How carbon credits can incentivize CCS projects

METI-JOGMEC-IETA joint workshop: Global Carbon Markets and CCS

Tokyo, 26th January 2023

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About us

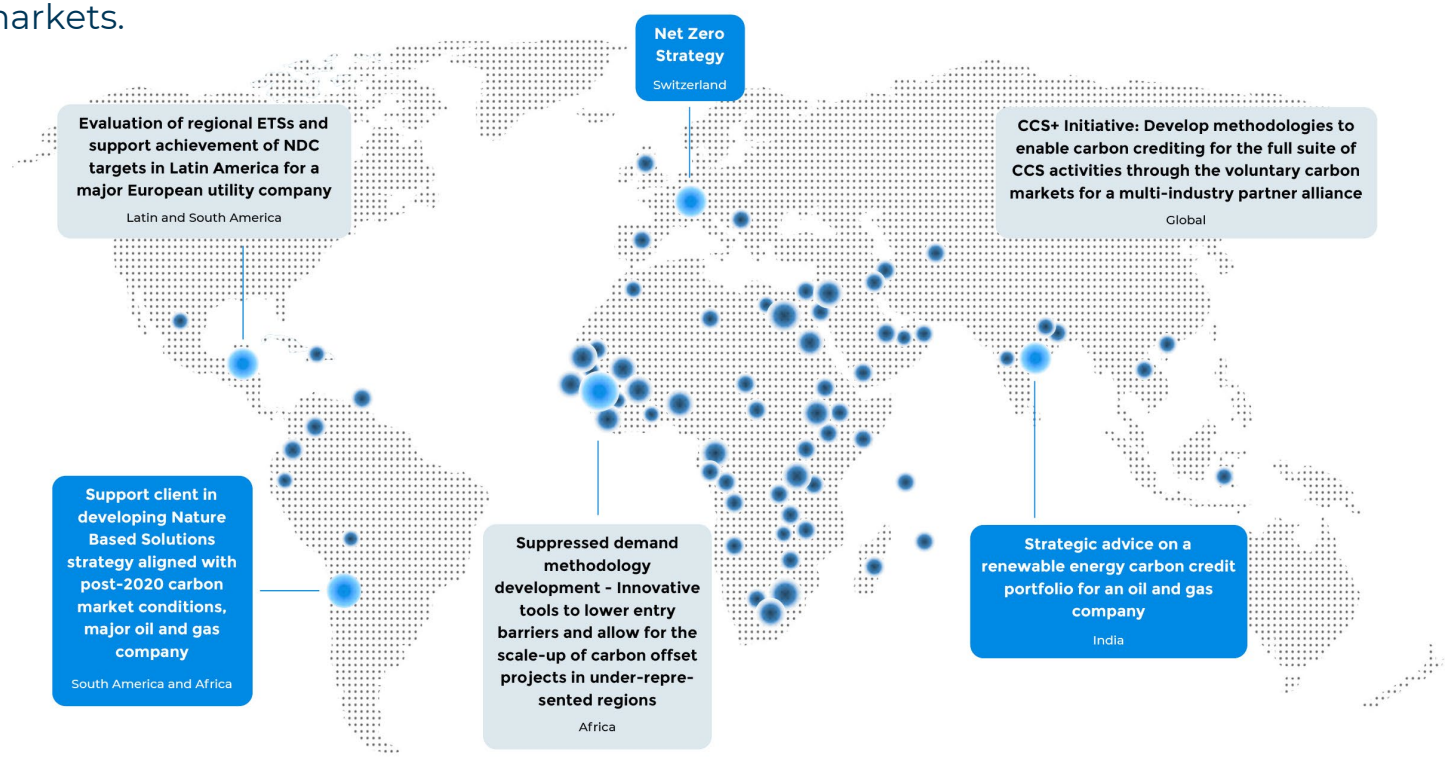
An independent group of consultants providing solutions for domestic and international climate policies, finance, and GHG markets.

20
Years of experience in carbon markets

40+
Employees from 17+ different nationalities

50M+
Carbon credits generated

500+
Projects completed in GHG accounting, GHG inventories, net-zero target setting, low-carbon strategies and more



Some of our clients: METI Ministry of Economy, Trade and Industry · TotalEnergies · SIEMENS · Swedish Energy Agency

Mitigation activity

Generating carbon credits

International | Bilateral | Domestic | Independent

UN Art6 | CDM | JCM | ERF | VCS | GS4GG | Etc.

Carbon crediting mechanism

Quality control process

Carbon credit

Trading carbon credits

Carbon credit

Carbon markets

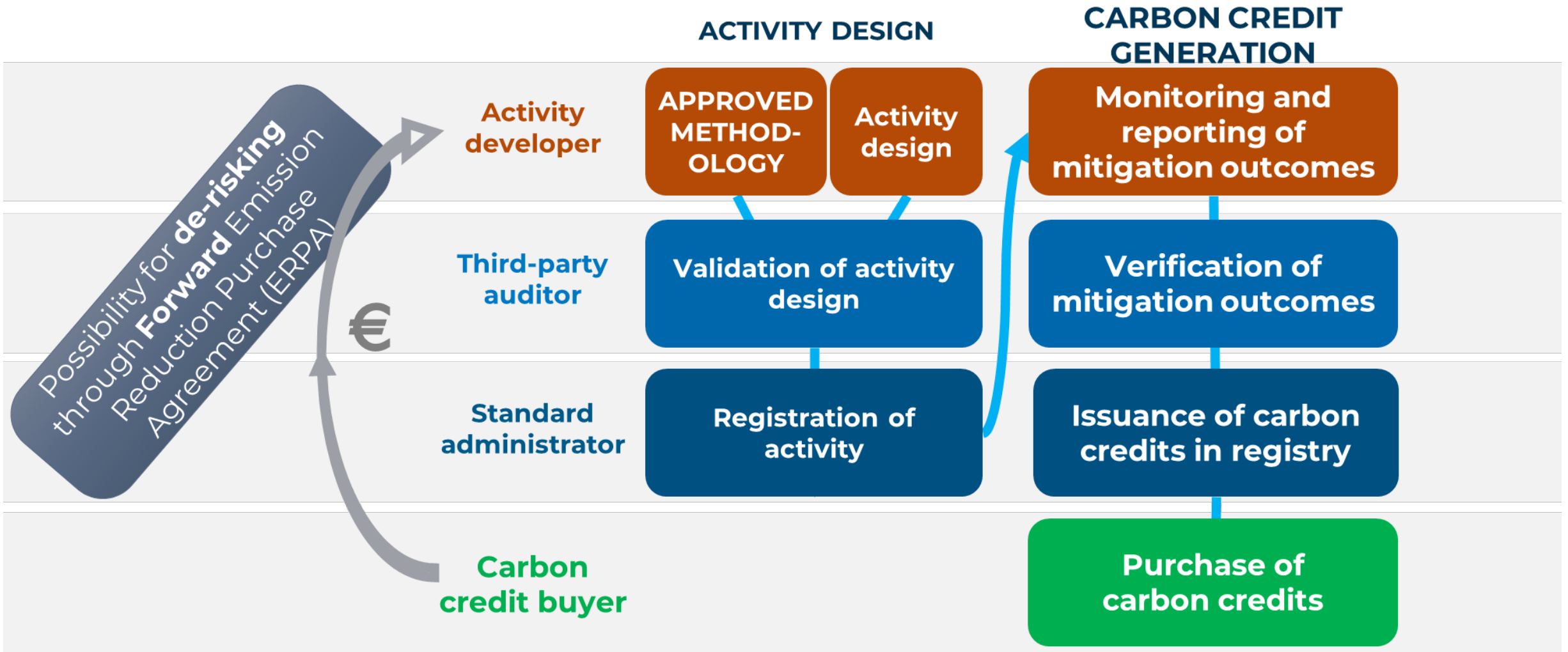
€

Using carbon credits

- Voluntary offsetting (corporates)
- CORSIA compliance (airlines)
- NDC compliance (governments under Article 6 of the Paris Agreement)

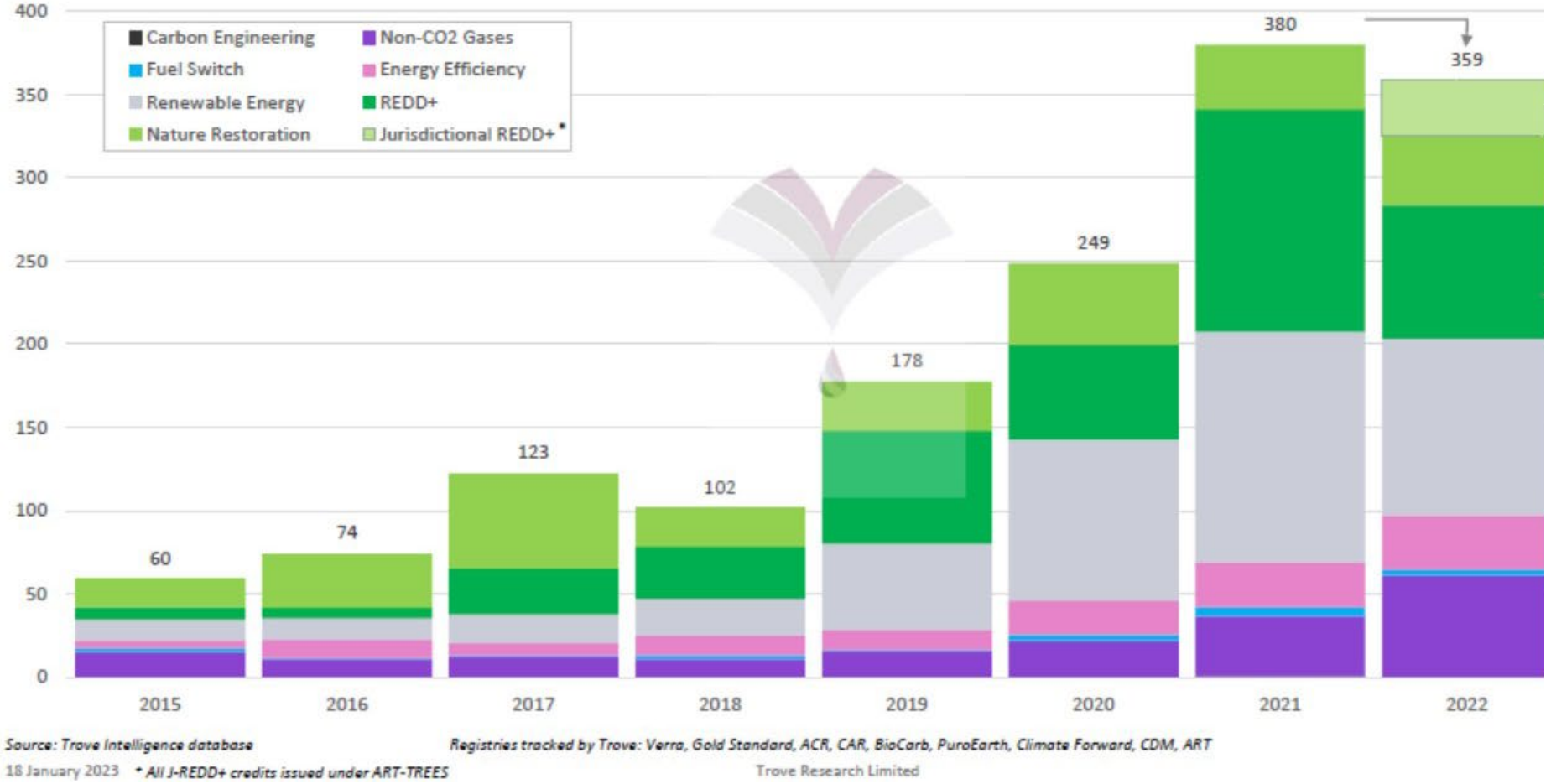
Source: Perspectives Climate Group

Carbon credit cycle



Voluntary carbon market development

Trove Intelligence (2022): Voluntary Carbon Market 1Q22 in Review Webinar



Average price last 3 years: 2-3 $US/t CO_2e

Prices vary significantly based on e.g. activity type, vintage, co-benefits from **<1 to 100+ $US /t CO_2e**

Future prices will be higher than the current average as low-cost action is needed for national targets

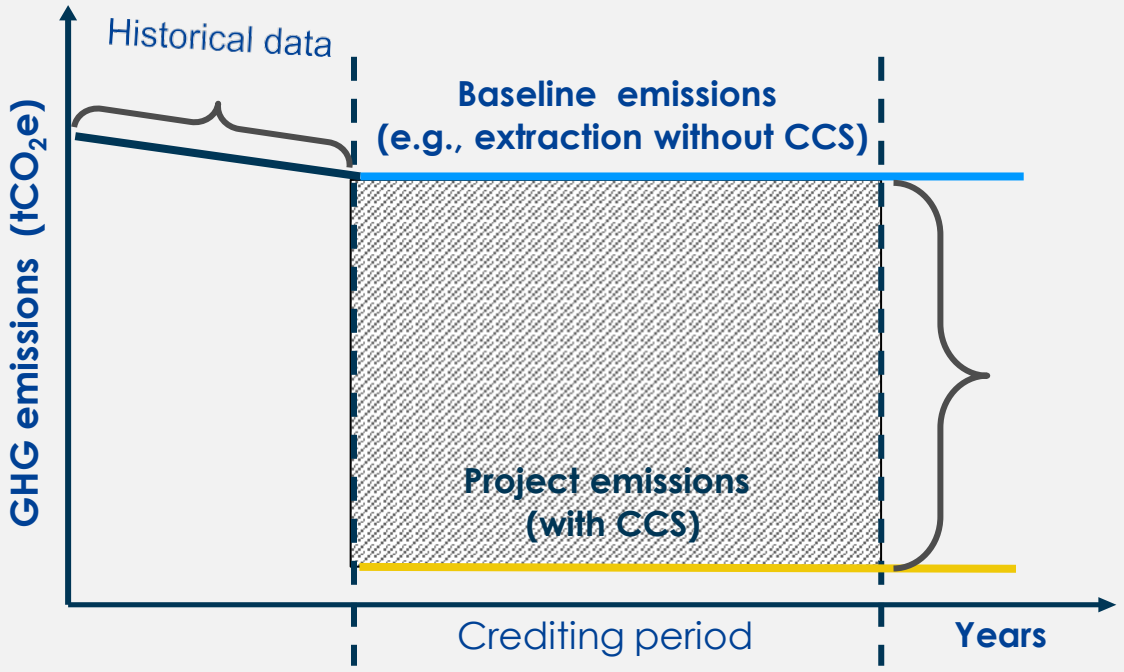
Principles of carbon crediting

Project requirements

- Approved Methodology
- Additionality
- Addressing non-permanence
- ...

ICROA

Code of Best Practice
Voluntary Carbon Market



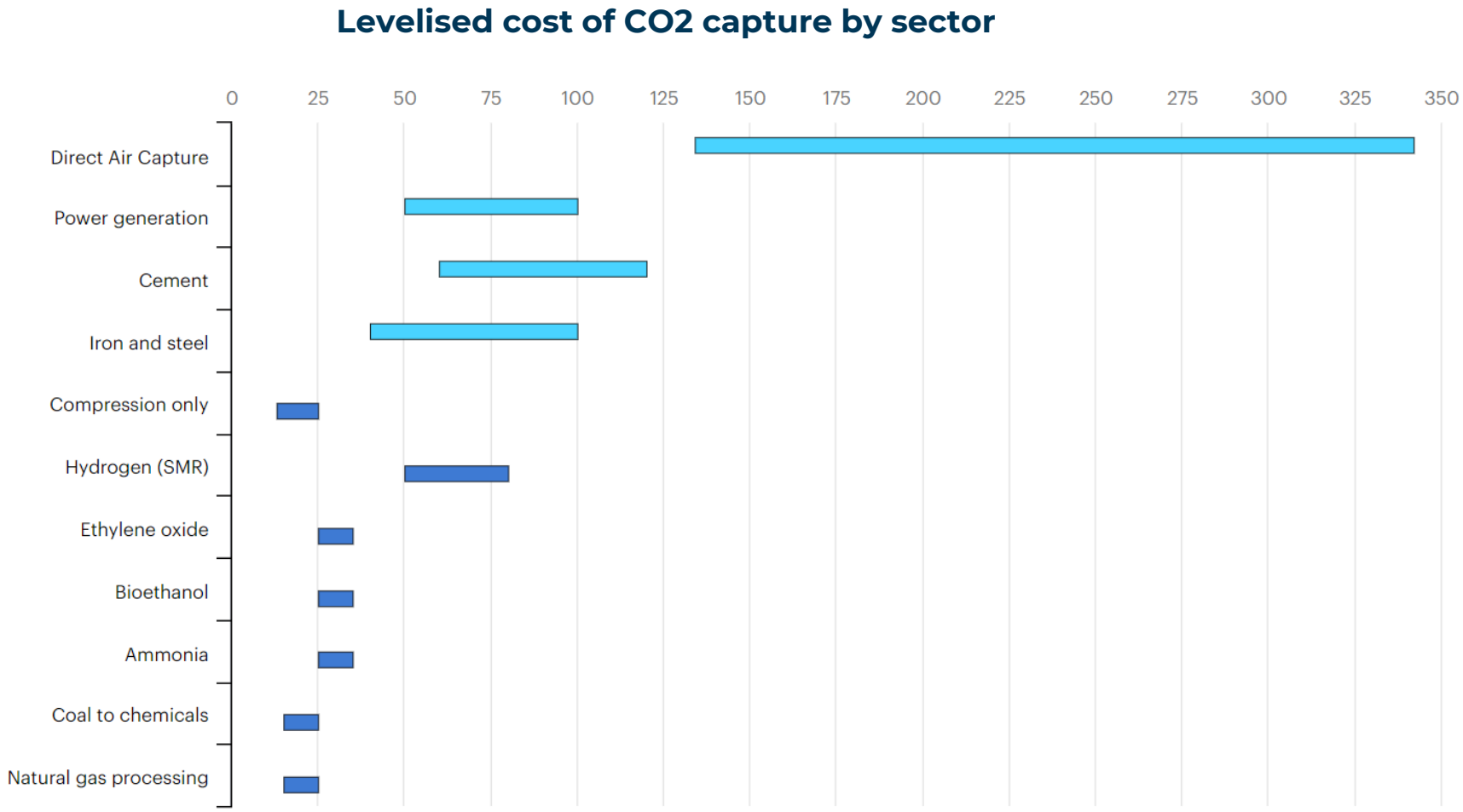
Emission reductions = **Baseline emissions** - **Project emissions** = Carbon credits $

Existing CCS methodologies

Methodology (Standard)	Activity scope	Geographical Scope	ICROA endorsement
Alberta Quantification Protocol for CO2 Capture and Permaent Storage in Deep Saline Aquifers **(Alberta Government)**	CCS in aquifers and EOR projects (ER)	Alberta (Canada)	No
Carbon Dioxide Removal by Direct Air Capture & Permanent and Secure Geological Storage of CO2 by In-situ Carbon Mineralization **(ISO 14064-2)**	DAC, storage by carbon mineralization (CDR)	Global	No
Methodology for the Quantification and MRV of GHG emission reduction and removals from CCS projects **(American Carbon Registry)**	EOR; DAC and BEC with storage in saline formations and depleted oil and gas reservoirs (CDR and ER)	US, Canada, Mexico	**Yes**
Geologically Stored CO2 Methodology **(Puro.earth)**	DAC and BEC with storage in deep geological formations and reservoirs (CDR)	Global	No
California Carbon Capture and Sequestration Protocol **(Low Carbon Fuel Standard)**	CCS projects with onshore sequestration (either saline aquifer or depleted oil and gas reservoirs) + EOR (ER)	US	No
Accelerated Carbonation of Concrete Aggregate **(Gold Standard)**	DAC and BEC, mineral carbonation of CO2 in demolished concrete (CDR)	Global	**Yes**
Carbon Capture and Storage Method **(Australia's Emission Reduction Fund, ERF)**	Applicable to a wide range of CCS technologies, explicitly excludes DAC	Australia	No

Costs of CCS operation

- Carbon capture has no negative abatement costs like other mitigation technologies
- Costs range considerably by sector/technology
- Transportation and storage add further costs 12-24+ $US/t CO2

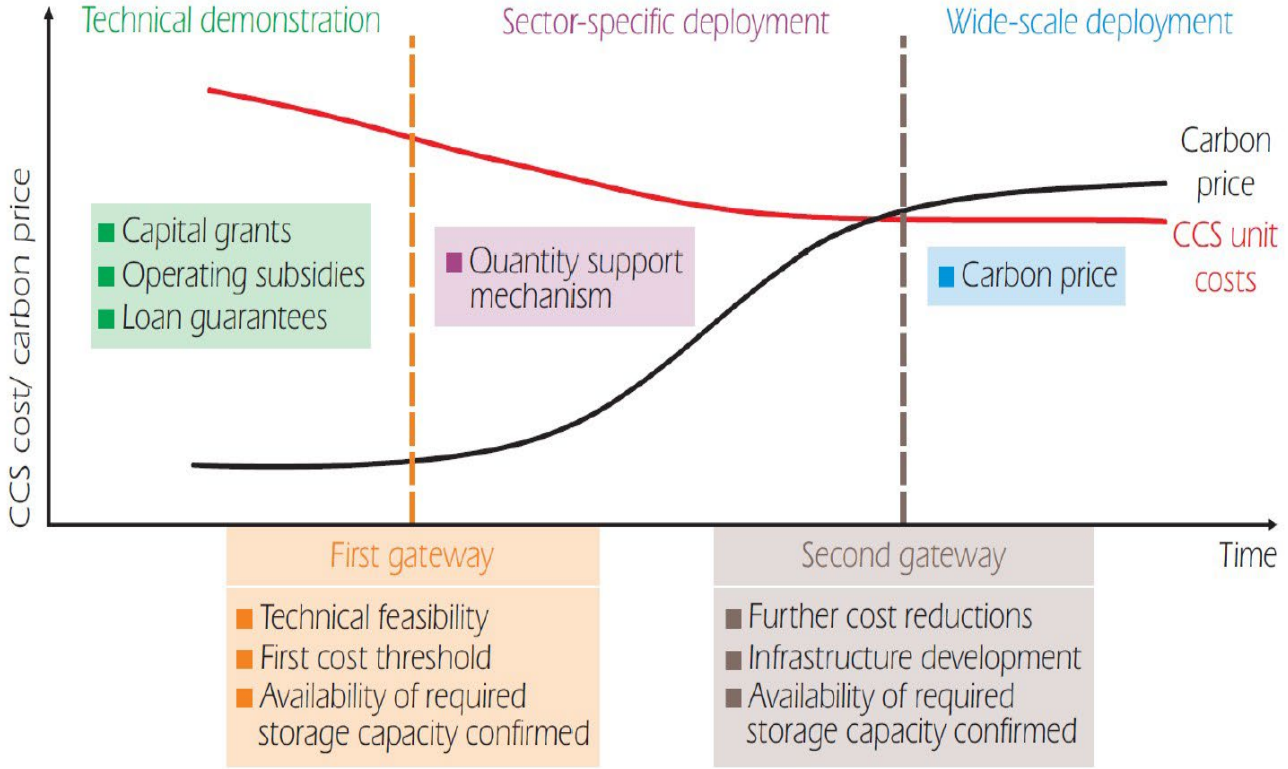


Source: IEA (2021). Is carbon capture too expensive?

Credit credits and public funding

- As the policy framework evolves, costs and risks of CCS development will shift to private sector
- Carbon credits generated by CCS projects could attain higher prices because geological storage of CO_2 is perceived more secure than nature-based solutions (NbS)
- Prices of CCS-generated credits could also increase if market participants would be willing to pay a premium for innovative and novel solution
- Prices will differ by CCS type (reductions vs. removals)
- Stacking of carbon credit revenue and other public funding sources needed before wide-scale deployment

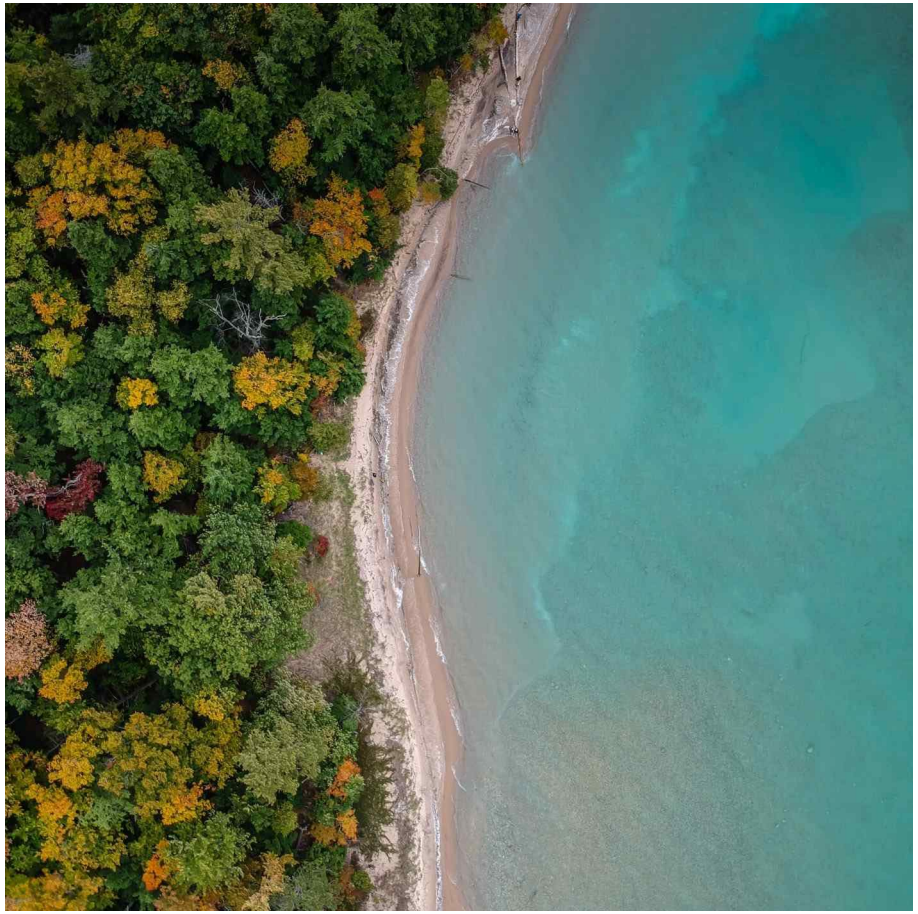
Possible gateways on the way to wide-scale deployment in a CCS policy framework



Source: IEA (2013). Global Action to Advance Carbon Capture and Storage

Case study: CCS in oil and gas exploration

Source facility	New gas field
Project activity	• **Source**: native CO_2 from gas field • **Capture**: CCS in acid gas removal process • **Storage**: depleted oil or gas reservoir
Start year	2025
Project lifespan	25 years
Native CO2 generated (Mil. t CO_2/year)	1
Project emissions (incl. fuel, fugitive) (Mil. t CO_2/year)	0.15
Emission reductions (Mil. t CO_2/year)	0.85

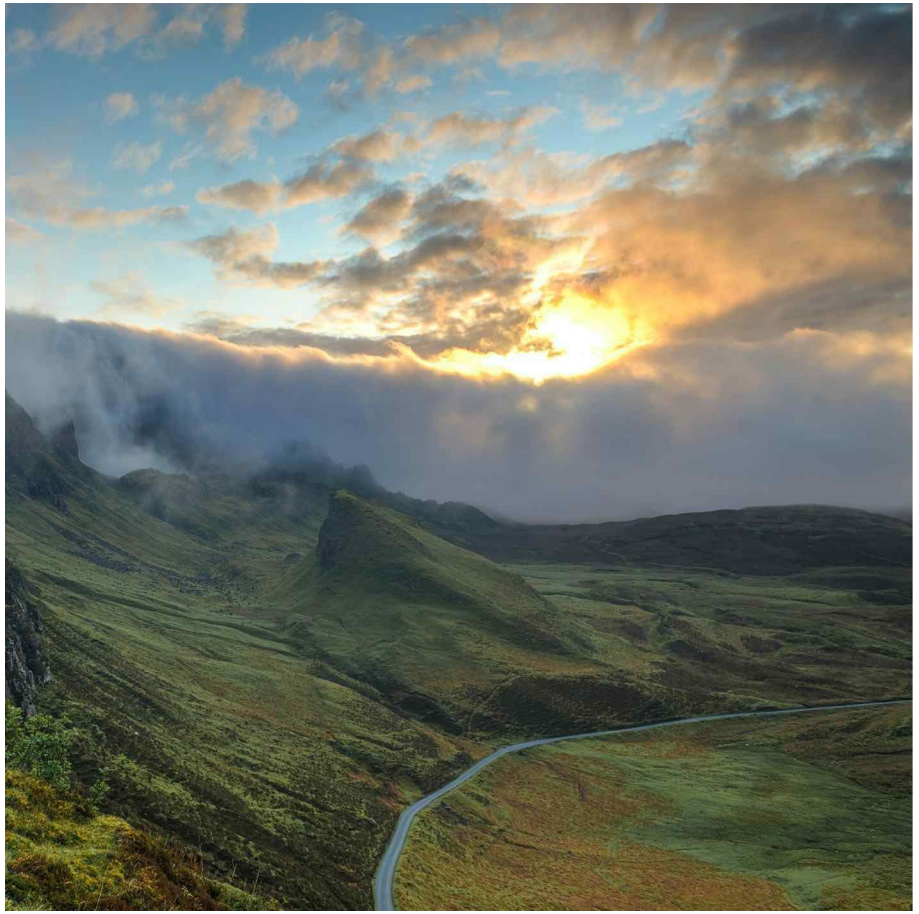


Case study: Investment analysis

What are the economics of the CCS project component?

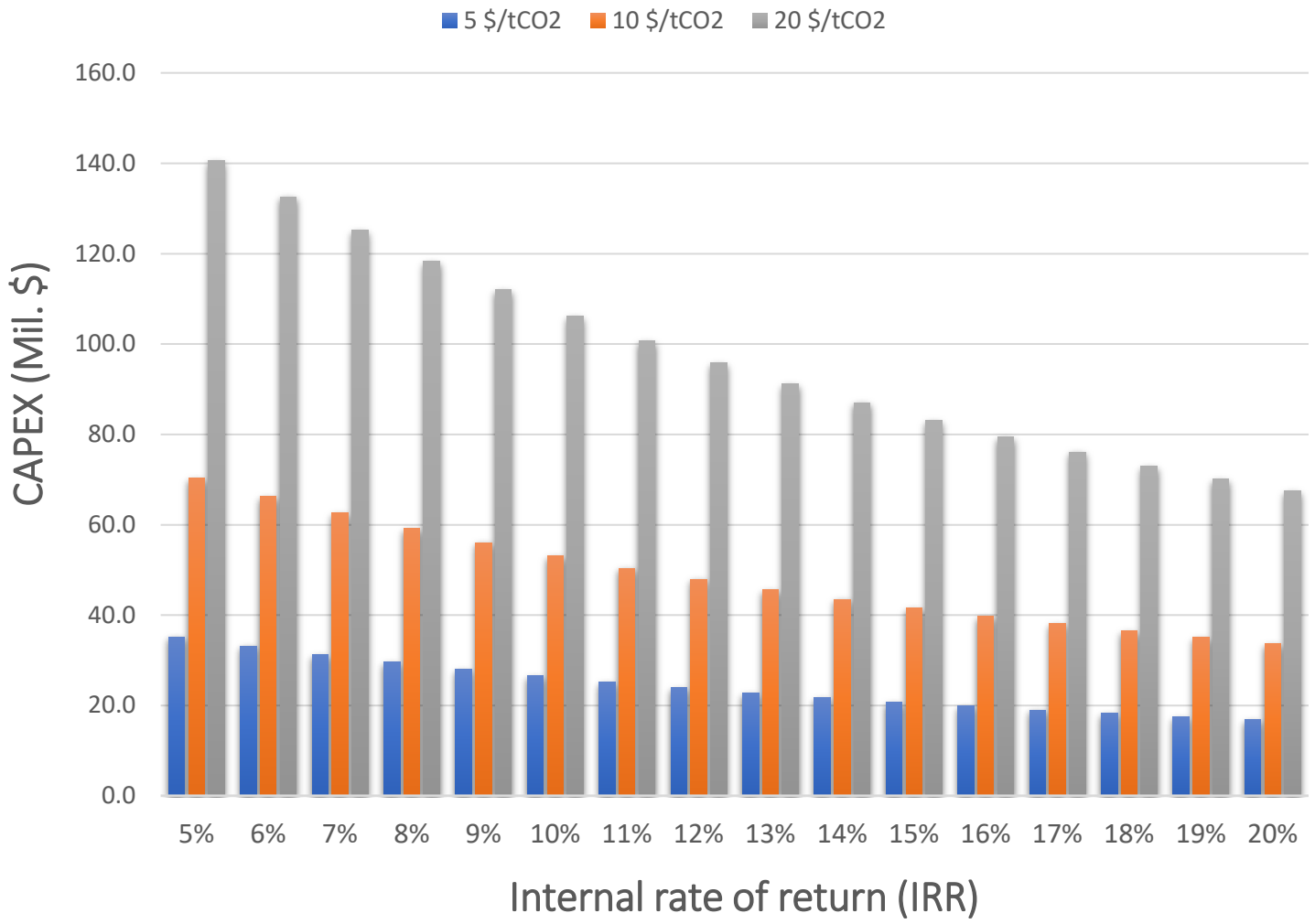
An analysis was carried out to estimate max. viable CAPEXs based on

- OPEX is assumed to be 5% of CAPEX
- 8% discount rate
- Emission reduction potential of the project
- 25 years of crediting
- Different carbon credit prices (5-20 $US/t CO_2)
- An expected range of IRRs (5 – 20 %)



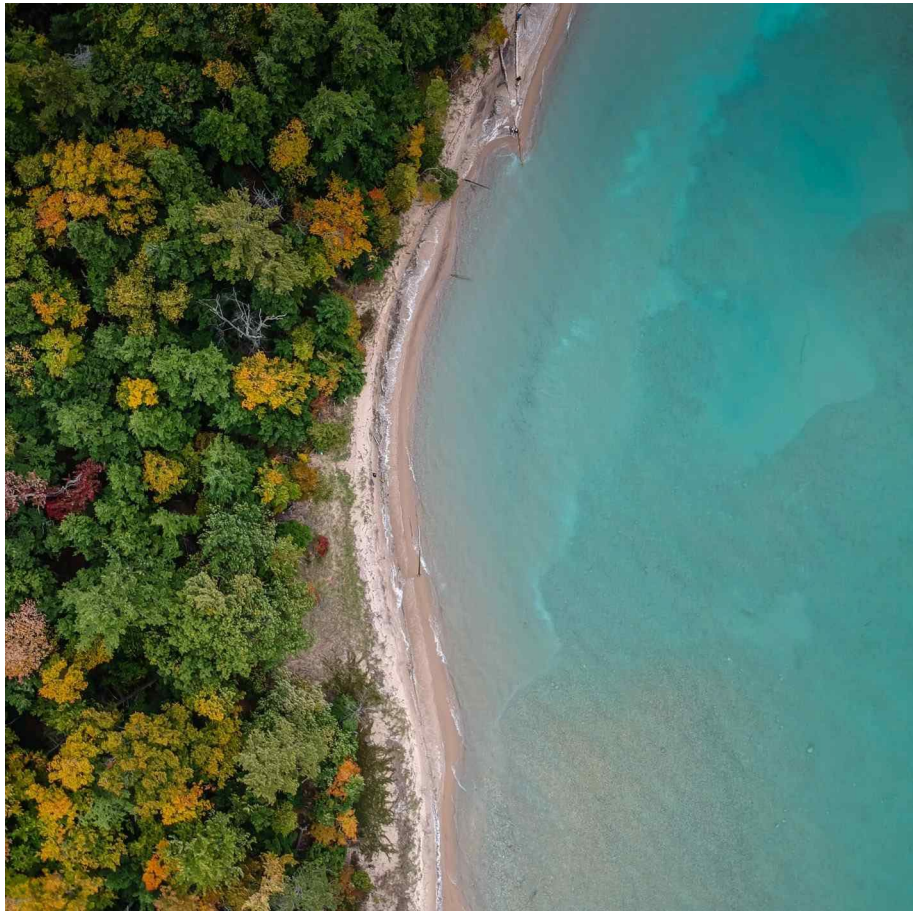
Scenario analysis: IRR & CAPEX

Case scenario	Carbon credit pricing ($/t CO_2)	Average revenue per year (Mil. $/yr)
A	5	4.3
B	10	8.5
C	20	17



Outlook

- Latest and upcoming carbon crediting methodologies make CCS carbon crediting possible
- Costs and carbon credit price will differ by CCS technology
- Stacking of carbon credit revenues and public funding will be necessary for most CCS project types before wide-scale deployment can be reached
- Article 6 “pilots” such as the JCM can help bridge the current gap between low carbon prices and actual CCS costs



THANK YOU!

Please contact me for questions & comments

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