the business case in the Ørsted Kalundborg Hub.

Certificates has enabled competitive business case and more efficient use of public funds by allowing more CO<sub>2</sub> captured for less amount of tax-payers money.

Certified carbon removals might be able to drive business cases in the future.

Important to maintain this source of finance both in current projects and in coming tender, to allow for cost efficient carbon capture.



## Tender design:

Important to maintain the possibility to include private finance in bid for CCS tenders.



## Caution on legal requirements for CCS:

Legal requirements to capture CO<sub>2</sub> might challenge regulatory additionality of CCS projects.



## CCS as principal activities:

If municipal companies can make CCS in their main business as their principal activity it might be considered a necessary, expense and hence not additional.



# A global view on carbon removal deployment

29 November, 2023

## · Agenda:

- Primer: Microsoft's carbon ambitions and criteria for high-quality removal
- Design Considerations for Early CDR Deployment
- Implications for Transparent and Accessible CDR Markets

# Microsoft's CDR ambitions and criteria



# Goal and Main CDR Pathways

We seek >5 megatonnes annually from 2030 across the following categories

## High (> 1000 yrs of removal)

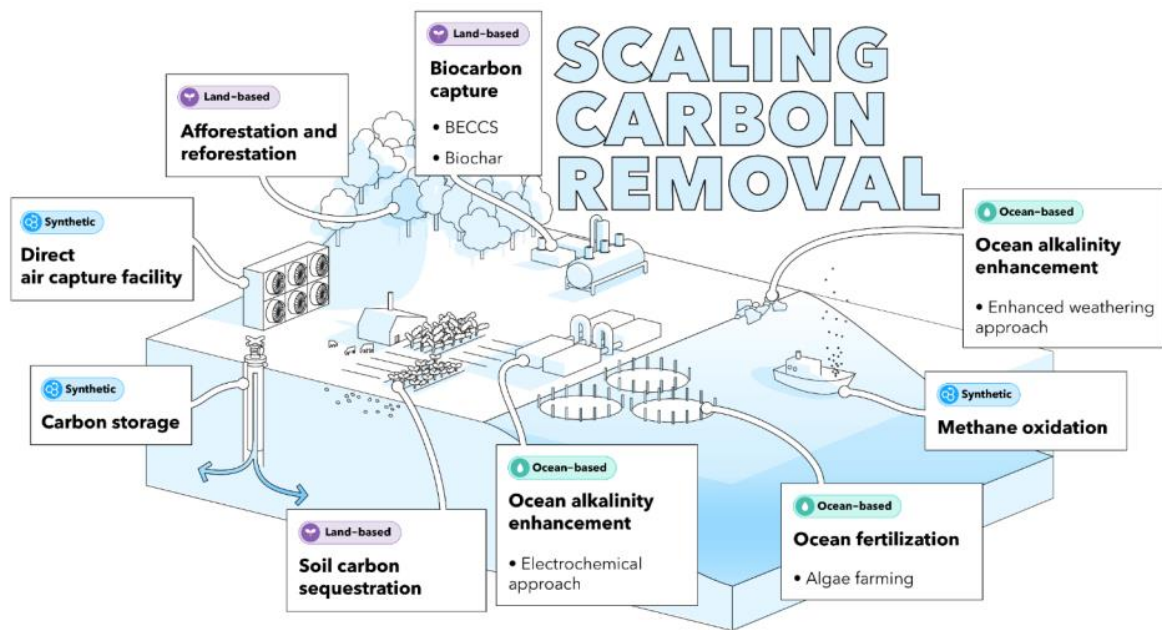
- Direct air capture
- Bioenergy carbon capture and storage
- Mineralization (e.g., rock weathering)

## Medium (100-1,000 yrs of removal)

- Biochar
- Biomass sinking (kelp)

## Low (<100 yrs of removal)

- Afforestation/reforestation
- Soil carbon sequestration
- Improved forest management
- Blue carbon (e.g., mangroves)



# High-Quality Criteria

Microsoft uses the criteria below to determine which projects are suitable purchases of carbon removal

<b>Additionality and baselines</b>	Removals are additional if they would not have occurred without carbon finance, measured against a counterfactual baseline	<b>Environmental justice</b>	All individuals should be equitably protected from environmental risk, and equitably empowered to participate in the environmental decision-making processes that affect them.
<b>Carbon accounting method</b>	Use of repeatable and verifiable methods to ensure that all greenhouse gases associated with a project are accounted for in a transparent manner, including using cradle-to-grave life cycle assessments (LCAs)	<b>Harms and benefits</b>	Avoiding negative impacts to economic, social, and environmental systems (aka "do no harm")  Ideal projects pursue co-benefits by advancing sustainable livelihoods and environmental justice, building climate resilience, supporting water conservation, and protecting ecosystems and biodiversity
<b>Monitoring, reporting, and verification (MRV)</b>	Development of and adherence to a plan for long-term monitoring of the project for the purposes of quality assurance	<b>Leakage</b>	Risk of displacing activities that cause GHG emissions to leak from the project site to another geographic location for economic reasons (e.g., when the market demand for an emitting activity is sustained despite the development of a CDR project).
<b>Durability</b>	Physical longevity and integrity of carbon in storage over time, including physical leakage (aka reversals)		

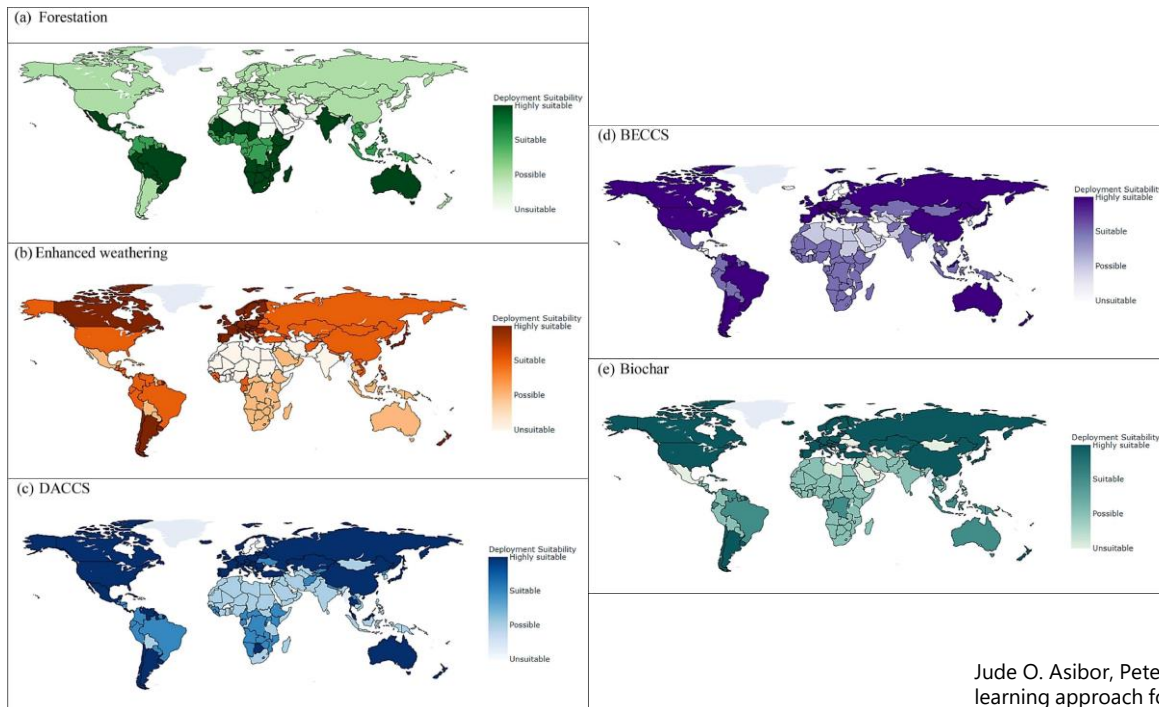
***For additional detail and guidance tailored to each CDR method (e.g., what projects MUST do vs. SHOULD do) see [Criteria for high-quality carbon removal](#)***

# Design Considerations for Early CDR Deployment



# Capacity varies worldwide by CDR approaches

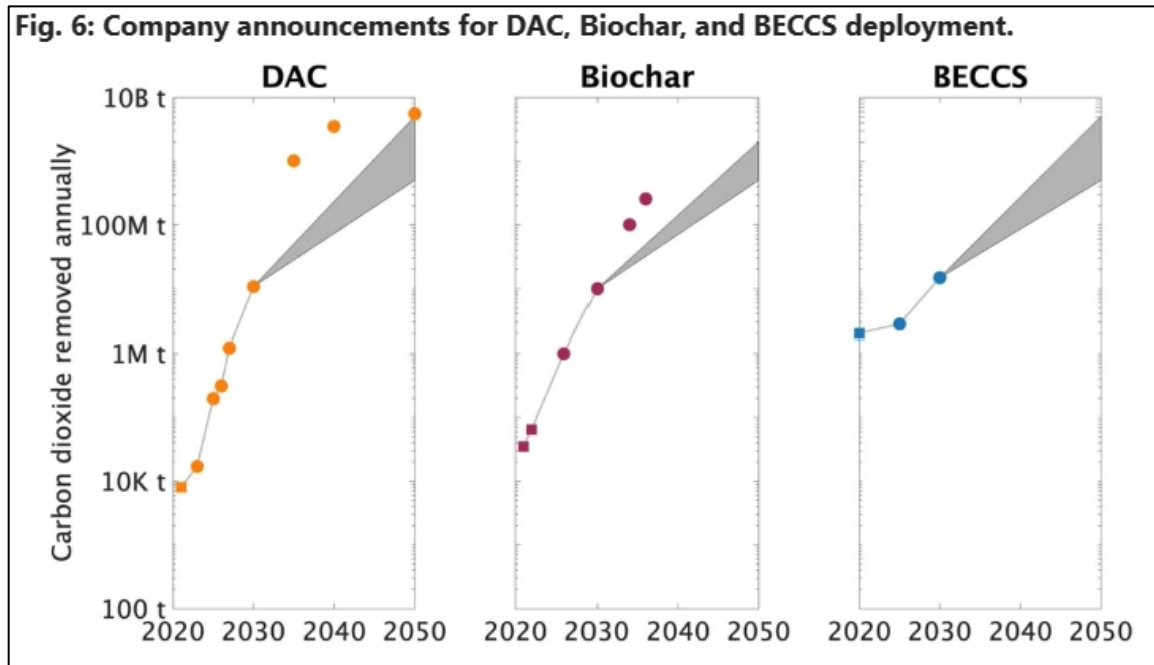
That variability means both that we have options and that we have to test out regional fits.



Some pathways, such as BECCS in Europe and DAC in North America, have gained traction that backs up these capacity projections.

Jude O. Asibor, Peter T. Clough, Seyed Ali Nabavi, Vasilije Manovic, "A machine learning approach for country-level deployment of greenhouse gas removal technologies," International Journal of Greenhouse Gas Control, Volume 130, 2023, 103995, ISSN 1750-5836, <https://doi.org/10.1016/j.ijggc.2023.103995>.

# Placeholder: Early Scaling Matters a Lot



**Bottom line: CDR needs to scale very fast and the first decade is very influential**

If those circular planned deployments don't turn into square actual deployments, then the 2050 global potential is considerably reduced.

Nemet, G., Greene, J., Müller-Hansen, F. *et al.* Dataset on the adoption of historical technologies informs the scale-up of emerging carbon dioxide removal measures. *Commun Earth Environ* 4, 397 (2023). <https://doi.org/10.1038/s43247-023-01056-1>



# Implications for Transparent and Accessible CDR Markets



# Transparency through hard, practical work

## **The product specifications—the methodologies—are everything**

Ground level work across disciplines is needed on many CDR approaches before we can achieve transparency and accessibility in an over-the-counter market.

Many players are stepping up to help here—buyers, sellers, advisories, ratings agencies, etc.

Select areas for work would include:

- Energy accounting for DAC
- Measurement and modelling uncertainty limits for rock weathering
- Cascading use for biomass

We will continue to transparently transmit what we learn and the challenges we see.

# Parallel CDR Accounting Illustrated

National Tallies



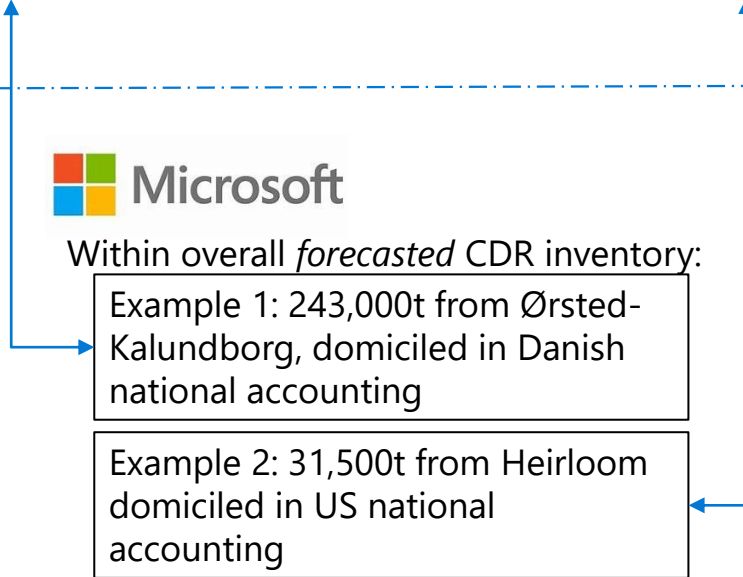
Corporate Tallies



Within overall *forecasted* CDR inventory:

Example 1: 243,000t from Ørsted-Kalundborg, domiciled in Danish national accounting

Example 2: 31,500t from Heirloom domiciled in US national accounting



Klimate.co

# The integrated platform for high-quality carbon removal

KLIMAMINISTERIET | 29. NOVEMBER 2023



INTRODUCTION

Our CO<sub>2</sub> asset management platform allows companies to actively secure high-quality carbon removal solutions, turning a carbon liability into future assets.

**We've been working for 3 years to set ourselves up for this. Here's where we are today.**

2020

**Launch** →

World's first transactional, portfolio-based carbon removal platform.

*Exclusive focus on Carbon Dioxide Removal (CDR) to address unavoidable emissions.*

2021 → 2022

**Scale** →

Carbon Purchase Agreements (CPAs) developed with suppliers.

*Secure long term supply through legal and financial infrastructure.*

2023

**Today** —

Global carbon asset management: Transparent, reliable, long-term management of CDR assets

*We are the #1 independent buyer of long-term CDR, focused exclusively on carbon removal.*

VISION

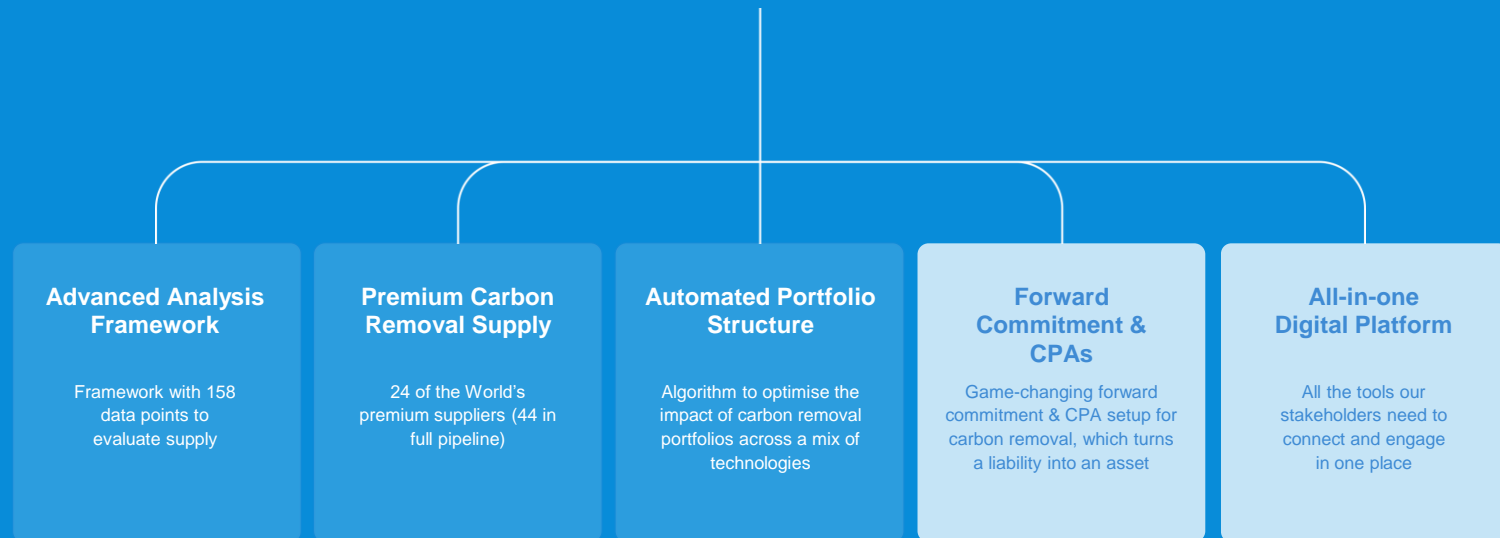
We are in business to reverse climate change and create a world-leading carbon removal solution.

MISSION

We empower responsible companies to achieve Net Zero and accelerate Carbon Removal technologies. We provide access to high-quality, innovative, and verifiable carbon removal solutions aligned with science. Our purpose is to scale demand and accelerate the development of methods and technologies needed to reverse climate change.

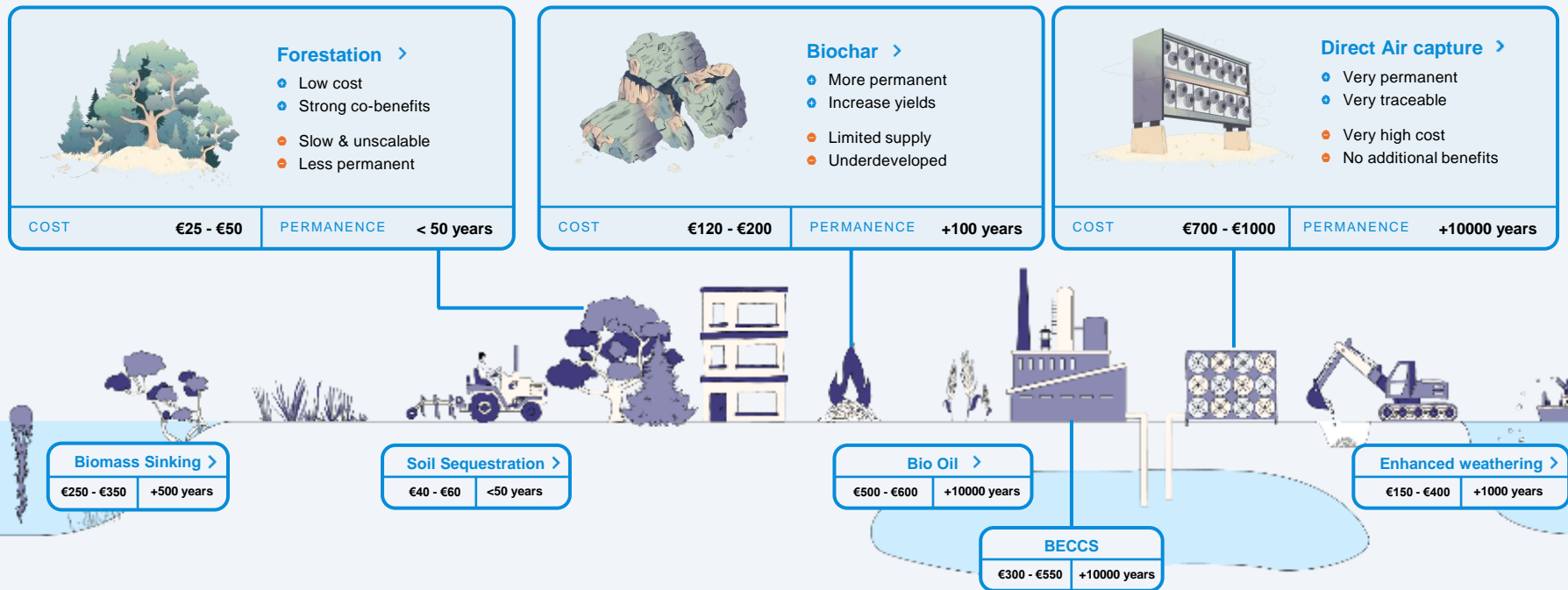
OUR FOUNDATION

**We've brought together the right components to ensure scale – without compromising integrity and trust. We're turning a liability into an investible and distributable asset.**



# CARBON REMOVAL

## Removal methods overview



# DUE DILIGENCE, MONITORING & REPORTING

## Benchmarking and due diligence of projects



36 DATA POINTS

### Climate impact

We evaluate how the project sequesters and stores carbon to determine the impact the project has on mitigating climate change.

- Permanence
- Rapidity
- Additionality
- Effectiveness



50 DATA POINTS

### Co-benefits

Beyond carbon removal, we evaluate the additional social and environmental benefits that carbon removal projects generate.

- Environmental
- Social



34 DATA POINTS

### Integrity

We analyse the certification and MRV procedures of carbon removal projects to ensure sound and credible projects.

- Monitoring
- Verification
- Certification
- Accounting



38 DATA POINTS

### Outlook

We evaluate the potential benefits and risks of the carbon removal projects and technologies to future-proof your investment.

- Potential
- Risk / Mitigation
- Governance
- SDGs

Gold Standard

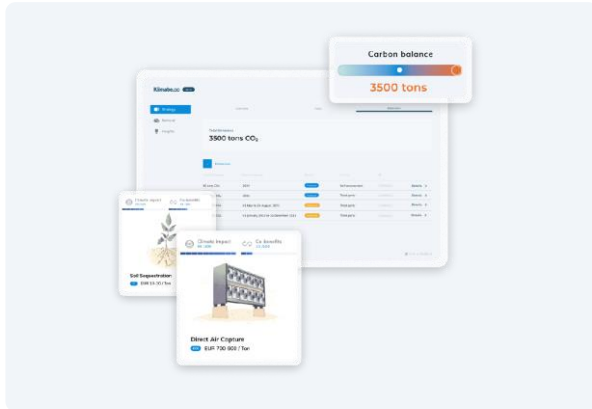


puro·earth



# All carbon assets contracted will be managed on Klimate's platform

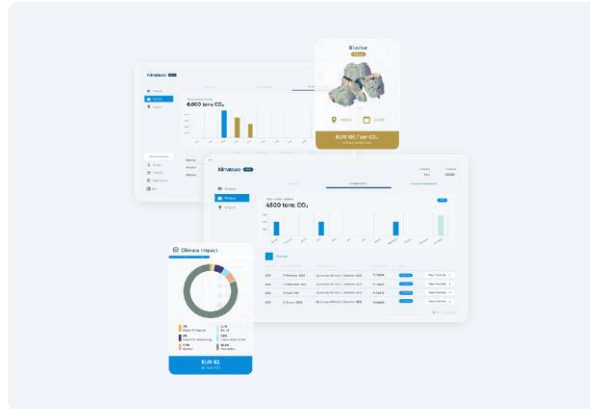
## STRATEGY



### Key features:

- ✓ Emission data aggregator
- ✓ Carbon removal project explorer
- ✓ Carbon removal planner
- VCMI & SBTi aligned portfolios
- Portfolio planner for contribution and long-term planning

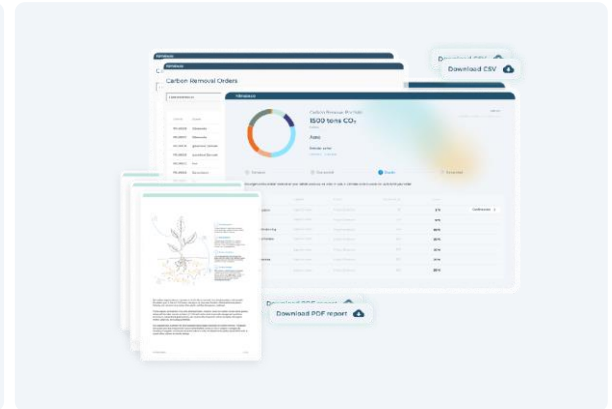
## REMOVAL



### Key features:

- ✓ Portfolio configurator
- ✓ Order and commitment manager
- ✓ Automated portfolio reviews
- Demand side planning and configurator
- Back-to-back CPA agreements

## INSIGHTS



### Key features:

- ✓ Public records and certificates
- ✓ Personalised reports
- ✓ Data visualisation dashboard and exporting tool
- VCMI Code of Claims support
- ICVCM Core Carbon Principles aligned credit information



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For any  
questions,  
please feel  
free to reach  
out directly



# Inherit

INHERIT CARBON SOLUTIONS

Markets for CO2 credits

Inherit is a carbon removal company addressing CO2 arising as a byproduct of organic waste treatment



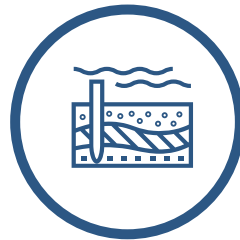
1,200 biomethane plants in Europe today.



# What we do



Sourcing CO2



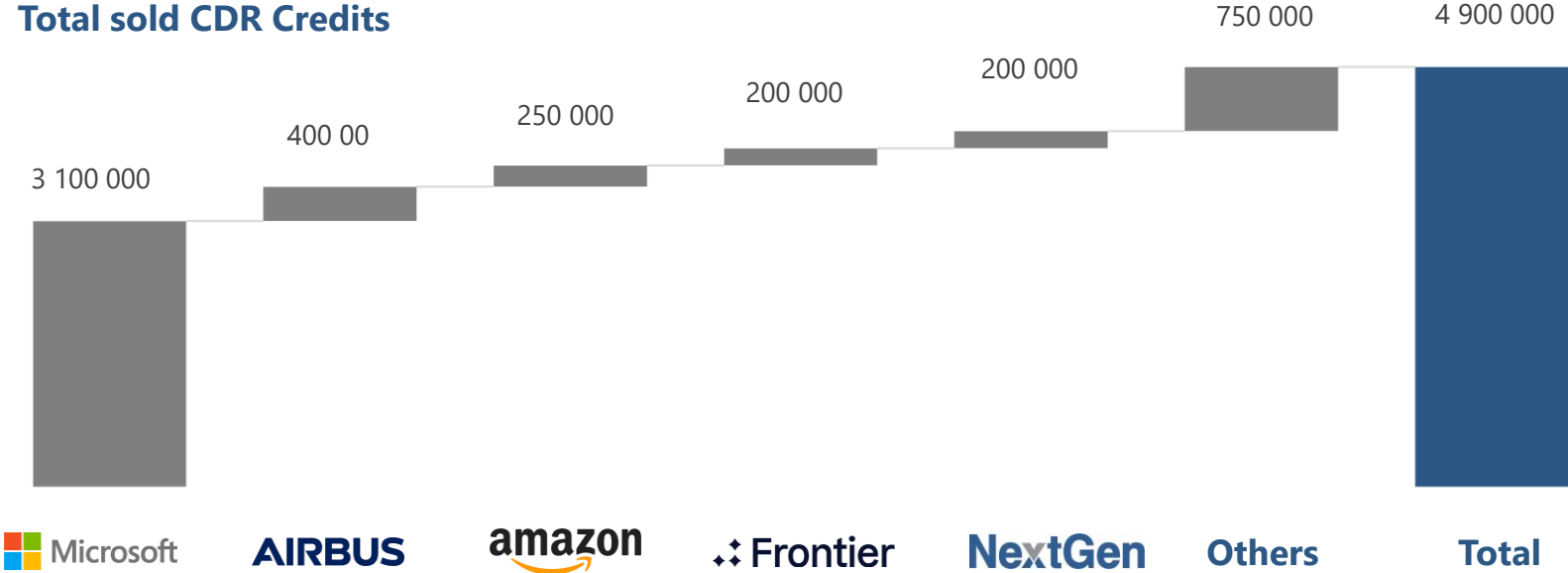
Transport and  
storage



Credit generation  
and sales

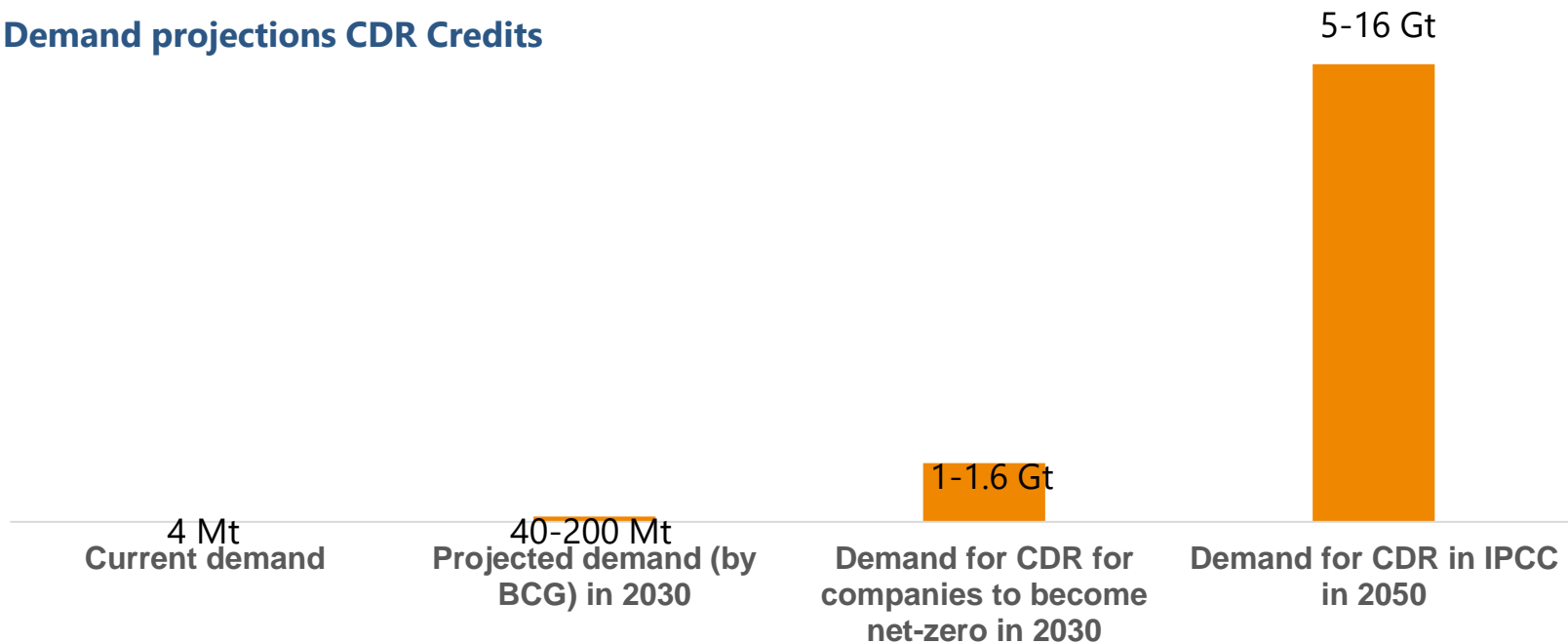
Currently the market is dominated a few buyers purchasing most of the volume sold

**Total sold CDR Credits**



However, the market needs to grow significantly to meet various demand projections over the next decades

### Demand projections CDR Credits



# The government should play a catalyst role to generate funds for the CDR market



Create simple incentive mechanisms with low risk



Ensure incentives can be combined with private market funds



Set separate targets for removal and reduction





# **General discussion and questions - involving both participants in the Ministry of Climate's premises and online**

## **Thank you for your participation!**