

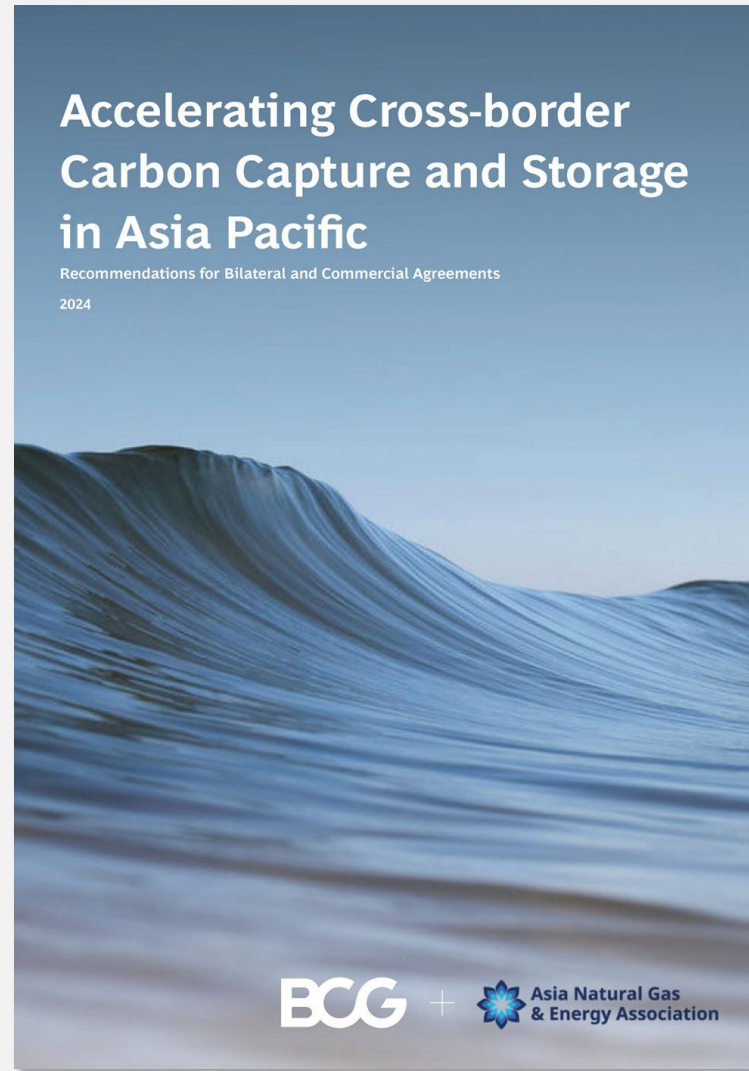


# Accelerating Cross-border CCS in APAC

Japan CCS Forum

4<sup>TH</sup> DEC 2024

ANGEA and BCG have partnered on the first of its kind study for accelerating Cross-border Carbon Capture and Storage in Asia Pacific



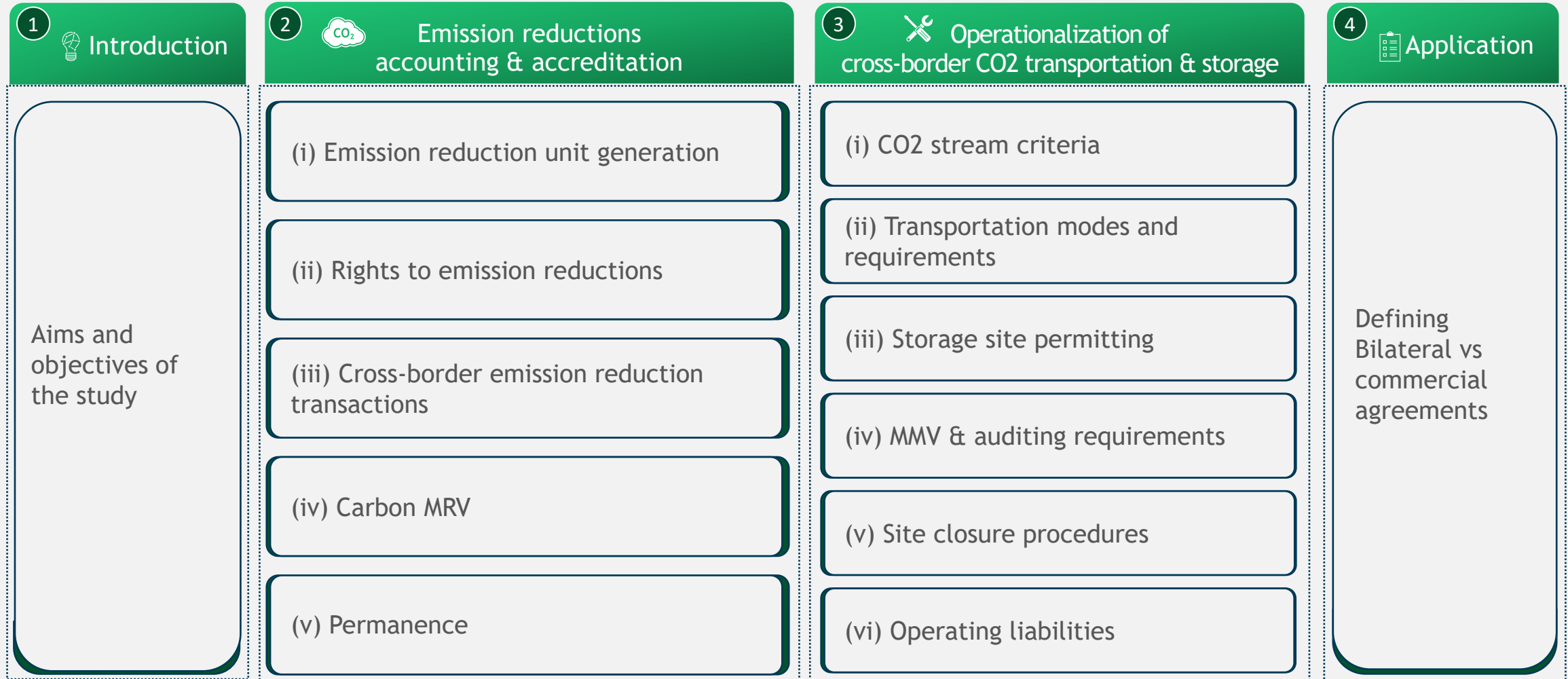
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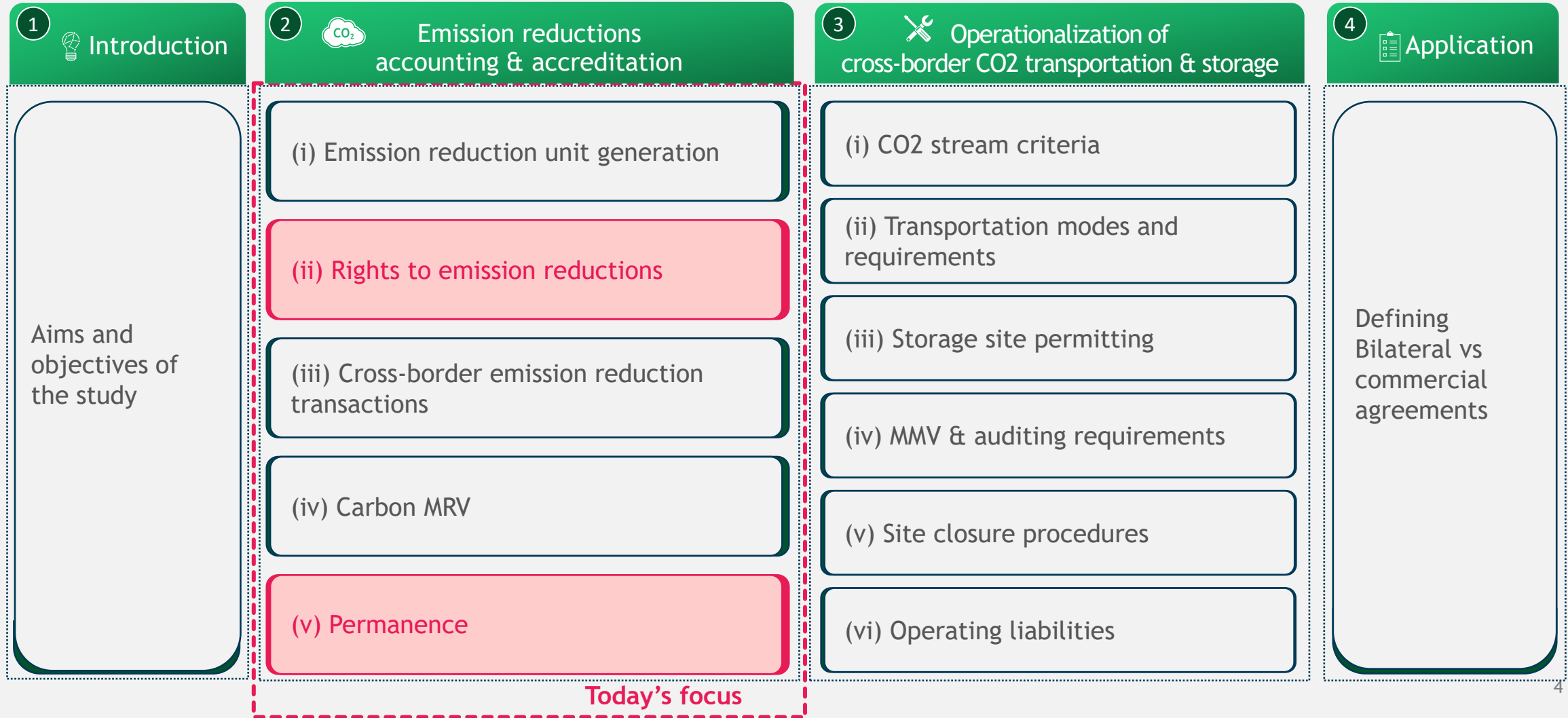
# Overview | The study covers the entirety of the CCS value chain and is structured along 4 chapters

## Accelerating Cross-border Carbon Capture and Storage in Asia Pacific



# Overview | The study covers the entirety of the CCS value chain and is structured along 4 chapters

## Accelerating Cross-border Carbon Capture and Storage in Asia Pacific



# Three potential options for ownership rights to emission reductions

Option 1: Single ownership	Option 2: Single ownership, with trading/selling	Option 3: Joint ownership
<p>Capture country retains rights to the emission reductions to claim towards their NDCs; no emission reduction benefit for storage country</p>	<p>Capture country retains rights to the emission reductions to generate Article 6.2 ITMOs, may share proportion of ITMOs with storage country</p>	<p>Capture country and storage country has joint ownership of the emission reductions, and can both agree on a split to claim towards their NDCs</p>
<ul style="list-style-type: none"> <li>+ Based on principle that ownership should go to where emissions would have taken place</li> <li>+ Provides clear case for capture country to incentivize cross-border CCS projects</li> <li>- Storage countries have no emission reduction benefit</li> </ul>	<ul style="list-style-type: none"> <li>+ Ensures clear credit ownership rights, using already established mechanism</li> <li>+ Storage countries have opportunity to benefit beyond storage fees</li> <li>- Dependent on capture country/project proponent's intended use</li> <li>- Capture country cannot claim for ERs</li> <li>- ITMO prices unlikely competitive</li> </ul>	<ul style="list-style-type: none"> <li>+ Storage countries have opportunity to benefit beyond storage fees</li> <li>- Not clear if this will be accepted by IPCC/UNFCCC in practice</li> <li>- Risk of double counting will need to be managed carefully</li> </ul>

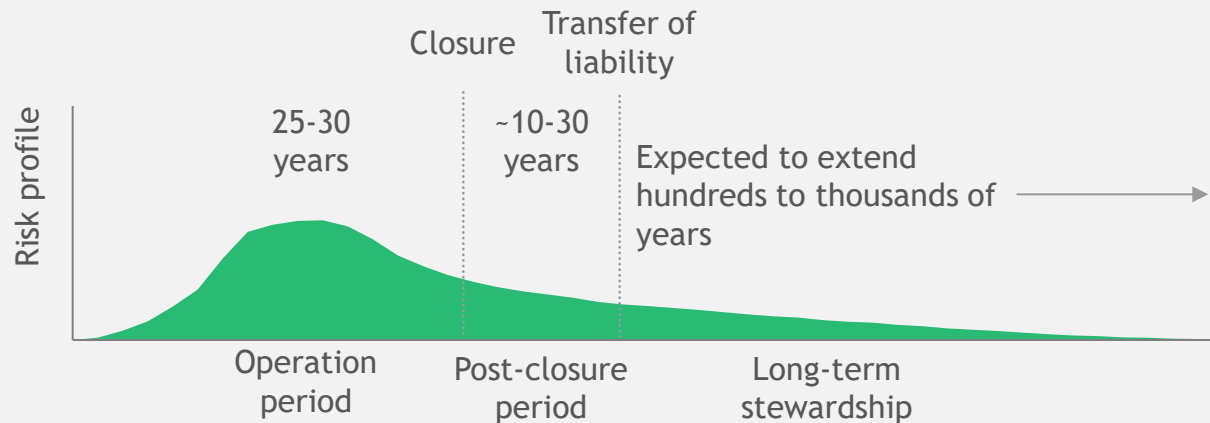
+ Pros - Cons

1. If project proponent is claiming for emission reductions towards a compliance scheme (i.e. an ETS or carbon tax), this will be accounted towards the capture country's national GHG inventory and hence NDCs.

# Leaked emissions need to be accounted and adjusted for to ensure the integrity of claimed emission reductions

Illustrative

**CCS leakage risks overtime**  
 Frequency of leakage is expected to **average <1% over a 1,000 year period** (and longer, decreasing over time), with low probability for appropriately selected sites



Our study covers risks of CO<sub>2</sub> leakages across the CCS value chain (capture, transport, storage) where majority of the risk is at the storage site but significantly decreases upon closure

**Operating liability**  
 Clearly laying out operating liability for CO<sub>2</sub> leakage will help ensure that responsibilities for site remediation and corrective measures are assigned

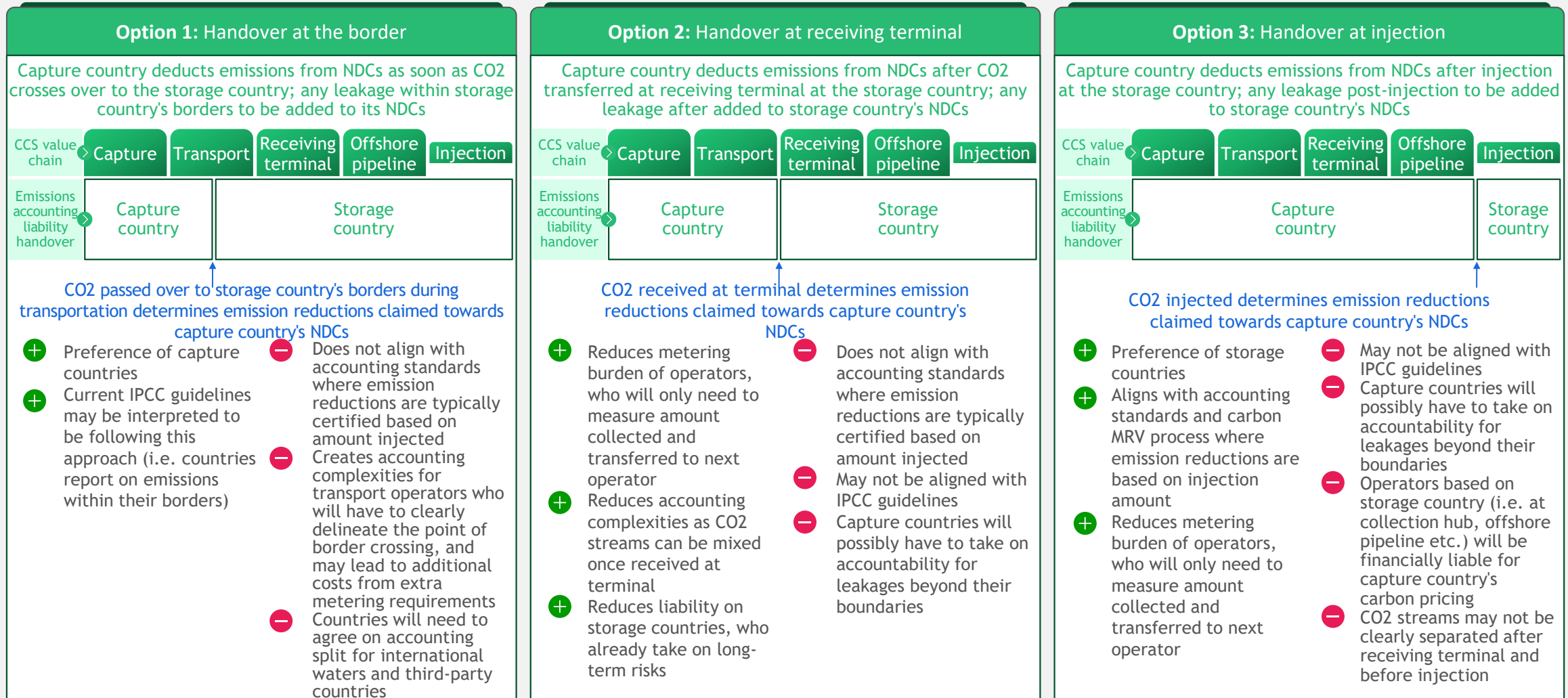
In some cases, part of liabilities include responsibility for managing non-permanence risk, or part of the compensation for damages include compensating for reversals of emission reduction units

**Focus of this section**

**Permanence**  
 As the initially stored CO<sub>2</sub> is released, the leaked emissions have to be accounted for given that emission reductions are reversed

Note: Content for sections will be tested and refined during stakeholder engagements  
 Source: Wilson et. al., 2007; IPCC Special Report on CCS (2005); Alcade et al (2018) "Estimating geological CO<sub>2</sub> storage security to deliver on climate mitigation"; U.S. Department of Energy (2016)

# Three ways to account for emissions from leakages



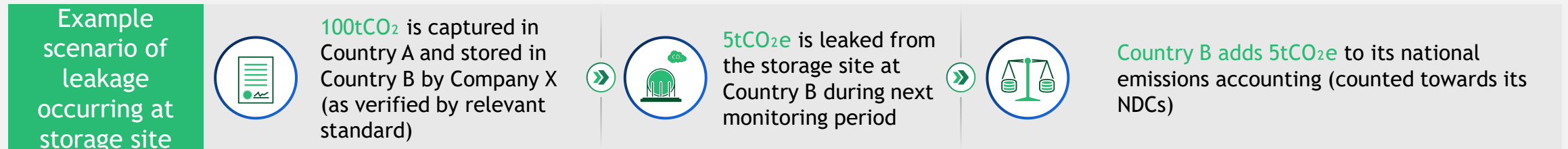
+ Pros - Cons

1. If project proponent is claiming for emission reductions towards a compliance scheme (i.e. an ETS or carbon tax), this will be accounted towards the capture country's national GHG inventory and hence NDCs.

# If leakage occurs after handover, 2 options for reversal accounting depending on requirements and commercial terms (1/2)

## 1 Option 1 (Likely scenario): Storage operator sets aside a financial safeguard to compensate for reversals in case of leakages

Capture country	Project proponent	Storage country	Storage operator
<ul style="list-style-type: none"> <li>No impact - NDCs originally claimed remain as is</li> </ul>	<ul style="list-style-type: none"> <li>No impact - emission reductions originally claimed remain as is</li> </ul>	<ul style="list-style-type: none"> <li>Adds leaked emissions to NDCs</li> <li>Additional emissions added to NDCs are compensated by storage operator</li> </ul>	<ul style="list-style-type: none"> <li>Uses financial safeguard to compensate storage country for additional emissions added to its NDCs</li> </ul>



Accounting to NDCs of...	Country A (Capture)	Country B (Storage)	Net total ERs from CCS
Before leakage	-100tCO <sub>2e</sub> (via claim by Company X <sup>1</sup> )	N/A	-100tCO <sub>2e</sub>
After leakage of 5t	-100tCO <sub>2e</sub> (via claim by Company X <sup>1</sup> )	+5t (compensated by storage operator)	-95tCO <sub>2e</sub>

1. Company X may also use the project's emission reductions to generate carbon certificates or credits that can be sold/traded with international buyers. In which case, the emission reductions if counted towards those countries' NDCs, should not be claimed by the project proponent and therefore to claim towards Country A's NDCs.

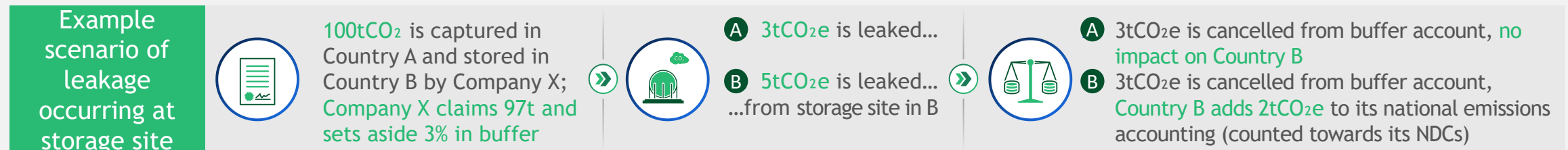
Note: While Option 1 places responsibility on the storage operator and storage country for accounting and compensating for the reversed emission reductions from leakage, this will likely also translate into a higher storage service fee passed on to the project proponent.



## If leakage occurs after handover, 2 options for reversal accounting depending on requirements and commercial terms (2/2)

**2** Option 2 (Unlikely, unless required by certification standard/regulator): Project proponent sets aside X% of ER units in a buffer account

Capture country	Project proponent	Storage country	Storage operator
<ul style="list-style-type: none"> <li>No impact - NDCs originally claimed remain as is<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>No impact - emission reductions originally claimed remain as is<sup>1</sup></li> <li>Cancel from buffer account same quantity of emissions as leaked</li> </ul>	<ul style="list-style-type: none"> <li>For leaked emissions beyond quantity in buffer account, adds the difference to its NDCs</li> <li>Additional emissions added to NDCs are compensated by storage operator</li> </ul>	<ul style="list-style-type: none"> <li>Compensate storage country for additional emissions added to its NDCs (if any)</li> </ul>



Accounting to NDCs of...	Country A (Capture)	Country B (Storage)	Net total ERs from CCS
Before leakage	-97tCO <sub>2</sub> e	N/A	-97tCO <sub>2</sub> e (3tCO <sub>2</sub> e in buffer is not claimable)
<b>A</b> After leakage of 3t	-97tCO <sub>2</sub> e (3tCO <sub>2</sub> e from buffer is cancelled)	N/A	-97tCO <sub>2</sub> e
<b>B</b> After leakage of 5t	-97tCO <sub>2</sub> e (3tCO <sub>2</sub> e from buffer is cancelled)	+2tCO <sub>2</sub> e (compensated by storage operator)	-95tCO <sub>2</sub> e

1. Company X may also use the project's emission reductions to generate carbon certificates or credits that can be sold/traded with international buyers. In which case, the emission reductions if counted towards those countries' NDCs, should not be claimed by the project proponent and therefore to claim towards Country A's NDCs.

Note: While Option 1 places responsibility on the storage operator and storage country for accounting and compensating for the reversed emission reductions from leakage, this will likely also translate into a higher storage service fee passed on to the project proponent.

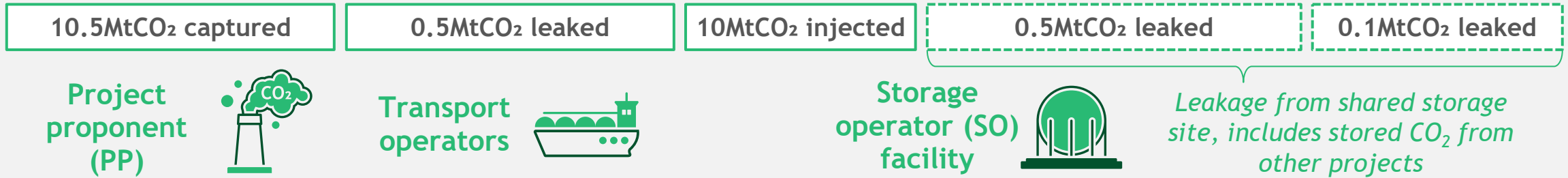
# Summary | Illustrative example of a Cross-border CCS project used towards reducing taxable emissions (under ETS or carbon tax)

Illustrative

Certification of emission reductions

Operation to post-closure

Long-term stewardship



CO <sub>2</sub> capture Capture country (CC)	CO <sub>2</sub> transport Shipping & pipeline	CO <sub>2</sub> storage (at shared storage hub of 100Mt capacity) Storage country (SC)		
<ul style="list-style-type: none"> <li>PP plans to use ISO to certify the project's ERs to reduce taxable emissions</li> <li>CC approves of CCS for reducing tax obligations</li> <li>SO to set range-bound stream criteria for shared storage hub</li> <li>PP aligns on project-specific stream criteria within range set by SO</li> </ul>	<ul style="list-style-type: none"> <li>Operators ensure that CO<sub>2</sub> transportation practices comply with latest regulations and standards</li> <li>CC and SC to agree on regulatory jurisdiction over int'l waters/3<sup>rd</sup> party countries</li> <li>Operators liable for CO<sub>2</sub> leakage as per transfer points (0.5Mt in this case)</li> </ul>	<ul style="list-style-type: none"> <li>PP is accountable for ER certification</li> <li>PP claims 10Mt ERs under carbon tax, reducing tax obligations by 10Mt</li> <li>CC claims 10Mt ERs for NDCs via PP's claims</li> </ul>	<ul style="list-style-type: none"> <li>SO contributes a % of storage fee into an escrow fund, mandated by SC</li> <li>SO informs PP &amp; SC of 0.5Mt leaked</li> <li>SC adds 0.5Mt to NDCs, compensated by SO (via respective financial guarantee)</li> <li>PP maintains 10Mt ER claims</li> </ul>	<ul style="list-style-type: none"> <li>SO accountable for following site closure procedures as per SC's regulations</li> <li>SC adds 0.1Mt to NDCs, compensated by escrow fund until depleted</li> </ul>

Based on study's selected key recommendations

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