Commercialising Carbon Dioxide Reduction and Removal (CDRR) in the ASEAN Region using Market-based Interventions

Chatchawan Genarkarn, Keerati Chukorn, Lucrezia Portigliatti, Gbemi Oluleye*

Centre for Environmental Policy (CEP), Imperial College London

Background

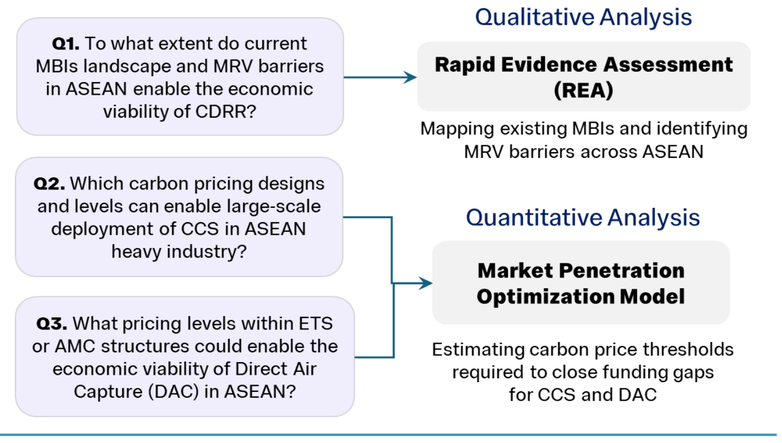
CDRR technologies remain largely absent from ASEAN climate strategies. Current Market Based Interventions (MBI) are fragmented and lack the design specifications needed to support high-integrity carbon removals.
Critical knowledge gaps exist regarding:

- Policy landscapes enabling CDRR economic viability
- Carbon pricing thresholds required to close funding gaps
- MRV barriers constraining market credibility

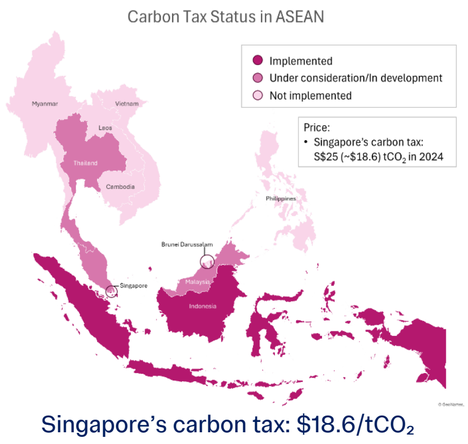
Research Objectives

Provide evidence-based analysis of policy landscapes and quantitative analysis of MBI pricing thresholds that make industry-level CDRR viable in the ASEAN region.

Integrated Methodology

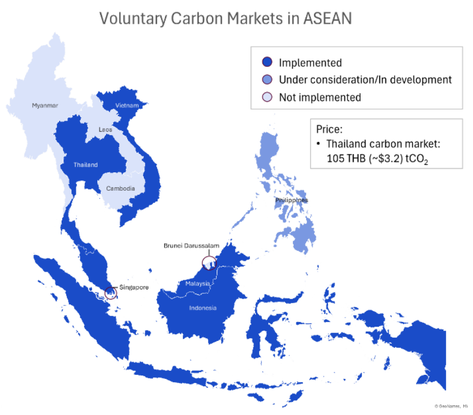


1. Existing Policy and CDRR Landscape in the ASEAN Region



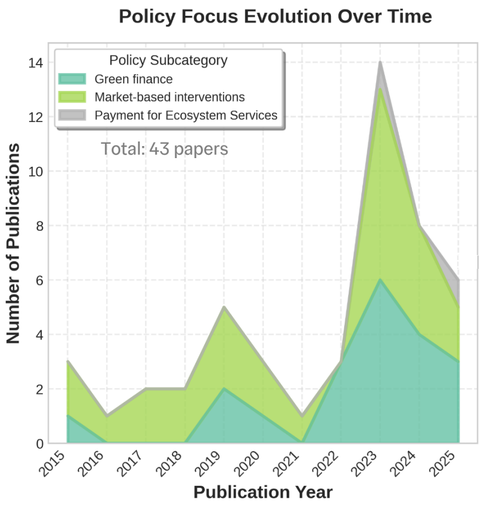
Singapore's carbon tax: $18.6/tCO$_2$

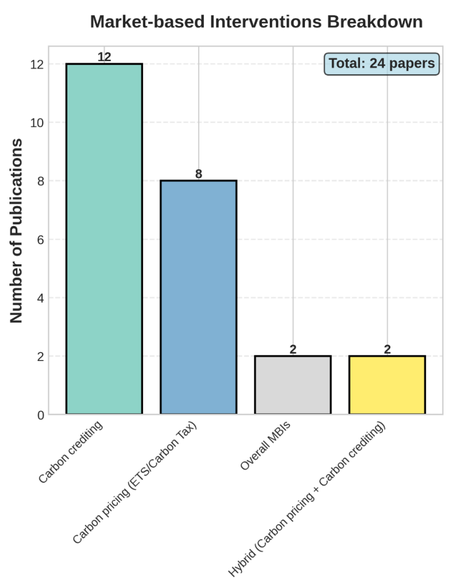
Indonesia's ETS: $0.7/tCO$_2$e
Vietnam's ETS: $1.85/tCO$_2$e

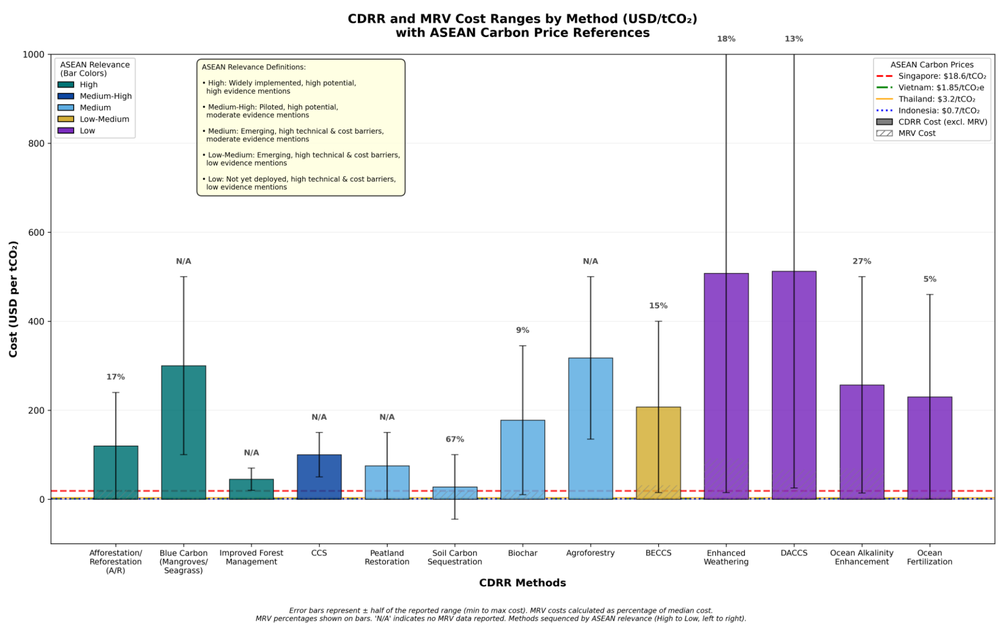


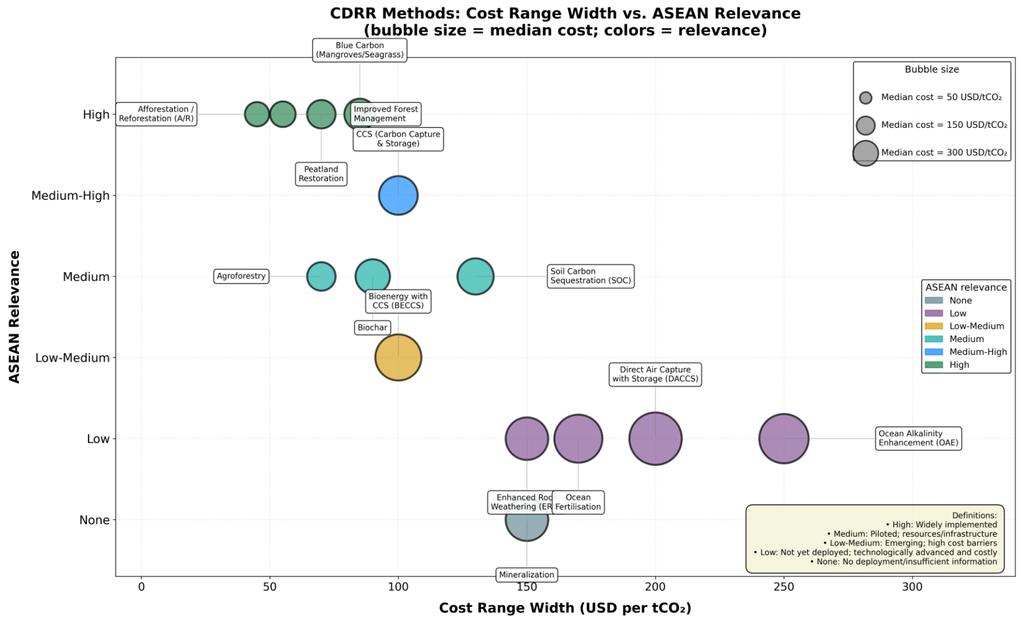
Thailand's carbon markets: $3.2/tCO$_2$e

- ASEAN's carbon pricing mechanisms remain nascent and fragmented, ranging prices from $0.7– $18.6/tCO$_2$. Persistent MRV barriers, including limited technical and institutional capacity, unharmonized accounting standards, and insufficient demand-stimulating policies, undermine market credibility and constrain the cross-border carbon trading essential for scaling CDRR deployment.

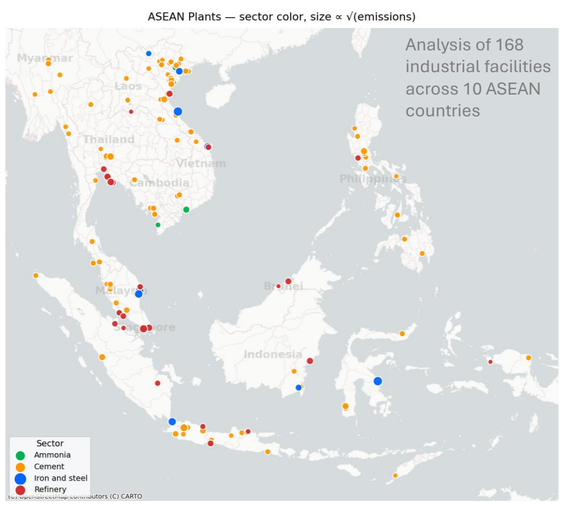


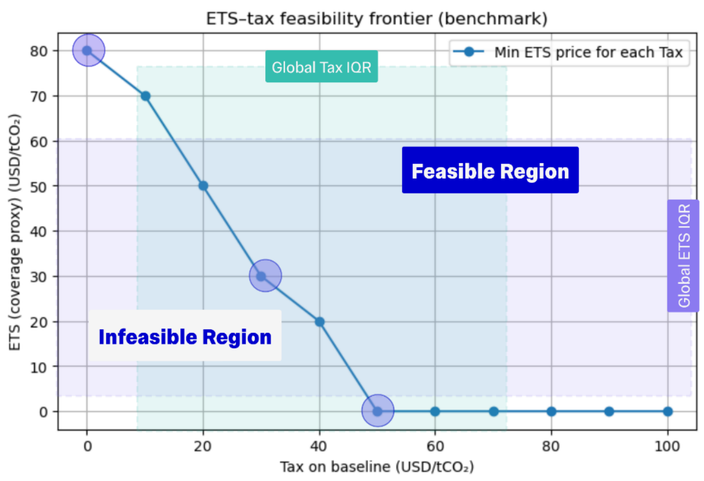




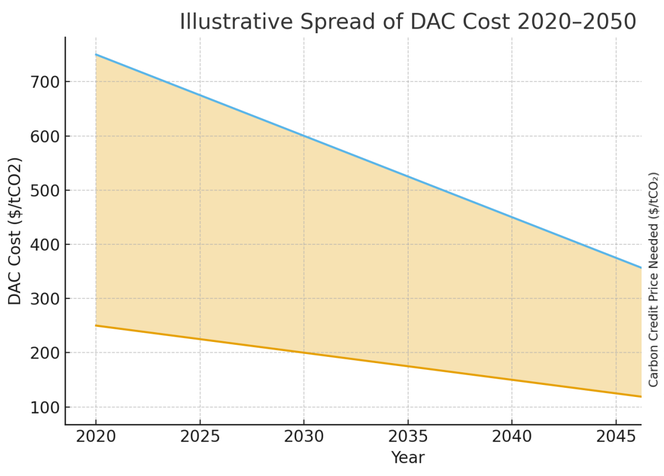


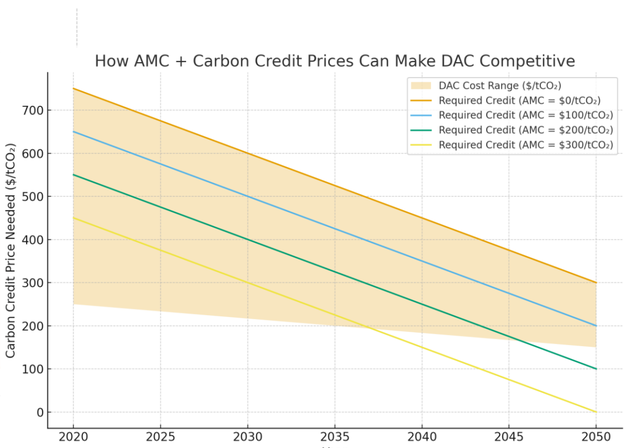
2. Carbon pricing designs and price levels for CCS commercialization

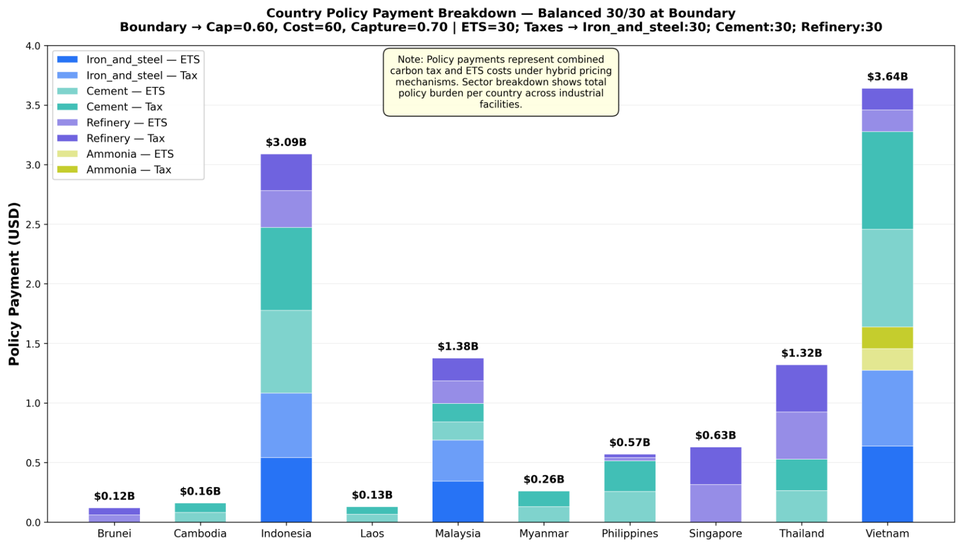




3. Carbon price levels for DAC commercialization







- Achieving commercial viability requires integrated policy mechanisms including ETS, tax credits, and advance market commitments, levels far beyond current ASEAN pricing frameworks.

Conclusion and Next Steps

- Achieving CDRR market viability requires combining several market-based policy interventions. Their value are dependent on the technology and end-user.
- Revenue recycling can strengthen technology investment while maintaining fiscal neutrality, though harmonized MRV frameworks are essential to unlock cross-border carbon markets.
- Future research will identify country-specific funding gaps and develop implementation frameworks that align MBI designs with feasible price thresholds across ASEAN contexts.

References

- Burke, J. and Schenuit, F. (2023) Governing permanence of carbon dioxide removal: a typology of policy measures. CO_2RE – The Greenhouse Gas Removal Hub.
- Chukorn, K. and Oluleye, G. (2025) Can market-based interventions commercialise CCS for deep decarbonisation – An ASEAN case study. Thesis. Imperial College London.
- Hermawan, S. and Kusuma, F.I.S. (2024) 'Navigating the complexities of carbon markets policy in ASEAN: challenges and opportunities', Environment, Development and Sustainability.
- IPCC (2022) Climate change 2022: mitigation of climate change. Contribution of Working Group III to the IPCC Sixth Assessment Report. Cambridge: Cambridge University Press.
- Mercer, L. and Burke, J. (2023) Strengthening MRV standards for greenhouse gas removals to improve climate change governance. Policy report. London: London School of Economics and Political Science.
- Portigliatti, L., Hanna, R., Rosales, R. and Oluleye, G. (2024) Quantifying the impact of market-based mechanisms on the economic viability of carbon removal via direct air capture. Thesis. Imperial College London.
- Shidiq, A. et al. (2024) 'How effective is the carbon pricing implementation in ASEAN member states to reduce regional emissions', IOP Conference Series: Earth and Environmental Science.
- Smith, S.M. et al. (2024) The state of carbon dioxide removal - 2nd edition.
- World Bank (2024) State and trends of carbon pricing 2024. Washington, DC: World Bank.

Imperial College London Postgraduate Researcher Profile