



KAPSARC's Submission to SCF: 7th Biennial Assessment and Overview of Climate Finance Flows

Scaling Up Finance for Carbon Capture, Utilization,
and Storage Technologies

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May 17, 2026

01 Background

The 28th session of the Conference of the Parties to the Climate Convention held in the United Arab Emirates, called on Parties to contribute to global efforts, in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways and approaches in accelerating zero- and low-emission technologies, including, inter alia, renewables, nuclear, carbon management technologies such as carbon capture and utilization and storage (CCUS)¹ and low-carbon hydrogen production (Decision 1/CMA.5, paragraph 28 (e)).

In the sixth biennial overview and assessment of climate finance flows (BA), CCUS was considered alongside other investments in clean energy systems, both within global finance flows and in the mapping of climate-mitigation-relevant activities from existing positive activity lists and taxonomies. However, the report provided limited information on CCUS. Despite their important role in meeting the Paris Agreement goals, CCUS investments have grown only modestly over the years. As affirmed in the CMA 5 decision, it is critical that the BA tracks CCUS investments, both public and private, to assess their contributions and impacts.

This paper aims to contribute to enhancing information on CCUS in the current Seventh Biennial Assessment and Overview of Climate Flows (7th BA) report of the Standing Committee on Finance by presenting an analysis of current investment disparities in CCUS technologies. It delves into the prevailing financing practices and challenges associated with CCUS, providing a comprehensive overview of the sector's current state. Subsequently, it offers a policy discussion outlining potential avenues to address the key obstacles hindering the widespread adoption of CCUS technologies.

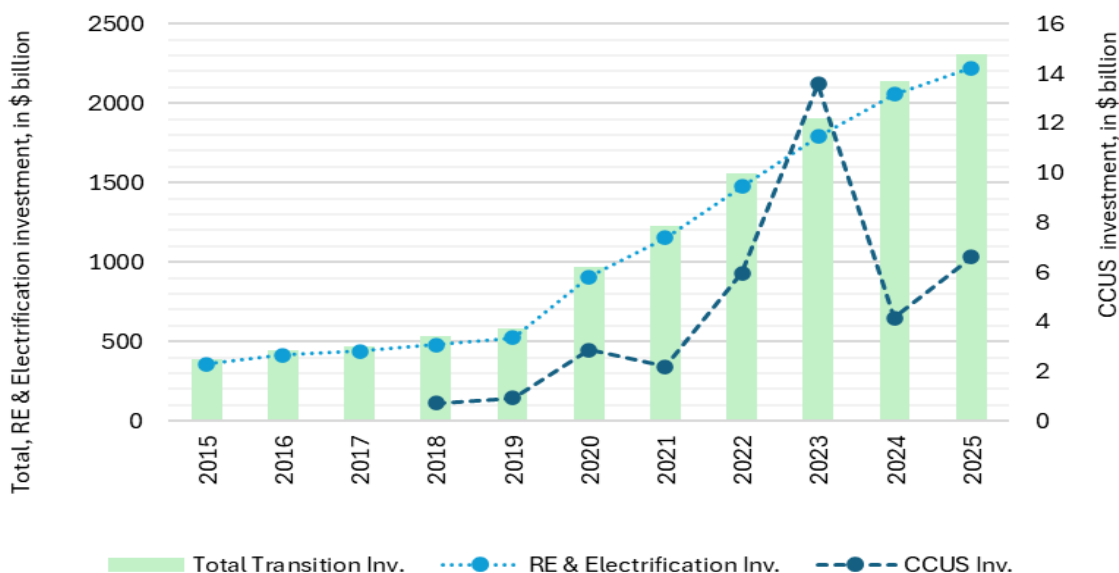
02 Carbon Capture, Utilization and Storage Investment Flows

Global transition investments have grown remarkably in recent years, driven by increasing private-sector participation. Clean technology investment flows surged from roughly US\$0.5 trillion in 2019 to US\$2.3 trillion in 2025. Yet investment remains heavily skewed toward renewable energy and electrification, which together account for over 95% of total flows (Figure 1). On the contrary, CCUS investment flows, a critical technology for the decarbonization of hard-to-abate sectors (e.g., steel, cement, petrochemicals, and heavy transportation), remained mostly low despite significant needs (Yilmaz 2025). The highest recorded annual flow was US\$13.5 billion in 2023, a figure that fell sharply in subsequent years, representing only a fraction of what net-zero pathways require by 2050. Hard-to-abate sectors are foundational to the global economy,

¹ CCUS is used as a broad term encompassing all carbon capture, utilization, and storage activities, including carbon capture and storage (CCS), carbon capture and utilization (CCU), direct air carbon capture and storage (DACCS), and bioenergy with carbon capture and storage (BECCS).

supplying direct or indirect inputs to almost all goods and services. Their failure to decarbonize carries significant financial and economic risks, including stranded asset risks, carbon credit costs, and potentially higher inflation (McKinsey & Company 2022; CFA Institute 2024). Conversely, early movers stand to gain long-term competitive advantage in emerging low-carbon markets (World Economic Forum 2021).

Figure 1: Global annual transition investment flows in clean technologies, by total, renewables (RE) and electrification, and CCUS, over time



Source: Author’s construction from Bloomberg NEF.

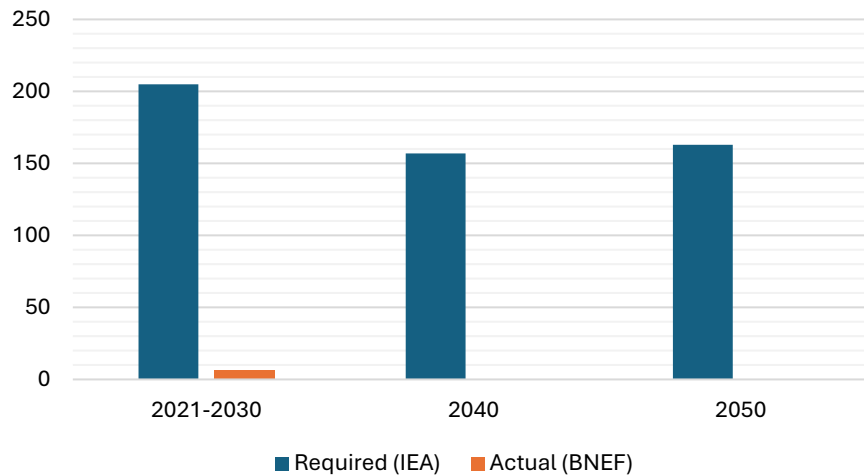
Notes: “Total Clean” includes all clean technology investment flows, including renewable energy, electrified transport and heat, power grids and energy storage, clean industry, nuclear, clean shipping, and CCUS. “RE & Electrification” covers the sum of renewable energy, electrified transport and heat, power grids, and energy storage.

These inputs may be considered under Chapter 2 on global climate finance, particularly on clean energy systems, in the draft report of the 7th BA.

03 Investment Gaps and Challenges

According to the International Energy Agency’s (IEA) net-zero emissions (NZE) scenario (IEA 2021), we need annual investments of US\$205 billion in CCUS in the current decade, and US\$157 billion and US\$163 billion annually in the following two decades until 2050. Overall, the total CCUS investment needed is estimated at US\$5.25 trillion. Yet, Figure 2 shows that global investment in CCUS has amounted to only US\$6.5 billion between 2021 and 2025, far below the needs for a successful global net-zero transition. This stark disparity between required and actual investments underscores the urgent investment gaps for CCUS deployment globally.

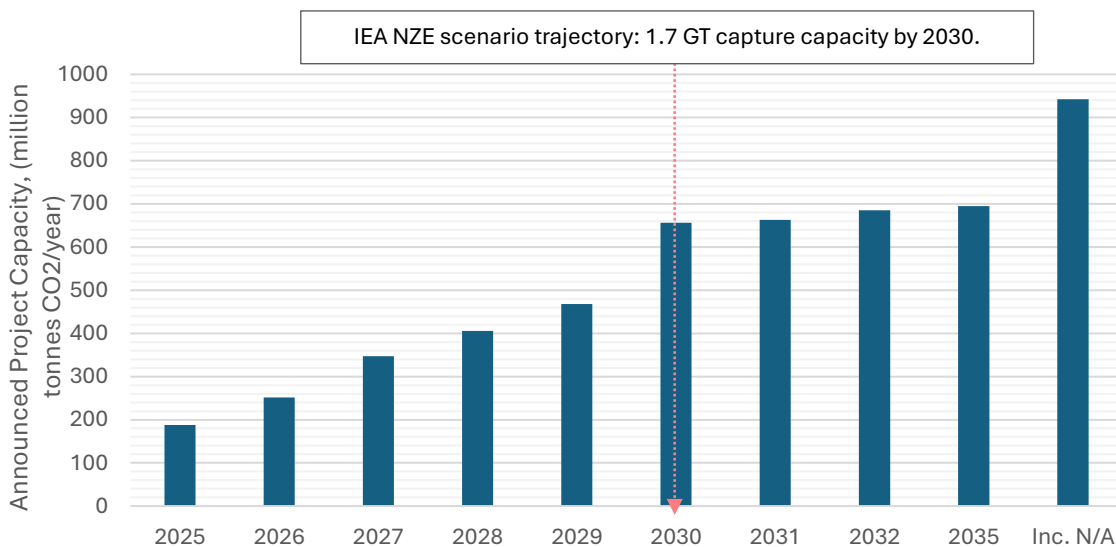
Figure 2: Investment gaps in CCUS, over time



Source: Author's construction from Bloomberg NEF.

Notes: "Require" levels indicate annual investment needs based on the IEA net-zero emissions scenario, and "Actual" covers average investment into the technology in the current decade between 2021 and 2025.

Figure 3. Cumulative CCUS Projects capacity by announced commissioning year



Source: Author's construction from Bloomberg NEF.

Note: The years on the x-axis indicate "announced commissioning dates", while the last bar (with incl. N/A) implies total capture capacity across all projects, including those with missing commissioning dates. The current status of these projects can be operational, under construction, with financing secured, or with permits obtained, while canceled or suspended projects are excluded from the figure.

Despite some recent growth in CCUS investment, the total announced project capacity remains far below the levels required for a successful net-zero transition by 2050. The IEA's NZE scenario estimates a global need for 1.7 gigatons (Gt) of annual CO₂ capture, utilization, and storage capacity by 2030, a target that currently planned projects fail to meet. Even accounting for all projects with both known and unknown commissioning dates, the 2050 target of 7.6 Gt per annum remains unattainable under current trajectories (Figure 3). The disparity between projected needs and actual deployment underscores a significant gap that can only be closed through substantial and sustained investment scaling up in the years ahead.

Our comparative analysis, focusing on current investment levels and scenario context, may be considered under Chapter 3 of the draft 7th BA report, which examines trends in alignment with needs and ownership.

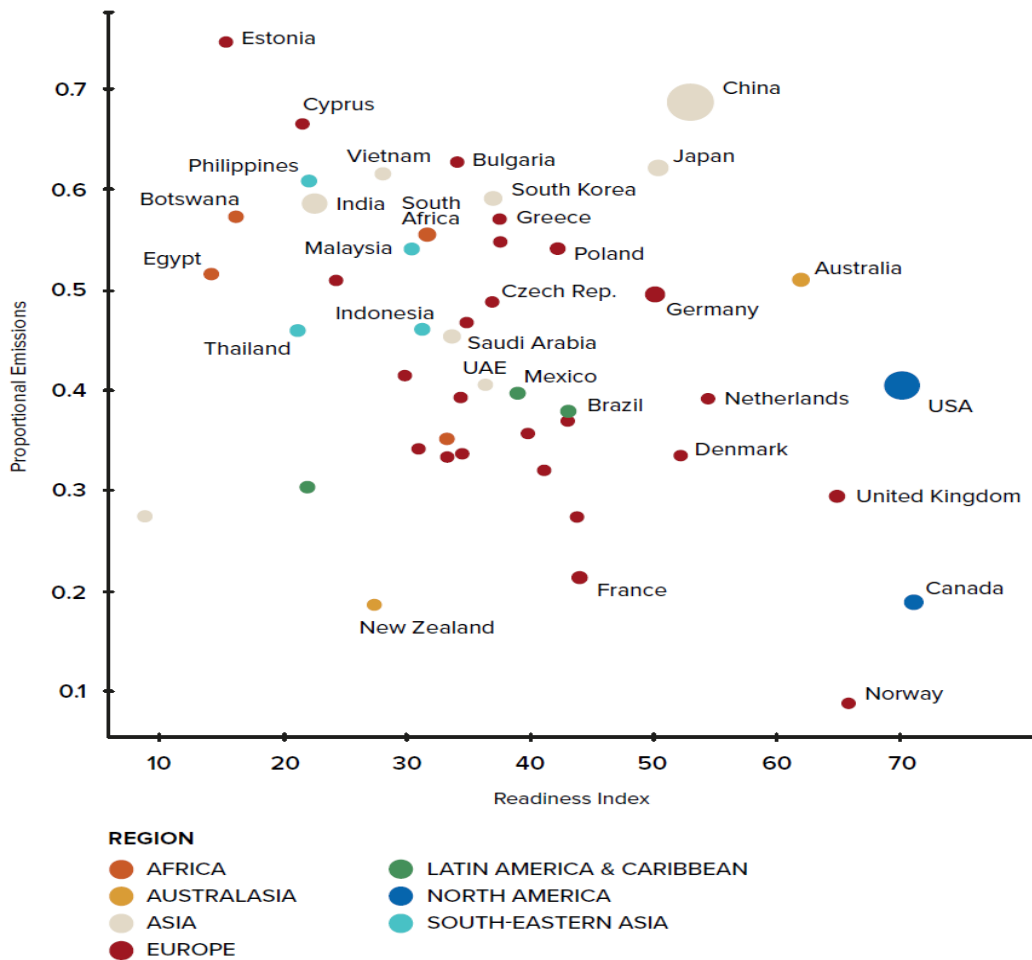
04 Current Financing Practices

CCUS projects are primarily financed through government subsidies and corporate equity, with incentives taking various forms, including grants, R&D support, fixed premiums, contracts for difference, and tax credits. Tax credit programs are particularly prominent in developed countries. For instance, the US 45Q tax credit under the IRA is estimated to reach a total budget of US\$157 billion, while Canada provides around US\$16 billion in investment tax credits for carbon capture and storage. These programs predominantly target the supply side. By contrast, EU-level instruments, such as the EU Innovation Fund, and individual European countries, such as Germany, the Netherlands, and Norway, tend to rely more on grants and price-support mechanisms. These incentive structures are inherently contingent on fiscal capacity, which severely limits developing countries' ability to attract CCUS deployment. In developing countries, CCUS projects are typically financed through state-owned enterprises (SOEs), sovereign wealth funds, or corporate equity. Notable examples include ADNOC, the United Arab Emirates' national oil company, which has invested in CCUS projects, and China National Offshore Oil Corporation, which has partnered with Shell and ExxonMobil to develop the Daya Bay CCS hub in Guangdong Province.

Yet, arguably, the need for CCUS is strong in developing countries, given their disproportionate concentration of hard-to-abate industries. For instance, China and India together produce more than half of global steel and nearly 60% of global cement, while major petrochemical output is concentrated in developing Asia and the Middle East. However, there appears to be a mismatch between deployment needs and readiness in most developing countries, as illustrated in Figure 4, which plots each country's hard-to-abate sector CO₂ share against its CCS Readiness Index score (Global CCS Institute, 2022). The figure reveals that most developing countries face a high CCUS need alongside significant readiness gaps, which explains the concentration of CCUS deployment in developed countries.²

² According to BNEF, the top-five CCUS project hosting countries, the U.S., UK, Canada, Australia, and China, account for 75 % of global announced CCUS capture capacity.

Figure 4. Country-level needs for CCUS technology (i.e., proportion of hard-to-abate emissions) and their current readiness



Source: Rassool (2021)

Note: Countries' proportional emissions (representing their need for CCS in iron and steel manufacture, cement production, power generation from fossil fuels, and bioethanol production) are measured against their scores in the Global CCS Institute's Readiness Index. The higher the value of proportional emissions, the greater the need for CCS. The larger the size of each circle, the greater the country's overall emissions.

Overall, most developing countries face significant challenges in decarbonizing hard-to-abate sectors. Along with limited public resources, they struggle with inadequate private financing mechanisms and technical deficiencies. Consequently, one-sided approaches like the Carbon Border Adjustment Mechanism (CBAM) of the Europe Union (EU), which require rapid adoption of decarbonization technologies in hard-to-abate sectors without offering any direct financial support, could further hinder transition efforts, particularly in the Global South (Magacho et al. 2024).

These discussions can directly feed into Chapter 3 of the draft 7th BA report, which covers global finance, opportunities and costs, and drivers and barriers to climate finance flows.

05 Conclusion and Policy Recommendations

Decarbonizing hard-to-abate sectors requires a holistic financing approach that addresses technical, market, and regulatory barriers simultaneously. Yet the most fundamental constraint remains the scarcity of available finance, compounded by inadequate physical and legal infrastructure that renders these sectors structurally unattractive to private capital.

Private investment in CCUS remains critically low relative to need. This reflects deep structural barriers: long project development cycles, uncertain revenue streams, immature carbon markets, and the absence of clear, globally consistent sustainability standards that would allow investors to assess and price transition risks. Inclusive and technology-neutral ESG frameworks, particularly those under the IFRS Foundation's International Sustainability Standards Board, must explicitly accommodate CCUS as a credible transition pathway. Concretely, this means ensuring that IFRS's climate-related disclosure standards recognize CCUS deployment as a legitimate Scope 1 emissions reduction strategy for hard-to-abate industries, rather than inadvertently stigmatizing carbon-intensive sectors that have no viable near-term alternative.

Equity concerns further compound the financing challenge. Instruments such as the EU's CBAM and technology-prescriptive project finance criteria risk marginalizing the Global South, where hard-to-abate industries are most concentrated, and CCUS need is greatest, yet fiscal space and institutional readiness are most limited. This tension sits at the heart of the principle of common but differentiated responsibilities enshrined in the United Nations Framework Convention on Climate Change framework. Uncoordinated or asymmetric policy action could deepen global decarbonization inequities rather than resolve them, effectively penalizing developing economies for structural conditions that are difficult to address in the short term.

Closing the CCUS financing gap requires coordinated action across policymakers, multilateral development banks (MDBs), financial regulators, and standard-setters. The New Collective Quantified Goal (NCQG) on climate finance represents a critical opportunity in this regard. CCUS deployment in hard-to-abate sectors should be explicitly recognized as an eligible use of concessional flows under the NCQG architecture, with dedicated sub-goals that reflect the disproportionate financing needs of developing countries in this space.

At the project level, several complementary mechanisms can help close the gap, particularly in developing country contexts:

- **De-risking and concessional capital:** Blended finance structures that combine public or MDB concessional capital with private investment, alongside credit guarantee programs from international institutions, can substantially reduce financing costs and crowd in private capital.
- **Enabling business cases:** Domestic governments can strengthen project viability through off-take and service purchase agreements with private sector partners, providing the revenue certainty that long-cycle CCUS projects require. Developing the requisite

physical infrastructure (transport and storage networks) and legal frameworks (liability, permitting, property rights for CO₂ storage) are equally foundational.

- **Carbon market integration:** The cooperative mechanisms established under Article 6 of the Paris Agreement offer a direct pathway for CCUS credits to generate tradeable or offsetable carbon units across borders, improving project economics and mobilizing additional private finance. Operationalizing Article 6.4 for CCUS-eligible activities should be a near-term priority.
- **Capacity building:** International institutions must prioritize technical assistance and training for developing country governments and regulators, addressing the readiness gaps that currently prevent many high-need countries from attracting or deploying CCUS investment.

Taken together, these measures form a coherent and equitable framework for scaling CCUS finance, consistent with both the urgency of net-zero commitments and the differentiated realities of countries at different stages of development.

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