NATIONAL CLIMATE FINANCE VEHICLES

BEST PRACTICE INSIGHTS FROM INTERNATIONAL CASE STUDIES

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Note:
In this publication, "$" refers to United States dollars, "A$" refers to Australian dollars, "B" refers to Thai baht, and "Rp" refers to Indonesian rupiah.

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ABBREVIATIONS

ADB	–	Asian Development Bank
ARENA	–	Australian Renewable Energy Agency
CEFC	–	Clean Energy Finance Corporation (Australia)
DEDE	–	Department of Alternative Energy Development and Efficiency (Thailand)
DMC	–	developing member country
EERF	–	Energy Efficiency Revolving Fund (Thailand)
ENCON	–	energy conservation
ESCO	–	energy service company
FIL	–	financial intermediary loan
GCF	–	Green Climate Fund
IRR	–	internal rate of return
LCCR	–	low-carbon, climate-resilient
MOF	–	Ministry of Finance
MW	–	megawatt
NDC	–	nationally determined contribution
PIM	–	public investment management
PFM	–	public fiscal management
PT SMI	–	PT Sarana Multi Infrastruktur (Indonesia)
SDG	–	Sustainable Development Goal
SIO	–	SDG Indonesia One
SMEs	–	small and medium-sized enterprises
SOE	–	state-owned enterprise
WACC	–	weighted average cost of capital

1. EXECUTIVE SUMMARY

1.1 Background

The urgent need to close the climate investment gap is a pressing issue for nations across Asia and the Pacific. The Asian Development Bank (ADB) estimates that developing Asia alone requires an estimated infrastructure investment of $1.7 trillion annually by 2030 to ensure that climate and development goals will be met. However, investments are falling significantly short, while the capacity of public finance to close the gap alone is insufficient. Strategic use of public financing to leverage climate-aligned private investment is therefore critical to mobilizing the necessary resources to support low-carbon, climate-resilient (LCCR) development pathways.

This working paper developed under ADB's Nationally Determined Contribution (NDC) Advance technical assistance platform sets out the important role that national climate finance vehicles can play in stimulating private investment in LCCR development. The paper also describes key challenges and solutions to successfully establishing and operating a financing vehicle in a developing country. Informed by three case studies of national financing vehicles from Australia, Indonesia, and Thailand, the paper presents a model design framework and key readiness criteria defining the key enabling factors and design choices for national climate finance vehicles to support the achievement of LCCR investment scale-up effectively. The working paper concludes with key recommendations for developing member countries (DMCs) to inform their approach to designing and operationalizing a climate finance vehicle.

1.2 Role of Climate Finance Vehicles

Climate finance vehicles focused on LCCR development are partly or wholly publicly financed entities separate from the government, with a separate balance sheet, that are mandated to invest in either or both climate mitigation and adaptation activities, covering sector(s) that either contribute to global emissions or are vulnerable to climate change. In principle, they are not set up to compete directly with private financial institutions but seek to crowd in private finance—especially by institutional investors—by addressing market imperfections that can inhibit the development and implementation of economically viable LCCR projects. To do this, climate finance vehicles may have various roles and employ a range of financial instruments that each play a specific role in supporting LCCR projects:

(i) **Blending finance.** Combining public and private funds to reduce risks and improve returns for private investors.
(ii) **Providing concessional finance:** Offering financing at favorable terms to support financial viability.
(iii) **Mitigating risks:** Using guarantees, insurance, and other credit enhancement tools to lower the risk profile of climate investments.
(iv) **Facilitating access to capital markets:** Helping to structure and issue green bonds and other financial instruments to attract institutional investors.
(v) **Project preparatory support:** Supporting project developers to prepare well-designed projects and thus develop bankable project pipelines.
(vi) **Capacity building and market information:** Acting as a hub for technical expertise and market information, the vehicle can reduce investor risk perception and build the technical capacity of stakeholders.

By leveraging these instruments and roles, climate finance vehicles seek to address market barriers that inhibit private investment, thus playing a crucial role in scaling up climate finance.

1.3 Readiness Criteria

The working paper presents a set of readiness criteria that should be assessed before prioritizing the establishment of a national climate finance vehicle:

Investment in a strong balance sheet. A climate finance vehicle requires a strong balance sheet to support investment activities. This strength depends on the country's stable public fiscal position, which should provide the necessary capital without compromising other fiscal commitments. A robust balance sheet enables the vehicle to undertake investments and boosts private investor confidence, especially when guarantees are involved, making them more willing to participate in high-risk projects.

Institutional and policy reforms. Sector and cross-sector policy and structural reforms are often needed as a precursor to unlock external and private finance and ensure financial viability. These reforms are crucial for enabling effective cost recovery. Without such reforms—especially in sectors like renewable energy, where inadequate cost recovery can erode financial stability—the effectiveness of climate finance vehicles will be severely limited.

Legal framework and market confidence. A credible climate finance vehicle requires strong market confidence rooted in a country's robust legal framework. This includes clear and enforceable laws governing investment, property rights, and contracts, ensuring transparency, predictability, and freedom from political influence. Such a legal environment enhances the vehicle's reputation, attracting domestic and international investors. Often, specific laws are enacted to establish climate finance vehicles, allocate funding, and outline governance arrangements, further bolstering investor confidence.

Public investment management processes. Effective public investment management (PIM) processes are essential to ensure a climate finance vehicle is not compromised by poor project design, procurement, or delivery. These processes should include methods for identifying, appraising, and prioritizing public investments, supported by sufficient institutional capacity to manage complex projects to high standards. Strong PIM processes are crucial because they create a robust pipeline of investment-ready projects for the climate finance vehicle. They ensure the vehicle makes fiscally sustainable investments, protecting its balance sheet and the government's.

Coordination with fiscal and monetary authorities. These authorities must be willing and capable of working collaboratively with the climate finance vehicle to align its activities with broader economic policies and objectives. Coordination helps ensure that the vehicle's investments are supportive of and supported by national fiscal and monetary policies. Effective coordination also mitigates the risk of macroeconomic imbalances arising from the climate finance vehicle's operations.

Institutional capacity and governance. Effective governance for a climate finance vehicle requires a clear mandate, defined roles and responsibilities, and robust oversight mechanisms to ensure transparency and accountability. Adopting principles similar to the Santiago Principles for sovereign wealth funds can guide good governance practices. Additionally, the success of the vehicle depends on having a skilled team with expertise in finance, risk assessment, environmental analysis, and regulatory compliance to manage investments and drive innovation.

Market conditions and private sector engagement. The broader market conditions need to be assessed, including the level of private sector engagement in climate-related investments and appetite for engaging and working with a climate finance vehicle. A climate finance vehicle's ability to mobilize private capital requires a supportive business environment and investment in relationships with the private sector to understand private sector views on opportunities and challenges.

1.4 Design Framework

Designing a climate finance vehicle involves making several important decisions to define its scope, funding structure, governance, and operational mechanisms. Following is a framework highlighting the key design categories and the factors driving each decision.

(i) **Scope.** Define the sectors the vehicle will target, such as energy or agriculture, based on national climate goals and market needs. Ensure interventions address market imperfections and align with strategic priorities.
(ii) **Funding structure.** Choose between public, private, or blended financing. Public funding offers more control but requires significant capital, while private financing may increase independence and attract more investment. Consider external funding requirements and financial soundness criteria.
(iii) **Governance and management.** Establish a governance model that balances independence with public coordination. Consider whether to use public or private management, adhere to principles of transparency and accountability, and manage risks related to government balance sheets.
(iv) **Investment mandate.** Define whether to focus on financially viable investments only or include noncommercial ones. Ensure decision-making procedures are transparent and consider blended finance to maintain financial viability.
(v) **Concessionality.** Set principles for financing at market rates, adjusting for concessionality where necessary. Evaluate factors such as targeted returns, barriers, and market impact to determine the appropriate level of concessionality.
(vi) **Financial instruments.** Choose instruments like equity, debt, or guarantees based on market conditions and project needs. Equity investments foster innovation but come with higher risks, while debt offers stability. Guarantees can attract private investment by mitigating risks.
(vii) **Coordination and integration.** Ensure alignment with national climate strategies and public fiscal processes while maintaining operational independence. Foster collaboration with public and private stakeholders to enhance impact.
(viii) **Risk management.** Implement rigorous risk assessments, maintain reserves for contingent liabilities, and enforce anticorruption measures to ensure integrity and stability.

Making informed design decisions based on evidence will support climate finance vehicles to effectively mobilize resources, attract private investment, and drive the transition to a low-carbon and climate-resilient (LCCR) economy.

1.5 Recommendations

Many DMCs face constraints that would reduce the effectiveness of a climate financing vehicle, including under-developed governance frameworks, a lack of human resources capacity, a lack of funding sources, and structural investment barriers. ADB can support DMCs in planning and implementing strategies to mobilize scaled-up climate financing, including establishing dedicated climate finance vehicles. Technical assistance and financing products like ADB's policy-based lending can support DMCs in designing and implementing readiness activities and broader sector reforms, while financial intermediary loans can address a financing vehicle's funding needs. The following recommended steps can guide a DMC's process and approach:

Conduct a comprehensive readiness assessment. A thorough readiness assessment can evaluate whether a DMC's financial, legal, and institutional context is conducive. This assessment can identify gaps in public fiscal management (PFM) and public investment management (PIM) systems, legal frameworks, and structural barriers to climate investment. Understanding these gaps will allow for targeted capacity building and the design of reform programs before taking the first steps to designing and operationalizing a national climate financing vehicle.

Strengthen the investment enabling environment. Reforms can support the financial sustainability and investment environment in targeted sectors. This includes establishing stable and predictable legal and regulatory frameworks, strengthening policy alignment, and reducing uneconomic incentives. For example, in the energy sector, fossil fuel subsidies work to undermine the investment case for renewable energy technologies, while non-cost-reflective tariffs can erode a utility's bankability and restrict investment in transmission infrastructure required for renewable energy integration. Upstream policy interventions can drive transformational impact compared to committing scarce public finance that only addresses downstream investment barriers.

Identify resources, reinforce public fiscal management and public investment management, and develop the capacity of public institutions. Strengthening PFM and PIM systems is crucial to establishing effective processes and capacity for managing public funds efficiently and transparently. Capacity building efforts should target the development of technical expertise within public institutions to improve the identification, preparation, and execution of climate-related projects. Sufficient resources must be available to fund the establishment, staffing, and initial capitalization of a climate finance vehicle.

Clearly define the rationale, mandate, and process for vehicle establishment. Develop a business case and implementation plan for establishing the vehicle. A proposed investment and operating mandate needs to define the market area in which it will operate, broad guidelines for investing and managing risk, its funding strategy, and how the vehicle is positioned within the broader objectives of national development and climate policy. Governance principles and mechanisms should be consistent with a DMC's statutory requirements for public bodies, including the responsibilities, powers, and statutory duties of office holders such as the board, chair, and chief executive officer. Employee duties, functions, and skill sets should also be defined. How the vehicle interacts with other public agencies and external institutions—such as development finance institutions—should also be considered.

Design with flexibility and clarity. The design of national climate finance vehicles should balance flexibility and clarity. While there is a need to have clear mandates and strategic objectives that align with national climate policies, there should be flexibility to adapt to changing market conditions and emerging priorities. The investment strategy may include a mix of financial instruments to address the diverse needs of LCCR projects. However, risk management must be prioritized, and therefore, a phased approach may be taken in line with building the capabilities to carry out the risk management function. Moreover, the overall aim of investment should be to return at least the government's cost of capital to ensure fiscal sustainability while also allowing for investments in projects with significant environmental or social benefits that may offer lower financial returns.

Ensure robust governance. Establishing strong internal governance structures is essential to safeguard the integrity of national climate finance vehicles. This includes setting up independent boards with clear decision-making authority, ensuring transparency in investment processes, and establishing mechanisms for monitoring and evaluating performance. Governance frameworks must be designed to prevent political interference and ensure investments are made based on sound financial and environmental criteria. Strong governance should include supreme state audit authority oversight to ensure appropriate financial reporting, sound procurement processes, transparency, and corruption-free conduct.

Engage the private sector. Engaging with the private sector is crucial for success. Governments and national climate finance vehicles should actively seek to build partnerships with institutional investors, offering them investment-ready projects that match their risk–return profiles. This can be facilitated through blended finance mechanisms that combine public and private resources to de-risk investments and make them more attractive to private investors. Additionally, collaboration with international climate finance institutions—such as the Green Climate Fund and Climate Investment Funds—can enhance credibility and attract additional funding. Leverage targets assist in maintaining focus on private sector engagement, even if there is a transition period before targets can be achieved.

2. INTRODUCTION

A growing climate investment gap threatens the achievement of national climate mitigation and adaptation goals across Asia and the Pacific. Moreover, climate change further widens the infrastructure investment gap and compounds challenges in progressing toward the Sustainable Development Goals (SDGs). The Asian Development Bank (ADB) estimates that from 2016 to 2030, $1.7 trillion per year will need to be invested in infrastructure in developing Asia alone to ensure that climate and development goals will be met. This translates into average investments of 5%–9% of gross domestic product.[1] Meeting climate change targets and the SDGs will require a significant scale-up in investment—particularly from private sources—along with a renewed focus on institutional strengthening.

In many developing member countries (DMCs), climate finance flows from the private sector are limited due to low perceived returns, information asymmetries, and the difficulty of reliably pricing climate risk or investing in technologies not yet commercially viable. Public sector investment is limited by financial incapacity, weak governance, and inadequate project development capability. Public balance sheets often have limited capacity for substantial further finance without significant reforms, creating additional fiscal space. In addition, more than one-third of the resources spent on creating and maintaining public infrastructure are lost because of inefficiencies closely linked to governance.[2]

In Indonesia, for example, the government budget can only cover 34% of the $85 billion investment required to reach the 2030 climate targets, leaving a gap of about $145 billion.[3] Private finance is thus expected to play a critical role in delivering the required climate finance.

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1 Pacific: 9.1%; South Asia: 8.8%; Central Asia: 7.8%; Southeast Asia: 5.7%; East Asia: 5.3%. ADB. 2017. Meeting Asia's Infrastructure Needs: Highlights.

2 International Monetary Fund. 2020. Well Spent: How Strong Infrastructure Governance Can End Waste in Public Investment. p.1.

3 Climate Policy Initiative. 2023. Climate-Aligned Investments in Indonesia's Financial Sector.

Climate finance vehicles focused on low-carbon and climate-resilient (LCCR) development offer a promising solution. Often performing roles akin to development banks, these vehicles are partly or wholly publicly financed entities separate from the government—with a separate balance sheet—that are mandated to invest in either or both climate mitigation and adaptation activities, covering sector(s) that either contribute to global emissions or are vulnerable to climate change.

Many national and subnational governments have used these vehicles to bridge the investment gap and achieve climate goals by bearing risk, crowding in external and private finance, strengthening governance, attracting institutional investors, addressing market imperfections, and providing expertise.[4] However, as climate finance vehicles are public entities, care must be taken to operate them so that economically justified subsidies are explicitly acknowledged and fiscal risk to the public balance sheet is carefully managed.

National climate finance vehicles can bring focus, performance transparency, and access to specialist management skills. They can also match investments with capital, helping coordinate investments with legislation and regulation and the activities and investments of other public bodies and private sector entities such as privately owned utilities.

National climate finance vehicles commonly use innovative transaction structures, risk reduction and transaction-enabling techniques, and local and market expertise to address the market imperfections that inhibit institutional investor participation (footnote 4). These vehicles also leverage structures and techniques with a long history of effective use, including credit enhancement mechanisms like partial credit guarantees.

This working paper—developed under ADB's NDC Advance technical assistance platform—sets out the important role that national climate finance vehicles can play in stimulating investment in LCCR development.[5] A model design framework and key readiness criteria are presented to understand the key factors supporting effective operation and achieving prioritized climate outcomes and sustainable development. The paper presents three case studies of national financing vehicles from Australia, Indonesia, and Thailand, identifying success factors and lessons learned. The working paper concludes with key recommendations for DMCs to inform the approach to designing and operationalizing a climate finance vehicle.

[4] Organisation for Economic Co-operation and Development (OECD). 2016. Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure, Australia's Clean Energy Finance Corporation, and the United Kingdom Green Investment Bank (sold to Macquarie Group).

[5] ADB. Supporting the Implementation of ADB's Climate Change Operational Framework 2017–2030 Subproject 2: Enhancing Financial Mechanisms to Develop Climate Actions of Developing Member Countries (TA 9744-REG).

3. MARKET BARRIERS TO SCALING UP CLIMATE FINANCE

Climate mitigation and adaptation projects do not always happen as expected. *Financially* viable projects that provide investors with a risk-adjusted return on capital often come to fruition with private investors willing to deploy capital if risk and financial return are within acceptable thresholds. *Economically* viable projects—which generate net economic benefits compared to available alternatives—should ideally also be pursued, but where they are not financially viable, they are often not undertaken without additional public support.

To understand why—in some cases—climate mitigation and adaptation projects do not happen or do not happen at scale, it should be recognized that not all mitigation and adaptation projects are economically viable. Efficient investment in mitigation and adaptation varies depending on each country's unique national and local context and international commitments.

Even for projects that are financially or economically viable, a range of market imperfections can inhibit their development and implementation. These include public goods, imperfect incentives, information asymmetries, transaction costs, and project risks.

Information asymmetries play a significant role. LCCR projects represent a large, diverse, and rapidly evolving asset class in terms of technologies, policy settings, and benefits as the impacts of climate change become more precisely modeled and understood and international climate policy evolves. Institutional investors require substantial research and upfront investment to understand this asset class, identify potential opportunities, and evaluate them. However, many institutional investors lack the scale to do so, and those with little incentive to share the knowledge they acquire have a reduced appetite for entering this asset class.

The key premise for the establishment of the state-owned Clean Energy Finance Corporation (CEFC) in Australia (case study 7.1), for example, was that while Australian banks had historically financed large-scale renewable energy projects—often focusing on wind projects with established power purchase agreements—they would likely refrain from pioneering investments or funding ventures involving emerging technologies or the scaling up of innovative technologies to commercial viability. Likewise, Australian superannuation funds and institutional investors tend to be cautious about investments that require significant knowledge development and associated costs for emerging opportunities.

Public goods present a gap between economic viability and financial viability. Projects may be economically viable but not financially viable due to their public good characteristics, where benefits extend beyond identifiable individuals, and one person's benefit does not come at the cost of another (non-excludable and non-rivalrous consumption). Virtually all mitigation strategies have benefits that extend beyond the individual, and many even benefit nations beyond the one taking action. For instance, reduced emissions lessen the impacts of climate change, which benefits all countries. Many adaptation strategies share similar characteristics. For example, building a sea wall protects a whole town or community from rising sea levels and indirectly benefits the surrounding area and country. In such situations, some individuals may rely on others' efforts and "free ride," leading to underinvestment. The difficulty with these projects is that the development and operation costs, including the cost of capital, cannot be recovered from those benefiting without some form of state intervention, resulting in underinvestment.

Imperfect incentives further complicate the situation. In sectors like energy and transport—where significant potential and large investments are required—promising new technologies introduce uncertainties that can lead to underinvestment due to "first mover disadvantage" issues. Investors often demand a national "track record" for investing in new technology, but private parties lack the incentive to take on "first mover" risks as it does not generate additional returns. Even when beneficiaries can be specifically identified, large-scale investment will not occur until investors are confident in the usage, which becomes apparent once the project is available (i.e., a "collective action" issue).

Transaction costs and the need for aggregation can further deter investment. Certain projects may offer attractive returns but require scale, such as energy efficiency projects like social housing insulation. The extended timeframe needed to establish an aggregation entity and develop sufficient scale to recover a risk-adjusted return on capital carries the risk of policy changes that could undermine the business. Thailand's government-backed Energy Efficiency Revolving Fund (EERF) (case study 7.3) was established in 2003 to stimulate private investment in energy efficiency projects by simplifying project appraisal and financing processes. Many energy efficiency measures are financially viable for investors but are inhibited by various market barriers. Thailand's banks have traditionally lacked the expertise and understanding of energy efficiency projects, resulting in barriers for developers to access financing. As such, local banks have provided insufficient energy efficiency lending, particularly to small and medium-sized enterprises (SMEs) and energy service companies (ESCOs). Small companies and ESCOs lack the balance sheets to provide sufficient collateral for loans, whereas future cost savings are typically not considered in the lending process. Inadequate institutional capacity and enabling legislation to drive energy efficiency finance have been significant constraints to financing energy efficiency in Thailand and mobilizing greater private sector investment.

Project risks add another layer of complexity. The national context related to governance, institutions, capital markets, macro-economy, and the public fiscal position can present challenges, including counterparty credit risk, policy risk, political risk, and exchange rate risk. These factors limit opportunities, particularly for long-term financing from institutional investors.

Some market imperfections are temporary, such as first-mover risks for new technologies, which require only transitional public support. Others are persistent, such as for public goods, necessitating structural public support.

Institutional investors typically cannot assume project development risk, but they can significantly impact during the operational phase if the market imperfections outlined in this paper are addressed and the risk–return offered is sufficient. By appropriately deploying different sources of capital across the project lifecycle, higher risk appetite financing sources capable of supporting project development can be recycled to the next project. Additionally, governance plays a crucial role; projects are not always identified, evaluated, and prioritized appropriately, leading to efficiency losses, which are often a result of weak governance in public fiscal management (PFM) and public investment management (PIM) processes.

4. DEFINING THE ROLE OF CLIMATE FINANCE VEHICLES

Climate finance vehicles—such as green investment banks—are partially or wholly publicly financed and operate independently from the government, maintaining a separate balance sheet. Governments endow these institutions with a public mandate to accelerate external and private investment in LCCR projects. They may focus on climate mitigation, adaptation activities, or both, covering all sectors or specific subsectors as required by their national and local contexts.

Operating in a role similar to that of national development banks, climate finance vehicles are dedicated to LCCR project development. In principle, they are set up so as not to compete directly with private financial institutions but rather seek to crowd in private finance, especially by institutional investors, by addressing the market imperfections discussed in section 3 all of which can inhibit the development and implementation of economically viable LCCR projects and investment in them by institutional investors.

Climate finance vehicles can employ a range of financial instruments to overcome these market imperfections. They provide debt and equity investments, credit enhancement mechanisms, and technical assistance, each playing a specific role in supporting LCCR projects:

(i) **Debt investments** involve lending funds to LCCR projects with the expectation of repayment with interest, including as part of blended public and private finance deals. By offering loans at concessional rates, climate finance vehicles can reduce the cost of capital for projects, making them more financially viable. This infusion of capital helps lower the initial financial barriers, allowing projects to proceed where they might otherwise stall due to lack of funding. In Thailand, the Energy Efficiency Revolving Fund (EERF) (case study 7.3) is a dedicated national fund created through a public–private partnership approach to boost energy efficiency. EERF supported energy market development by providing below-market concessional loans to banks, who then on-lent to energy efficiency project developers.

(ii) **Equity investments** entail climate finance vehicles taking an ownership stake in LCCR projects. These vehicles share the financial risk with private investors by providing equity, enhancing the project's appeal. This risk-sharing mechanism is crucial for attracting private capital, especially in high-risk projects or emerging sectors where private investors might be hesitant to invest without public support.

(iii) **Credit enhancement mechanisms** such as guarantees and partial risk guarantees, are pivotal in mitigating various project and policy risks. These guarantees assure private investors that they will recover a portion of their investment in case of project failure or adverse policy changes. This assurance reduces the perceived risk, encouraging private investment by improving the project's risk–return profile. For example, partial risk guarantees can protect against specific risks like currency fluctuations or regulatory changes, which are often significant concerns for institutional investors.

(iv) **Blended finance is key to enhancing investment viability and the financial sustainability of the climate financing vehicle.** Blended finance allows investors to participate in the same project while accommodating varying risk tolerance levels. This method is commonly applied in real estate deals and is useful for financing essential yet challenging projects. It facilitates collaboration among philanthropic organizations, government sources, and private investors, each with different risk and return profiles. Investors open to higher risk can provide a financial buffer for those seeking lower risk, making it possible for high-impact initiatives to receive the necessary funding. A national climate change vehicle can use blended finance to maintain hurdle rates of return to ensure financial sustainability,

using blended finance (e.g., investment grants) to lower capital costs as required. This allows it to maintain a strong balance sheet without needing recourse to that of the state, enabling it to be sustainable for the long term.

(v) **Technical assistance** is another critical tool used by climate finance vehicles. This involves providing expertise and support to address information asymmetries and enhance the capacity of institutional investors to engage with the LCCR asset class. Technical assistance can include offering local and market expertise, conducting feasibility studies, and helping with project design and implementation. Supporting project preparation can build pipelines of bankable projects ready for financing and aligned with government policy priorities. By improving the knowledge base and confidence of investors and commercial lenders, technical assistance ensures they are better equipped to identify, evaluate, and invest in LCCR projects. Thailand's EERF is a leading example of how private sector investment can be more readily mobilized by developing technical and policy training courses for commercial financial institutions to consider the energy-saving potential of projects and the ability to translate these savings into profit. The fund further provided seminars and training for prospective clients and banks, advertising campaigns to share knowledge about energy efficiency opportunities, and a better understanding of funding requirements.

These financial instruments and support mechanisms are not novel; they have a long history of effective use by development banks in the development context. This includes credit enhancement mechanisms the International Finance Corporation provides, such as partial credit guarantees. In addition to financial support, climate finance vehicles bring focus and performance transparency, access to specialist management skills, and the ability to match investments with capital. They help coordinate investments with legislation and regulation, align the activities and investments of other public bodies, and engage private sector entities such as privately owned utilities.

Indonesia's PT Sarana Multi Infrastruktur (SMI) (case study 7.2) is a good example of a traditional "infrastructure investment bank" that has pivoted to direct its governance arrangement, risk management framework, commercial approach, and suite of financial instruments to investment in climate change. PT SMI is a state-owned enterprise (SOE) established in 2009 under the Indonesian Ministry of Finance. Functioning as a special mission vehicle, PT SMI was created to address the nation's growing need for infrastructure development and specific market imperfections. Its core mission is to act as a catalyst, accelerating infrastructure projects through innovative financing solutions.

Since 2020 PT SMI has strategically broadened its focus to encompass climate change mitigation and adaptation. PT SMI supports the Government of Indonesia in implementing its low carbon development strategy, as set out in various policy documents, including its Enhanced Nationally Determined Contribution (NDC) and Climate Resilience Development Policy, 2020–2045.

Climate finance vehicles can play a temporary role in addressing market imperfections related to first mover risks associated with emerging technologies. They can phase out once these technologies become established, as exemplified by the UK Green Investment Bank sale.[6] The independence from the public balance sheet provides these vehicles with greater perceived stability and commitment to their investment mandate. This independence can also offer some insulation from government policy, budget, and political cycles compared to on-balance sheet public funding.

[6] GOV.UK. UK Green Investment Bank is now independent of the UK government.

Challenges with Climate Finance Vehicles

Countries must also navigate various challenges when establishing the legal and regulatory foundations, governance structure, investment mandates, and management systems of climate finance vehicles. The primary issues and risks that climate finance vehicles face include the following:

(i) **Establishment costs and resourcing.** The first challenge to overcome is the recognition that there will likely be considerable establishment costs to set up a new, professional, well-resourced financing vehicle. Identifying and recruiting capable executives and personnel to deliver on its mandate is also likely challenging. These issues need to be properly considered and assessed. Australia established the CEFC following a government-commissioned expert panel review made up of experienced finance and investing specialists whose mandate included the identification of establishment issues that needed to be considered by the government.

(ii) **Fiscal sustainability and balance sheet independence.** National climate change vehicles must return their cost of funds to be financially sustainable over the long run. The value of an asset on a balance sheet is, ultimately, defined by the cash flows it can create in the future. If investments made by a national climate finance vehicle do not generate sufficient cash flows to cover their costs of funds, the resulting divergence between equity and assets, and revenues and profits is not a sustainable trend. It must be reversed, or the financing vehicle will eventually have to revalue its assets downward. A simplified analogy is that a property investor must receive the rent to cover their mortgage payments to avoid financial loss, and climate change vehicles must ensure their investments generate enough returns to cover their costs to remain financially sustainable. This is not to say that individual investments must all be financially viable; it simply means that blended finance may be needed to ensure that the finance vehicle remains financially viable over the long term. Indonesia's PT SMI, for example, approaches each LCCR project in the same way that it does its more traditional infrastructure investment projects, using the same risk management framework, project due diligence, hurdle rates of return requirements, governance arrangements, alignment with national priorities, etc., but using blended finance to achieve similar commercial outcomes. Investment grants, for example, are used to reduce the weighted average cost of capital (WACC), which enables PT SMI to achieve hurdle internal rates of return (IRRs).[7]

(iii) **Crowding out private finance rather than crowding it in.** When public funds are heavily involved in financing projects, there is a potential for private investors to withdraw or reduce their investment, assuming that the public sector will bear the financial burden. This displacement effect can undermine the objective of leveraging private capital to scale up investments in LCCR projects. To mitigate this risk, climate finance vehicles must carefully design their financial instruments and assessment criteria for when and how to intervene to complement, rather than replace, private financing, ensuring they crowd in private investment. This requires discipline, clear investment mandates, and a climate finance vehicle focusing on pioneering investments, such as funding ventures involving emerging technologies or scaling up innovative technologies to commercial viability. At the same time, this should include withdrawal from sectors when private investment is operating effectively and at scale to meet the investment task. Private capital leverage targets can help facilitate this alongside investment mandates that provide clear direction. An example of success is Indonesia's PT SMI, which in 2022—across 22 projects—

[7] For example, a marginal mini-hydro project in West Sumatra became bankable with the introduction of a UK donor-funded 20% investor grant. This allowed the more standard 70:30 debt-to-equity ratio to fall to 65:15, reducing the WACC and improving the project IRR.

achieved a 5.6x multiplier effect on total commitments and a 26.9x multiplier effect on paid-up capital in PT SMI. In addition, Australia's CEFC has achieved an average leverage of A$2.82 in private investment for every A$1.00 of investment by the CEFC.[8]

(iv) **Strong corporate governance.** Governance structures must ensure robust oversight, transparent decision-making, and effective management of investments. This typically involves a board of directors, board subcommittees, and a clear delegation of responsibilities. Boards of directors should be responsible for setting strategy, establishing a risk appetite, and appointing and holding the chief executive officer accountable. The executive should be responsible for day-to-day management, operational, and investment decisions within limits established by the board. The board should operate independently of the government to ensure objective and prudent management of public funds within the parameters set by the government through enabling legislation and its investment mandate. Board members should be drawn from various relevant backgrounds, including investment banking, central banking, and private equity. Countries have taken different approaches to this issue. PT SMI, for example, has a board of commissioners comprising individuals from key ministries, including the Ministry of Finance (MOF), as well as several independent commissioners (appointed by the MOF), creating a blended representation of government and infrastructure finance expertise. The CEFC represents the most independent model, with the board members all being independent. Government independence is strengthened by the CEFC Act, which limits ministerial powers to direct the CEFC board to issue investment mandate directions.[9] Finally, as a state-owned entity, national climate finance vehicles should be subject to audit by supreme audit institutions. This is the case for CEFC, whose financial statements are subject to review and audit by Australia's National Audit Office.

(v) **Weak public financial management framework and public investment management program.** National climate finance vehicles rely—to a sizeable extent—on the ability of government agencies to develop robust project pipelines for which they can provide financing. Without this, climate finance vehicles must undertake considerable project origination themselves, which requires scale and potential overlap with the government. Alignment with PFM and PIM processes ensures that the vehicle's activities are coherent with national fiscal policies and strategies, avoiding duplication of efforts and ensuring optimal use of public resources. Governments must properly consider how their national climate vehicles will coordinate effectively with key government agencies delivering climate investment programs locally, nationally, and regionally to pool resources, share knowledge, and avoid duplication of efforts, leading to more cohesive and comprehensive climate action. The CEFC, for example, benefits from Australia's robust institutions and sound PIM and PFM practices. This creates an enabling environment and a deep pipeline of potential adaptation and mitigation projects where climate finance vehicles can be established and create impact faster, operating more effectively and efficiently.

(vi) **Striking a balance between independence and fiscal prudence.** Government-owned climate finance vehicles have the potential to adversely impact government balance sheets, despite their independence, if, for example, they generate equity returns below the government cost of capital. For these reasons, the balance between independence and fiscal prudence has to be maintained. This means that climate finance vehicles should be subject to PFM and/or PIM processes representing oversight of state-owned entities, similar to how other financial sector state-owned enterprises may be managed.

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[8] The target value is A$2.50 to A$3.00. Government of Australia. 2023. New Energy, New Ambition: Clean Energy Finance Corporation Annual Report 2022–23. p. 62.

[9] Government of Australia. 2023. New Energy, New Ambition: Clean Energy Finance Corporation Annual Report 2022–23. p. 95.

(vii) **Mission creep beyond the original mandate of the climate finance vehicle.** Over time, as these institutions grow and evolve, there can be a tendency to expand their scope and objectives, often influenced by changing political priorities or emerging issues. This expansion can dilute the focus on their primary goal of supporting LCCR projects, leading to inefficiencies and reduced effectiveness. Climate finance vehicles must maintain a clear and consistent mandate to prevent mission creep, regularly reviewing their activities to ensure alignment with their core objectives and adapting their strategies without deviating from their fundamental purpose.

(viii) **Checks on mission creep can take various forms.** In Australia, statutory reviews have been undertaken to assess the effectiveness of the CEFC in achieving its aims in 2012 (at its inception) and 2018. Moreover, mission creep check is further embedded in the CEFC's enabling legislation, whereby its investment mandate is periodically reviewed by the ministers for energy and finance to reflect the dynamic nature of the clean energy sector and the evolving policy landscape, following which directions are given to the board about the performance of the corporation's investment function.

(ix) **Politically motivated use of funds is another significant challenge that climate finance vehicles must navigate.** When political considerations influence the allocation of funds, there is a risk that investments may be misaligned with the primary goal of achieving climate policy objectives. Politically driven decisions can lead to suboptimal investments that do not necessarily deliver the most significant environmental or economic benefits or do not crowd in private finance. To safeguard against this, climate finance vehicles need robust governance structures that ensure transparency, accountability, and decision-making processes based on objective criteria and evidence-based assessments.

(x) **Managing exposure to contingent liabilities is another challenge for climate finance vehicles.** As they provide guarantees and other credit enhancement mechanisms, there is an inherent risk of future financial obligations if the supported projects fail or face difficulties. These contingent liabilities can strain the vehicle's financial position and impact its ability to support new projects. Effective risk management strategies—including rigorous project appraisal, ongoing monitoring, and setting aside reserves to cover potential liabilities—are essential to mitigate this risk and ensure the financial sustainability of the climate finance vehicle. PT SMI has adopted a robust, best-practice risk management framework.[10] Governed by a risk appetite statement established by its board, management has implemented three lines of defense in establishing work units related to risk management: (i) the work unit implementing the risk-taking function (business or operation division) as risk taker or risk owner (subsequently will be called the Risk Taking Division), (ii) the working unit with the risk management function or compliance function, and (iii) the internal audit function.

(xi) **The risk of corruption threatens the effectiveness and credibility of climate finance vehicles.** Given the substantial amounts of public funds involved and the complexity of LCCR projects, there is a vulnerability to corrupt practices. To combat this, climate finance vehicles must implement stringent anticorruption measures, including robust internal controls, transparency in operations, regular audits, and a culture of accountability. These would be subject to audit by the supreme audit institution. Ensuring that all stakeholders adhere to high ethical standards is crucial for maintaining trust and integrity in the operations of climate finance vehicles.

[10] PT SMI. 2022. *2022 Annual Report - Enhancing Synergy: Promoting for Development and Sustainability.*

By addressing these challenges and effectively utilizing their financial instruments and expertise, climate finance vehicles can play a crucial role in overcoming market imperfections and fostering institutional investment in LCCR projects, helping to reduce the investment gap. Their contributions are essential in the global effort to mitigate and adapt to climate change, ensuring financial barriers do not hinder economically viable projects.

5. READINESS CRITERIA

Several important readiness criteria should be assessed before prioritizing the establishment of a national climate finance vehicle. The successful operation of a financing vehicle can be contingent on these factors. The proposed criteria in this section can support DMCs in targeting readiness activities to strengthen the enabling environment.

5.1 Investment in a Strong Balance Sheet

The climate finance vehicle must have a robust balance sheet to support its investment activities and withstand financial pressures. This is contingent on the country's public fiscal position, which should be stable and capable of providing the necessary capital without jeopardizing other fiscal commitments. A strong balance sheet enables the vehicle to undertake significant investments and instills confidence among private investors, who may otherwise be wary of participating in high-risk projects. This is particularly the case with a private investor relying on a guarantee provided by the climate finance vehicle.

5.2 Institutional and Policy Reforms

Establishing national climate finance vehicles must typically go hand-in-hand with a series of sector and cross-sector policy and structural reforms that unlock external and private finance sources and ensure entity financial viability. Blended finance presents opportunities for mixing grant financing with more commercial lending—albeit on a concessional basis—but the costs of funds must ultimately be recovered from the portfolio of climate finance vehicle investments. This will inevitably require a range of institutional and policy reforms to accommodate effective cost recovery of the finance that underpins new investment.

Investment in renewable energy, for example, will be severely hampered if sector settings do not allow for cost recovery through the tariff system and the government does not bridge this funding gap with transparent, cost-recovering subsidies. This is the experience of many energy sector SOEs in emerging markets: they cannot fully recover their costs and do not receive adequate compensation for this via government-issued public service obligations or similar. Their balance sheets erode over time, and their ability to make new investments is severely hampered.

In establishing climate finance vehicles and defining their investment mandates, it will also be necessary to consider what structural reforms are required to sustain their investments and balance sheets, but equally importantly, to effectively crowd in external and private sources of finance. Failure to undertake these difficult but necessary reforms will limit the effectiveness of the newly established entity.

5.3 Legal Framework and Market Confidence

For a climate finance vehicle to be perceived as credible and independent, there must be high market confidence in the country's legal frameworks and procedural propriety. This includes having clear and enforceable laws related to investment, property rights, and contracts. The legal environment should support transparent and predictable operations, free from undue political influence or corruption. A robust legal framework enhances the vehicle's reputation and attracts domestic and international investors. Specific laws are often enacted to establish climate finance vehicles, allocate funding, and specify governance arrangements (including board representation).

5.4 Public Investment Management Processes

Effective public investment management processes ensure that the climate finance vehicle's efficiency gains are not undermined by poor project design, procurement, and delivery. The country must have well-established processes for identifying, appraising, and prioritizing public investments. Institutional capacity should be sufficient to manage complex projects and meet the required standards. This includes having skilled personnel and adequate resources (however procured) for project implementation and management. This enabling factor has likely played a key role in the successes of Indonesia's PT SMI and Australia's Clean Energy Finance Corporation. The robust PIM process serves two purposes. It enables the creation of a deep pipeline of projects for climate finance vehicles to invest in and ensures that the vehicle makes fiscally sustainable investments that ringfence the government's balance sheet from its own.

5.5 Coordination with Fiscal and Monetary Authorities

Close coordination with domestic fiscal and monetary authorities is essential for the climate finance vehicle's success. These authorities must be willing and capable of working collaboratively with the vehicle to align its activities with broader economic policies and objectives. This coordination helps ensure that the climate finance vehicle's investments are supportive of and supported by national fiscal and monetary policies. Effective coordination also mitigates the risk of macroeconomic imbalances arising from the vehicle's operations.

5.6 Institutional Capacity and Governance

The climate finance vehicle must have a governance structure that promotes accountability, transparency, and prudent investment practices. This includes having a clear mandate, well-defined roles and responsibilities, and robust oversight mechanisms. The Santiago Principles—which promote good governance for sovereign wealth funds—can serve as a useful guide. Strong governance ensures that the vehicle operates efficiently, maintains public trust, and achieves its strategic objectives.

A climate finance vehicle's success also depends on the availability of its expertise, including financial and technical expertise. This includes having professionals with experience in project finance, risk assessment, environmental impact analysis, and other relevant fields. Building a team with the necessary skills and knowledge ensures that the vehicle can effectively evaluate and manage investments, navigate complex regulatory environments, and drive innovation in climate finance.

5.7 Market Conditions and Private Sector Engagement

The readiness assessment should also consider the broader market conditions, including the level of private sector engagement in climate-related investments and appetite for engaging and working with a climate finance vehicle. The vehicle's ability to mobilize private capital is crucial for scaling up investments in LCCR projects and ultimately achieving its aims. This requires a supportive business environment and investment in relationships with the private sector to understand private sector views on opportunities and challenges for the climate finance vehicle.

Countries can determine their readiness to establish and operate a national climate finance vehicle by systematically evaluating these factors. Addressing any gaps identified in the assessment will help ensure the vehicle is well-positioned to mobilize resources, attract private investment, and drive the transition to an LCCR economy.

6. DESIGN FRAMEWORK

Designing a climate finance vehicle involves making critical decisions defining its scope, funding structure, governance, and operational mechanisms. The following framework highlights the key design decisions and the factors driving each decision.

6.1 Scope of the Vehicle

A fundamental aspect of designing a climate finance vehicle is determining its scope, particularly which sectors it will cover. This decision is driven by the need to identify energy, transport, and agriculture sectors aligning with national climate goals and strategies. Evaluating the addressability of market imperfections within these sectors is crucial, as it determines the vehicle's potential role and impact. The vehicle must ensure that its interventions are feasible and can significantly enhance climate resilience and mitigation. Aligning the chosen sectors with national priorities ensures coherence and maximizes the effectiveness of the vehicle's efforts.

6.2 Addressing Market Imperfections

The climate finance vehicle must also address specific market imperfections like public goods, information asymmetries, and transaction costs relevant to the sectors within its scope. Evaluating the vehicle's capability to address these imperfections is essential. For example, technologies are rapidly evolving in the energy sector, highlighting the need to address imperfect incentives and information asymmetries (section 3).

6.3 Funding Structure

Deciding the funding structure of the climate finance vehicle involves a choice between entirely public financing or incorporating private investment. Public financing offers greater control over the vehicle's design and operations but requires substantial capital commitment from the government. Conversely, incorporating private financing (less common) introduces dynamics such as expectations of dividends and higher returns on investment, which can reduce control and increase the complexity of governance. Private investment may increase the vehicle's independence from public election and budget cycles. Balancing these factors is essential to ensure an optimal funding structure that supports the vehicle's objectives and is responsive to the country's fiscal space. Considerations must also be made to meet

requirements if external funding sources are targeted. For example, ADB's financial intermediary loan (FIL) modality requires financial intermediaries that lend funds to meet financial soundness criteria as evidenced by adequate capital, asset quality, liquidity, and profitability; adequate credit and risk management policies; and operating systems and procedures.[11]

6.4 Governance and Management

Establishing an effective governance model is crucial. The governance model must balance sufficient independence from government influence with effective coordination with public policies. Deciding whether public or private entities will manage the vehicle involves evaluating management expertise and potential efficiency gains from private sector management. Public accountability must be maintained, ensuring transparency and adherence to standards that uphold the vehicle's integrity. Adhering to the Santiago Principles—which promote good governance, accountability, transparency, and prudent investment practices—is critical to maintaining credibility and effectiveness. Additionally, the vehicle must carefully assess risks associated with its balance sheet, particularly regarding its independence from the government balance sheet, to ensure financial stability and stakeholder trust.

6.5 Investment Mandate

Defining the investment mandate and decision-making procedures is a key design decision. The mandate must consider whether the vehicle will only consider financially viable investments or whether it will also make noncommercial investments. If noncommercial investments will be undertaken, then the fiscal costs must be explicitly acknowledged and public funding allocated. Clear and publicly disclosed decision-making procedures foster transparency and accountability. Blended finance—which allows a variety of investors with different risk appetites to participate in the same project—can play an important role in ensuring that the climate finance vehicle remains financially viable over the long term, maintaining its hurdle rates of return as investment grants or other forms of concessional finance lower costs of capital as required.

The investment mandate should focus on crowding in private finance rather than crowding it out, ensuring that investments are assessed for economic and financial viability. Specific, measurable leverage targets provide focus and sharpen objectives in this regard.

6.6 Concessionality

Principles on concessionality should also be established. Ideally, the climate finance vehicle should aim to provide financing at market rates adjusted for concessionality. The principle should be to provide financing on the least generous terms for the proposal to proceed (i.e., offered on terms as close to market standards as feasible).

Concessionality may involve reduced pricing, increased risk tolerance, or longer financing terms. The determination of concessionality levels would then consider several factors, including the following:

(i) the entity's targeted portfolio rate of return;
(ii) evaluation of barriers that the project must overcome;
(iii) assessment of positive externalities generated; and
(iv) potential impact on the market.

[11] ADB. 2018. Financial Due Diligence for Financial Intermediaries: Technical Guidance Note.

6.7 Financial Instruments and Support

The country's specific market conditions, project needs, and policy objectives should guide the choice of instruments and their mix. For instance, a country with a high need for early-stage project development might prioritize equity investments, while one seeking to enhance the bankability of more mature projects might focus on debt and guarantees. The overall strategy should aim to balance risk and return, crowd in private investment, and ensure alignment with national climate goals.

(i) **Equity investments** are particularly effective in fostering innovation and unlocking projects at an earlier stage of development. By providing equity, the climate finance vehicle gains partial ownership and representation in the project's decision-making process, allowing for greater influence over project direction and outcomes. This can be especially valuable in guiding projects toward alignment with national climate goals. However, equity investments also come with higher risk than debt, as returns depend on the project's success. Additionally, the need for dividend payments can create fiscal pressures. Therefore, countries must ensure they can manage these risks and have the expertise to engage effectively in project governance.

(ii) **Debt financing,** involving loans or bonds, typically carries lower risk than equity as it provides a fixed return regardless of the project's performance, provided the borrower remains solvent. This makes it a more stable and predictable option for climate finance vehicles and private investors. However, the ability of the borrowing entity to repay the debt must be thoroughly assessed to avoid defaults, which could undermine the vehicle's financial stability. Debt financing can attract private capital by providing a layer of security, encouraging investment in projects that may otherwise be deemed too risky. Structuring debt with favorable terms—such as low interest rates or extended repayment periods—can further enhance its attractiveness and effectiveness in mobilizing private finance.

(iii) **Guarantees and credit enhancements** are crucial in mitigating project-specific risks and making investments more attractive to institutional investors. These instruments can cover various risks, including political, policy, and counterparty credit risks, thereby lowering the overall risk profile of a project. However, guarantees involve contingent liabilities, meaning the climate finance vehicle must provide for potential payouts if the covered risks materialize. This requires careful risk assessment and financial planning to maintain sufficient reserves. Guarantees can be particularly effective in leveraging private investment by providing confidence and reducing perceived risks, thereby unlocking funding for projects that might otherwise struggle to secure financing.

In addition to financial instruments, providing technical assistance is valuable to address information asymmetries and build investor confidence. This can involve offering expertise in project development, market analysis, and regulatory compliance, which are critical for the successful implementation of LCCR projects. Technical assistance can also facilitate knowledge transfer and capacity building, ensuring that local stakeholders are equipped to manage and sustain projects over the long term. By reducing uncertainties and enhancing project viability, technical assistance complements financial instruments and maximizes the impact of climate finance vehicles.

Climate finance vehicles can also coordinate country interactions with key green funds. For example, Indonesia's PT SMI coordinates Indonesia's interactions with the Green Climate Fund and is the first institution in Southeast Asia to be accredited by the Green Climate Fund.

6.8 Coordination and Integration

Effective coordination with public fiscal processes and alignment with national climate strategies are vital for the vehicle's success. Establishing mechanisms for fiscal coordination ensures that the vehicle's activities align with broader national policies. However, maintaining operational independence from government influence is equally important. The vehicle must ensure coherence with national and local climate policies and foster collaboration with other public and private stakeholders, including public agencies and private sector entities. This collaborative approach enhances the vehicle's ability to achieve its objectives and maximize its impact.

6.9 Operational Considerations

Identifying the human resource needs and developing a robust pipeline of projects are critical operational considerations. The vehicle must ensure that its team possesses or has access to the range of expertise in LCCR projects required across economic, financial, technical, environmental, and social due diligence. This involves identifying the specific skills needed—including based on the sectors within the scope of the climate finance vehicle—and how those skills will be procured (including what will be insourced and outsourced). The vehicle must also invest in capacity building to enhance skills and capabilities. Establishing mechanisms for identifying and evaluating potential projects is essential for pipeline development. Focusing on projects that offer sustainable and scalable solutions for climate resilience and mitigation ensures that the vehicle's efforts are impactful and aligned with its mandate.

6.10 Risk Management

Managing risks associated with climate finance vehicle operations—including contingent liabilities and decision-making integrity—is essential for maintaining the vehicle's perceived and actual integrity and financial stability. Conducting rigorous risk assessments for all projects and maintaining reserves and contingency plans to cover potential liabilities are critical components of risk management. For example, Indonesia's stringent anticorruption policies and practices ensure transparency in operations and accountability for decision-makers. This comprehensive approach to risk management safeguards the vehicle's credibility and supports its long-term success.

7. INTERNATIONAL CASE STUDIES

7.1 Clean Energy Finance Corporation

7.1.1 Overview

Australia's Clean Energy Finance Corporation (CEFC) is Australia's "green bank," a government-owned financial institution established under the Clean Energy Finance Corporation Act 2012 to address climate change by accelerating investment in clean energy. The CEFC's strategy revolves around bridging the financing gap for clean energy projects and technologies, supporting Australia's efforts to reduce greenhouse gas emissions, and investing in the transition to net zero emissions by 2050.

The key premise for the establishment of the CEFC was that while Australian banks had historically financed large-scale renewable energy projects, often focusing on wind projects with established power purchase agreements, it was recognized that they would likely refrain from pioneering investments or funding ventures involving emerging technologies or the scaling up of innovative technologies to commercial viability.

Likewise, Australian superannuation funds and institutional investors were expected to be cautious about engaging in investments that required significant knowledge development and associated costs for emerging opportunities, given that they traditionally allocate their capital to more liquid markets such as bonds, property, and equities. There was thus a critical role to be played by a government-backed national climate finance vehicle to address market gaps and grow the sector.

The CEFC received an initial capitalization of A$10 billion from the federal government, and its founding principles—including ensuring that it targets a rate of return around the government's cost of funds—ensured that it was treated as an off-balance sheet, government-owned financial vehicle, a status it has maintained.

This case study summarizes the CEFC's key characteristics to provide lessons for DMCs that see a role in establishing "climate finance vehicles" focused on low-carbon climate-resilient (LCCR) development that bridges the investment gap by bearing risk, matching investments with suitable capital, and providing expertise. By strengthening governance and attracting institutional investors through these vehicles, countries can bridge the investment gap and achieve their climate goals. However, as climate finance vehicles are often wholly or predominantly public entities, they must be operated so that economically justified subsidies are explicitly acknowledged and fiscal risk to the public balance sheet is carefully managed.

7.1.2 Strategy and Mandate

The CEFC's mission is to drive investment in Australia's transition to net zero emissions by 2050 (with a 43% reduction by 2030).[12] To achieve this mission, the CEFC prioritizes projects contributing to energy security, enhancing grid reliability, and supporting regional economic development. For these projects, the CEFC seeks to catalyze private investment, address market gaps, and reduce risks for projects that may otherwise struggle to secure private financing, achieved through various mechanisms such as direct investments (equity and debt), concessional loans, guarantees, and other credit enhancement mechanisms. By aligning its financial activities with broader national policy goals, the CEFC is crucial for facilitating Australia's progress toward its climate targets, promoting sustainable economic growth, and ensuring a resilient and diversified energy landscape.

[12] Footnote 9, p. 3.

The government set the CEFC's original investment mandate, which outlined the broad expectations and parameters for its investments, upon its establishment in 2012. Under the CEFC Act, this mandate is periodically reviewed by the ministers for energy and finance to reflect the dynamic nature of the clean energy sector and the evolving policy landscape, following which directions are given to the board about the performance of the corporation's investment function. The most recent update was in 2023.

The CEFC's investment function, as described in the CEFC Act, is to make direct and indirect investments in clean energy technologies. The CEFC Act defines complying investments as clean energy technologies such as (i) energy efficiency technologies that are related to energy conservation or demand management technologies, (ii) low-emission technologies as determined by the board, or (iii) renewable energy technologies that are hybrid technologies that integrate renewable energy technologies.[13]

The CEFC's investments are required to be primarily based in Australia. This includes considerations of project location, use, management, and benefits flow to Australia, such as carbon abatement and technological advancements. The CEFC is also prohibited from investments in certain technologies, such as nuclear power and carbon capture and storage. The CEFC Act and the ministerially established investment mandate also prescribe portfolio limits and diversification guidelines, including a limit of 5% of total portfolio value on guarantees (excluding certain portfolio commitments such as the Rewiring the Nation Fund) and a limit of A$300 million per year on concessionality loans.[14]

The CEFC's investment strategy spans a broad range of sectors, reflecting its comprehensive approach to reducing Australia's carbon footprint:

(i) **Renewable energy generation.** Investments in solar, wind, bioenergy, and hydro projects. The CEFC also supports emerging technologies like offshore wind and geothermal energy.
(ii) E**nergy storage.** Enhancing the reliability and stability of renewable energy through investments in battery storage and other innovative storage solutions.
(iii) **Agriculture.** Funding projects that improve energy efficiency in farming operations and reduce emissions through sustainable practices and advanced technologies.
(iv) I**nfrastructure.** Supporting the development of green infrastructure projects, including low-emission transport systems and energy-efficient buildings.
(v) **Property.** Investing in the retrofitting of buildings to improve energy efficiency and sustainability, reducing operational emissions in the property sector.
(vi) **Transport.** Promoting the adoption of electric vehicles and other low-emission transport options and supporting infrastructure such as electric vehicle charging networks.
(vii) **Waste management.** Financing projects that convert waste to energy, enhance recycling processes, and reduce landfill emissions.
(viii) **Hydrogen industry.** Through the Advancing Hydrogen Fund, the CEFC supports the growth of Australia's clean, innovative, and competitive hydrogen industry, recognizing hydrogen's potential as a critical component of the future energy mix.

[13] Government of Australia, Department of Climate Change, Energy, the Environment, and Water. 2023. Federal Register of Legislation. Clean Energy Finance Corporation Act 2012 (latest text).
[14] Government of Australia, Department of Climate Change, Energy, the Environment, and Water. 2023. Clean Energy Finance Corporation Investment Mandate Direction 2023.

7.1.3 Governance

The governance structure of the CEFC is designed to ensure robust oversight, transparent decision-making, and effective management of investments. This structure involves a board of directors, three committees, and a clear delegation of responsibilities.

The Government of Australia appoints the CEFC's board of directors, which has seven members. The board is responsible for making high-level management, operational, and investment decisions and operates independently of the government to ensure objective and prudent management of public funds within the parameters set by the government through enabling legislation and its investment mandate.[15] Board members have been drawn from a range of relevant backgrounds including investment banking, the Reserve Bank, and private equity. Independence from the Government of Australia is strengthened by the CEFC Act limiting ministerial powers to direct the CEFC board to primarily issue investment mandate directions (footnote 9).

To assist in its oversight responsibilities, the CEFC board has established three committees, each with a specific focus:

(i) I**nvestment committees.** Multiple investment-related committees exist, including the main Investment Committee and the Rewiring the Nation Investment Advisory Committee. These committees review and evaluate potential investments, focusing on the risks, benefits, and alignment with government policy objectives. The Investment Committee provides additional scrutiny for large-scale or complex transactions.
(ii) **Audit and risk committee,** which oversees the financial reporting process, the audit process, the system of internal controls, and compliance with laws and regulations
(iii) **People and culture committee,** which addresses matters including developing and implementing policies concerning staff recruitment, retention, and remuneration.
(iv) While the board retains ultimate responsibility for all investment decisions, certain authorities are delegated to the chief executive officer and senior executives for day-to-day operations.
(v) The CEFC adheres to high standards of transparency, regularly reporting on its operations, financial performance, and the impact of its investments. This includes preparing annual reports detailing its financial statements, operating costs, and the specifics of individual investments. The CEFC also produces risk appetite statements that establish the risk boundaries for financial and nonfinancial risk consequences across its investment portfolio.

7.1.4 Investment Approach

The CEFC follows general staged appraisal and risk processes. Projects are selected based on their potential for significant emissions reductions and alignment with Australia's clean energy goals.

Screening of investments is undertaken across three phases (high-level, detailed screening, and external due diligence). It focuses on identifying the value drivers expected to generate a positive financial return for each investment. Depending on the type of investment, this may include identifying and assessing the future cashflows expected to service debt or the potential growth in a business that could increase the value of an equity investment. The CEFC evaluates projects on additional criteria, including environmental impact, technological innovation, and broader economic benefits.[16]

[15] CEFC. 2012. *Expert Review. Report to Government*.
[16] Government of Australia. 2021. *CEFC Investment Policies*.

The CEFC employs a structured approach to risk screening where a fundamental range of risks generally relevant to investment activities is identified and considered at a threshold level. Strength of management or sponsorship, financial flexibility, operating margins, and industry competitiveness are often key factors for considering any investment. There is also frequently a more detailed set of risk factors that will vary across individual sectors (for example, renewable energy versus energy efficiency) as well as within sectors (for example, wind versus solar) and across individual investment proposals (for example, conservative versus leveraged capital structures) (footnote 16).

The CEFC board plays a key role in the investment process. The board reviews and approves investments case by case, ensuring each project meets the required criteria and is within the investment mandate. The investment committees—comprising experts with extensive experience in finance, energy, and risk management—assist the board in evaluating potential investments. The investment committees conduct detailed due diligence, assess the risk profile of projects, and recommend investment strategies to the board that align with the CEFC's objectives and investment mandate.

7.1.5 Activities and Instruments

The CEFC employs a variety of investment activities and financial instruments to support its mission. These activities and instruments are designed to address specific market failures and to catalyze private sector investment in clean energy technologies.

The CEFC intends to provide financing at market rates, adjusted for concessionality. The principle is to provide financing "on the least generous terms for the proposal to go ahead (i.e., offered on terms as close to market standards as feasible)."[17]

CEFC concessionality may involve reduced pricing, increased risk tolerance, or longer financing terms. The determination of concessionality levels considers several factors, including

(i) the CEFC's targeted portfolio rate of return,
(ii) evaluation of barriers that the project must overcome,
(iii) assessment of positive externalities generated, and
(iv) potential impact on the market.

The investments the CEFC utilizes are equity investment, debt financing, co-investment, and credit enhancement.

Equity investment. Through this, the CEFC takes ownership of a company or project. This type of investment is crucial for clean energy ventures that may struggle to attract sufficient private investment due to perceived high risks and long payback periods. By providing equity capital, the CEFC helps to mitigate risk for private investors and supports innovation. An example of this approach is the CEFC's investment in sustainable agriculture platforms, such as the partnership with global investment group CDPQ and Gunn Agri Partners. This A$50 million CEFC investment as part of a A$200 million platform aims to decarbonize farming practices while boosting productivity, demonstrating how equity investments can drive sector-specific sustainability.

Debt financing. Through this, the CEFC provides loans to clean energy projects and companies. Debt financing—especially where long-dated—helps expand access to capital, assisting clean energy projects that would otherwise face difficulties securing loans from traditional financial institutions due to the high upfront costs and long development timelines. By offering longer terms and competitive pricing, the CEFC can increase access and lower the overall cost of capital for clean energy projects. An example

[17] Footnote 15, p. 28.

of the CEFC providing debt financing is the A$490 million of concessional debt provided to EnergyCo, the New South Wales state government's investment planner, for the Central-West Orana Renewable Energy Zone, which aims to increase grid capacity for renewables and reduce consumer costs.

Co-investment. The CEFC invests alongside private investors, leveraging private capital by sharing investment risks and benefits. Co-investment addresses market failures by:

(i) **Encouraging private sector participation.** By sharing the financial burden and risks, co-investments make it more attractive for private investors to engage in clean energy projects.
(ii) **Demonstrating viability.** Successful co-investments can demonstrate the financial and operational viability of clean energy technologies, encouraging further private investment.

An example of co-investment is the CEFC cofinancing of the Australian first 100 megawatt (MW) battery project at the Hornsdale Power Reserve in South Australia. This project was a collaboration with Neoen, a French renewable energy producer, and involved multiple additional stakeholders, including Tesla and the Government of South Australia.

Credit enhancement mechanisms. The CEFC reduces risks for private investors. These include loan guarantees and subordinated tranches in debt structures, which help to enhance the creditworthiness of clean energy projects. By improving the risk profile of these projects, the CEFC enables them to expand access to financing and obtain it on more favorable terms.

7.1.6 Capital Structure

As a wholly government-owned climate finance vehicle, the CEFC has A$30.5 billion ($20.3 billion) from the Government of Australia, increasing from the initial allocation of A$10 billion in 2012. Funding is then split into a CEFC general portfolio and five investment funds:

(i) **Rewiring the Nation Fund (A$19 billion).** This fund seeks to enhance grid reliability, reduce transmission losses, and enable the integration of large-scale renewable projects.
(ii) **Household Energy Upgrades Fund (A$1 billion).** This fund provides financial support for upgrades such as insulation, solar panels, energy-efficient appliances, and home battery systems.
(iii) **Powering Australia Technology Fund (A$500 million).** This fund supports the research, development, and deployment of new technologies, accelerating the commercialization of innovative solutions in renewable energy, energy storage, and smart grid technologies.
(iv) **Advancing Hydrogen Fund (A$300 million).** This fund invests in hydrogen production, distribution, and export infrastructure, aiming to establish Australia as a significant player in the global hydrogen market.
(v) **Clean Energy Innovation Fund (A$200 million).** This fund operates with the Australian Renewable Energy Agency (ARENA), which focuses on providing equity finance to innovative clean energy projects and businesses.

There is also an A$1 billion Reef Funding Program dedicated to investing in clean energy projects that support the health and resilience of the Great Barrier Reef by reducing emissions and improving energy efficiency in reef catchment areas.

7.1.7 Progress

The CEFC has progressed significantly since its inception, positioning itself as a pivotal player in Australia's transition to a low-carbon economy. Portfolio composition is A$7.7 billion in investments, with 34% equity and 66% debt. It has remained active despite government changes and has grown in stature and scale.

In fiscal year (FY) 2022–2023 the CEFC created 30 new and 20 follow-on transactions worth A$11.7 billion. These projects have generated leverage of A$5.02 in private investment for every A$1.00 investment by the CEFC, highlighting the CEFC's role in mobilizing substantial private capital.[18]

Since its inception in 2012, the CEFC has reached commitments of A$19 billion in clean energy investments and developed more than 300 transactions worth A$48.8 billion. The average leverage generated is A$2.82 in private investment for every A$1.00 of investment by the CEFC (footnote 8). Funds have been allocated across various projects, including renewable energy generation, energy efficiency improvements, and low-emission technologies. The investments have catalyzed further private financing, effectively leveraging additional billions to support Australia's clean energy transition. These are the key aspects of the CEFC's progress:

(i) **Environmental impact.** The projects financed by the CEFC are expected to achieve an estimated reduction of over 240 million tons of carbon dioxide equivalent over their lifetimes.[19]
(ii) **Backing major projects.** The CEFC invested A$100 million in the Waratah Super Battery, the largest standby network battery in the southern hemisphere and one of the largest in the world.
(iii) **Sector diversification.** Initially focused heavily on large-scale renewable energy projects, the CEFC has diversified its portfolio to include a broader range of sectors, including energy efficiency, energy storage, electric vehicles, green building construction, and bioenergy.
(iv) **Supporting innovation.** The CEFC operates the Clean Energy Fund with the Australian Renewable Energy Agency, which has supported early stage and emerging technologies.
(v) **Policy and advisory.** Beyond direct investments, the CEFC has actively engaged in policy advocacy and advisory roles. It has provided expert advice to the government on policy settings conducive to the growth of clean energy finance.
(vi) CEFC's original investment mandate saw A$10 billion in funding divided broadly into two streams:
    (a) a renewable energy and enabling technology stream, with one-half of the funding allocated; and
    (b) an energy efficiency and low-emissions technology stream that could fund renewable energy projects in addition to the dedicated stream.

The *Investment Mandate Direction 2023* introduced several changes, including providing direction for how the CEFC will invest new budget allocations of A$20.5 billion for Rewiring the Nation, the Household Energy Upgrades Fund, and the Powering Australia Technology Fund (footnote 14).

This switch to dedicated funds represents a withdrawal from sectors where private investment is operating effectively and at scale to meet the investment task while simultaneously stepping in to fill gaps where the private sector is absent or where its participation continues to help leverage private investment or accelerates investment in emissions reduction activities.

[18] Footnote 9, p. 20.
[19] Footnote 9, p. 13.

Statutory reviews were undertaken to assess the effectiveness of the CEFC in achieving its aims in 2012 (at its inception) and 2018. The 2018 review by Deloitte found that the CEFC has been effective relative to the counterfactual without its involvement, consistent with the findings of the 2012 report. This suggests that the CEFC has been crowding in rather than crowding out private investment, "In a number of instances, projects may not have proceeded without the CEFC's support... due to the perceived risk associated with the project or the low return expectations" (footnote 16).

7.1.8 Commercial Model, Operational Performance, and Financial Sustainability

The CEFC generates revenue through various financing instruments such as loans, guarantees, and syndications. Revenue sources include the following:

(i) equity returns in the form of dividends or sale of equity interests;
(ii) interest income from loans;
(iii) loan fees on loans originated and processed; and
(iv) fees earned from other activities, such as underwriting and the provision of credit enhancement.

Financial sustainability is a cornerstone of the CEFC's strategy, with target return rates set for both the general portfolio and specific return targets for the Clean Energy Innovation Fund and the Advancing Hydrogen Fund. Critically, these target rates exceed the government bond rate, ensuring fiscal sustainability and off-balance sheet treatment over the long term.[20]

(i) **General portfolio.** The CEFC's targeted portfolio benchmark return for the general portfolio—established in the *Investment Mandate Direction 2023*—is the 5-year bond rate plus 2.00%–3.00%. With the 2023 target of 3.90%–4.90%, the 2023 normalized result was 4.22%, within the target range.
(ii) **Clean Energy Innovation Fund.** The target benchmark is the 5-year bond rate plus 1.00%. With the 2023 annualized target of 2.80%, the annualized return for FY2023 was 0.93%, below target.[21]
(iii) **Advancing Hydrogen Fund.** The target benchmark is the 5-year bond rate plus 1.00%. With the 2023 target of 1.55%, the annualized return for FY2023 was 0.59%, below target.[22]

The total adjusted operating result for FY2023 was A$160 million, 14.0% above the top of the target range of A$120 million–A$140 million. Repayments and returns to the CEFC averaged almost A$1 billion for the 4 years 2019–2023.[23]

7.1.9 Conclusion and Recommendations

The CEFC's achievements reflect its effectiveness as a green bank and a catalyst for Australia's clean energy transition. Through substantial financial commitments, environmental impact, sector diversification, innovation support, and policy engagement, the CEFC has established itself as a cornerstone of Australia's strategy to achieve net zero emissions by 2050.

[20] Deloitte. 2018. Statutory Review of the Clean Energy Finance Corporation Report prepared for the Department of the Environment and Energy. p. 16.
[21] The fiscal year of the Government of Australia ends on 30 June.
[22] Target differs for the Advancing Hydrogen Fund compared with the Clean Energy Innovation Fund because the Advancing Hydrogen Fund's first project occurred part-way through the year FY23. Footnote 9, p.104.
[23] Footnote 9, p. 17.

The CEFC is a successful example of a climate finance vehicle or green bank. DMCs looking to establish similar institutions can draw the following valuable lessons from the CEFC's experiences:

(i) **Fiscal sustainability.** CEFC's investment mandate contains specific rate of return targets. For the general portfolio, the CEFC's board must target an average return of at least the 5-year Australian Government bond rate of 2.0%–3.0% per annum over the medium to long term. Achieving rates of return close to or slightly above the Government of Australia's cost of funds ensures that the CEFC can be treated as an off-balance sheet—a government-owned financial vehicle—a status it has maintained since its inception. This is an important consideration of DMCs, who are motivated to establish national climate vehicles for several reasons, including providing additional fiscal capacity for investment in climate change. Unless such vehicles can recover their government cost of funds, they cannot provide this fiscal relief. The annualized portfolio benchmark return target for the general portfolio from inception to 30 June 2023 was 3.90%–4.90%, with an annualized cumulative return of 4.24%. The CEFC achieved the target portfolio benchmark return for the first time on 30 June 2023 (footnote 9).

(ii) **Strong enabling environment.** The CEFC benefits from Australia's robust institutions and sound public investment management (PIM) and public financial management (PFM) practices. This creates an enabling environment and a deep pipeline of potential adaptation and mitigation projects where climate finance vehicles can be established and create impact faster, operating more effectively and efficiently. For example, the Rewiring the Nation Fund can immediately tap into state government-planned energy transmission investments of almost A$100 billion to ensure that privately transmitted wind and solar generation investments can transmit where needed. DMCs should focus on building sound PIM and PFM policies and institutions to provide stable regulatory environments and pipelines of potential investment projects for national climate finance vehicles.

(iii) **Clear investment mandates and strong governance arrangements to execute them.** The CEFC has been successful because the Government of Australia provided clear direction and established priorities while also setting limits on concessionality (i.e., giving financing on the least generous terms for the proposal to go ahead). A strong, independent board has enabled the execution of the various mandates over the years. DMCs must properly consider the investment mandate of their proposed climate change vehicles, ensuring they have clear principles around fiscal sustainability, concessionality, and leveraging private investment. Strong corporate governance will be critical to ensure the investment mandate(s) can be effectively executed.

(iv) **Collaboration across government and nongovernment organizations.** The CEFC collaborates very effectively with state and territory governments, delivering the energy transition through the Rewiring the Nation Fund and other federal agencies, such as the Australian Renewable Energy Agency (ARENA). Collaboration with ARENA is across various domains, including hydrogen, electric vehicles, alternative fuels, renewable energy, and storage. ARENA is also represented on the Joint Investment Committee of CEFC's Clean Energy Innovation Fund. This enhances its leveraging capacity and ensures alignment of efforts. DMCs must consider how their national climate vehicles will coordinate effectively with key government agencies delivering local, national, and regional climate investment programs to pool resources, share knowledge, and avoid duplication of efforts, leading to more cohesive and comprehensive climate action.

(v) **Crowding in private investment.** The CEFC demonstrates the value of climate finance vehicles helping to leverage private capital rather than crowd it out. This has been achieved by focusing on pioneering investments, funding ventures involving emerging technologies, or scaling up innovative technologies to commercial viability. At the same time, this has involved withdrawal from sectors when private investment is operating

effectively and at scale to meet the investment task. DMCs must be mindful that their national climate finance vehicles do not compete with private investors by investing in projects that represent technologies that are already commercially viable. Private capital leverage targets can help facilitate this alongside investment mandates that provide clear direction. Private sector leverage reached an all-time high in 2022–2023, with each A$1.00 of CEFC capital attracting an additional A$5.02 in private capital. With a lifetime leverage of A$2.82: A$1.00 on A$12.7 billion in CEFC commitments, the total transaction value was A$48.8 billion on 30 June 2023.[24]

7.2 Indonesia: PT Sarana Multi Infratruktur

7.2.1 Overview

PT Sarana Multi Infrastruktur (PT SMI) is a state-owned enterprise established in 2009 under the Indonesian Ministry of Finance. As a special mission vehicle, PT SMI was created to address the nation's growing need for infrastructure development and specific market failures.[25] Its core mission is to act as a catalyst, accelerating infrastructure projects through innovative financing solutions.

Since 2020 PT SMI has strategically broadened its focus to encompass climate change mitigation and adaptation. While PT SMI was not set up initially to function as a climate finance vehicle, it increasingly plays an important role in supporting the Government of Indonesia in implementing its low carbon development strategy, as set out in various policy documents including its Enhanced Nationally Determined Contribution (NDC) and Climate Resilience Development Policy, 2020–2045, that also considers a substantial role for other state-owned enterprises, government agencies, subnational governments, as well as private firms and households.

In this regard, PT SMI represents one approach to delivering on climate investment commitments by expanding the mandate of a financing vehicle rather than establishing a dedicated one to invest in climate change.

PT SMI's channels for climate finance include the following:

(i) **Establishing the Sustainable Financing Division,** which led to the value of new financing projects for active new and renewable energy projects reaching 4,205 billion Indonesian rupiah (Rp) by September 2023 (approximately $275 million at the prevailing September 2023 exchange rate). The project sectors financed are geothermal and mini hydro power plants, including a 350 MW hydropower plant. The Sustainable Financing Division also implemented a project management unit for the government Drilling Geothermal Upstream Development Program and the development of geothermal exploration financing products for geothermal resource risk mitigation. Alongside its traditional issuance of bonds to support its business growth, PT SMI has carried out numerous green bond issuances specifically earmarked for LCCR projects, with adequate funding sources and optimum tenor, listed on Indonesia's stock exchange (footnote 10).

(ii) **Acting as platform manager for the SDG Indonesia One platform** which provides blended finance solutions to support projects aligned with the Sustainable Development Goals (SDGs), specifically SDG 13: Climate Action. SIO was launched with the first total

[24] CEFC. 2023. Investing in Australia's net zero transition.

[25] An analysis of the financial sector in Indonesia by the World Bank leading up to the establishment of PT SMI showed that the structure of Indonesia's bank liabilities, with more than 85%of deposits with maturities of less than 1 month, meant that providing long-term loans to infrastructure projects was not possible for banks. In addition, the asset bases of institutional investors were relatively small compared to overall financial assets, and such institutions were averse to lending to long-term illiquid assets.

commitment of $2.46 billion. The aim is to collect funding from donors, philanthropists, investors, and other bilateral and multilateral financial institutions to distribute to projects in Indonesia that support SDG achievement (footnote 10).

(iii) **Acting as country platform manager for Indonesia's Energy Transition Mechanism**. ADB launched the Energy Transition Mechanism in 2021, a program that utilizes concessional and commercial capital from various public and private sources to incentivize the early retirement or repurposing of coal-fired power plants and other carbon-intensive power generation (e.g., heavy fuel oil) while supporting investments in clean energy, grid modernization, and energy storage. Under appointment as the program's platform manager by the Government of Indonesia, PT SMI plays a key role in facilitating the transition toward clean energy and a low-carbon economy.

(iv) **Coordinating Indonesia's interactions with key green funds,** including the Green Climate Fund (PT SMI is the first institution in Southeast Asia to be accredited).

7.2.2 Strategy and Mandate

PT SMI was established as a 100% government-owned entity to enhance infrastructure development and attract private investment in the sector. It was initially capitalized with Rp1 trillion (approximately $100 million) to provide a solid foundation for its operations and investments. PT SMI was established after an analysis of Indonesia's financial sector that showed that the short-term nature of bank deposits—over 85% maturing in less than a month—prevented banks from offering long-term loans for infrastructure projects. Additionally, institutional investors in Indonesia had relatively small asset bases compared to the total financial assets and tended to avoid long-term, illiquid investments. Instead, they preferred short-term instruments and government bonds.[26]

PT SMI's strategy is to mobilize diverse funding sources, foster public–private partnerships, and promote sustainable development. Since supporting Indonesia's transition toward clean energy and a low-carbon economy, the company aligns its objectives with Indonesia's nationally determined contribution (NDC) targets, aiming to support a low-carbon development path. PT SMI is mandated by the Government of Indonesia to act as a catalyst in fostering long-term infrastructure financing in Indonesia, focusing on two objectives:

(i) optimizing the social and economic benefits of infrastructure for communities; and
(ii) supporting the achievement of the SDGs, including supporting climate change mitigation efforts.

In support of Indonesia's climate change objectives, PT SMI prioritizes renewable energy, clean water, mass transportation, and other critical climate change mitigation and adaptation sectors.

7.2.3 Governance

As a wholly state-owned enterprise (SOE), PT SMI adheres to strict corporate governance principles. It emphasizes transparency and accountability to ensure the responsible use of public funds. PT SMI has a board of commissioners comprising individuals from key ministries, including the Ministry of Finance (MOF) and independent commissioners (appointed by the MOF), who create a blended representation of government and infrastructure finance expertise. The role of the board of commissioners is to supervise and advise the board of directors of the company's executive leaders on strategic issues and ensure that the Government of Indonesia's interests are protected.

[26] Global Infrastructure Hub. 2019. Guidance Note on National Infrastructure Banks and Similar Financing Facilities.

PT SMI has a Shari'ah supervisory board tasked with overseeing the board of directors, implementation of its policy related to fulfilling Shari'ah principles. PT SMI also has an annual general shareholders' meeting where MOF's representative, as the sole shareholder, approves annual budgets, business plans, and long-term strategies.

The board of directors oversees the day-to-day management, including a president director (or chief executive officer) and individuals responsible for PT SMI's key functions, including finance and investment, project development and advisory, operation and finance, and risk management. The board of directors is also appointed by the finance minister, suggesting some degree of political involvement. PT SMI publishes annual reports which disclose its activities and financial position.

PT SMI employs a risk management framework that includes independent risk management and compliance functions that carry out independent review and monitoring, as well as an internal audit function. PT SMI conducts a risk profile assessment and establishes a risk appetite statement to guide operations, which are periodically reviewed.[27]

As part of due diligence leading to a financial intermediary loan (FIL) into SIO, ADB conducted a financial management assessment on PT SMI and concluded it has strong financial management systems and credit and risk management policies, adequate operating processes, and a well-established audit committee and internal audit function. PT SMI complies with all prudential regulations as part of its bond issuance process and all financial covenants disclosed in its annual audited financial statements. PT SMI prepares its financial statements following Indonesian accounting standards, which are mostly aligned with international financial reporting standards. The assessed pre-mitigation financial management risk is low mainly because of the oversight provided by the MOF and PT SMI's sound governance arrangements.[28] These arrangements include a strong board with considerable independence, a clear investment mandate and principles around concessionality, and leveraging private investment.

7.2.4 Climate Investment Approach

Climate investments challenge the private investment community, given differing approaches to risk and return compared to public capital. There is frequently also a mismatch between the short-term horizons of private investors and the often-long timeframe within which physical climate risks manifest. There may be several climate investments that public and nonprofit entities would be willing to make while being considered too risky for private investors, rendering them unbankable. For these reasons, blended finance presents several opportunities to bridge risk, horizon, pricing, and bankability gaps across climate investments.

PT SMI's approach to this challenge is to deploy blended finance on climate investments in ways that maintain the same rigorous corporate governance standards, risk analysis, and due diligence that apply to its more traditional business activities: investment in economic infrastructure. Blended finance allows investors to participate in the same project while accommodating varying risk tolerance levels. This method is commonly applied in real estate deals and is useful for financing essential yet challenging projects. It facilitates collaboration among philanthropic organizations, government sources, and private investors, each with different risk and return profiles. Investors open to higher risk can provide a financial buffer for those seeking lower risk, making it possible for high-impact initiatives to receive the necessary funding. This allows it to maintain a strong balance sheet without needing recourse to that of the Government of Indonesia, enabling it to be sustainable in the long term.

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[27] PT SMI Sustainable Finance Action Plan.

[28] ADB. 2022. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Technical Assistance Grant - Republic of Indonesia: Sustainable Development Goals Indonesia One–Green Finance Facility (Phase 1).*

PT SMI deploys a range of support and instruments to mobilize climate finance for Indonesia's transition to a low-carbon economy, anchored in three strategic pillars: financing and investments, project development, and advisory services.

Financing and investments. PT SMI offers a comprehensive suite of financial products tailored to infrastructure development needs, including debt and equity instruments, and risk mitigation instruments.

(i) Debt instruments include (a) direct lending where PT SMI directly finances green projects across sectors like renewable energy, energy efficiency, climate-smart agriculture, and sustainable infrastructure; (b) loan guarantees, where PT SMI reduces the risk for commercial banks financing climate projects; (c) cofinancing where PT SMI partners with development finance institutions and commercial banks to cofinance large-scale climate projects, leveraging its resources and expertise; and (d) blended finance, where PT SMI utilizes blended finance instruments, combining concessional funds with commercial finance, to enhance the attractiveness of climate investments for the private sector.
(ii) PT SMI may invest directly in firms or project companies or participate in green funds to support venture capital or private equity investments in LCCR.
(iii) Risk mitigation instruments include credit guarantees, partial risk guarantees, and other risk mitigation tools to de-risk climate projects and attract private sector investments.

Project development. PT SMI actively participates in developing bankable LCCR projects, including project identification, technical assistance, feasibility studies, and procurement. PT SMI approaches each LCCR project in the same way that it does its more traditional infrastructure investment projects, using the same risk management framework, project due diligence, hurdle rates of return requirements, governance arrangements, alignment with national priorities, etc., but using blended finance to achieve similar commercial outcomes.

Advisory services in capacity building and knowledge management. PT SMI offers expertise and shares knowledge to strengthen both public and private sector capacity on LCCR and the role PT SMI can play, collaborating with key international knowledge and technical partners, including USAID, the OECD, and the Global Green Growth Institute.

As an example of the application of blended finance, SIO's approach to blended finance includes four types of facilities tailored to the appetites of donors and investors: development facilities, derisking facilities, financing facilities, and equity funds (footnote 28).

(i) **Development facilities** encourage preparing national and regional government infrastructure projects. With this support, the preparation of infrastructure projects improves in terms of quality and quantity.
(ii) **Derisking facilities** aim to increase the bankability of infrastructure projects so that they are attractive to private parties—in this case, commercial banks and investors—to participate in infrastructure projects. Blended finance is key to derisking. Investment grants, for example, are used to reduce the WACC, which enables PT SMI to achieve hurdle IRR. For example, a marginal mini-hydro project in West Sumatra became bankable by introducing a UK donor-funded 20% investor grant. This allowed the standard 70:30 debt–to–equity ratio to fall to 65:15, reducing the WACC and improving the project's IRR.
(iii) **Financing facilities** encourage and stimulate greater infrastructure financing by attracting the participation of other parties—such as commercial banks or private investors—to participate in infrastructure projects. Financing facilities can play a role in the form of flexible financing products and function to close the gap.

(iv) **The equity fund** aims to encourage private investors to participate in LCCR to the SDGs. An equity fund will strengthen capital capacity for new projects (greenfield). It can also act as asset recycling for projects that are already operating (brownfield).

7.2.5 Capital Structure

PT SMI leverages a diversified capital structure that includes government equity, domestic and international borrowings, and *sukuk* (Islamic) and green bond issuances. This allows the company to finance large-scale projects while managing its risk profile. The Government of Indonesia—as the sole shareholder—provided equity in the company of more than Rp34 trillion ($240 million in 2021). Debt in PT SMI was more than Rp20 trillion ($150 million in 2021) and was provided by the following sources (footnote 10):[29]

(i) loans from private banks and other private financial institutions;
(ii) loans from the Government of Indonesia (including on-lending of funds from ADB and the World Bank); and
(iii) bonds issued in domestic capital markets.

PT SMI has achieved relatively high national credit ratings of AAA from PEFINDO and BBB from Fitch as part of its issuances.[30] These strong ratings have enabled it to attract institutional finance on relatively favorable terms. It has only been about 100 basis points above government bond issuances (in the case of 3-year bonds). The support provided by the Government of Indonesia drives such ratings (particularly AAA), plus the company's relatively low level of gearing relative to equity injections.

7.2.6 Progress

PT SMI has made progress across all its climate initiatives. PT SMI's SIO, for example, has participated in 84 blended finance projects and mobilized Rp3.25 billion, of which Rp931 million has been agreed, and Rp233 million has been realized. SIO was catalyzed by an ADB 20-year FIL of $150 million to the Government of Indonesia in February 2022, and re-lent to PT SMI for financing green and SDG-impacting subprojects. ADB has estimated that if the FIL loan funds are used twice (i.e., revolved once during the ADB loan tenor at PT SMI's discretion), the $150 million could potentially facilitate green projects with total project costs of about $1 billion, providing a leverage of about 8 times the original loan amount.

The value of new financing projects for active new and renewable energy projects up to September 2023 reached Rp4.205 trillion (approximately $275 million at the prevailing September 2023 exchange rate), which financed geothermal and mini-hydro power plant projects. PT SMI has also undertaken 60 ecosystem enabler activities—including capacity building, sharing sessions, and business matching—and worked with 34 partner organizations worldwide on SIO. PT SMI has maintained its status as the only entity in Indonesia with Green Climate Fund (GCF)-accredited entity status. With the 2022 upgrade to *medium* rating, PT SMI can apply for GCF funding with a maximum proposal value of $250 million and a broader range of financial instruments.

In 2022, the total annual project value had reached Rp820 trillion (approximately $55 billion at average 2022 exchange rate) across 22 projects, equating to a 5.6x multiplier effect on total project commitments and a 26.9x multiplier effect on paid-up project equity capital. Further, PT SMI supported PT Geo Dipa Energi—a state-owned enterprise engaged in geothermal exploration and exploitation—collaborating with the World Bank to undertake geothermal energy exploration and upstream development, including developing a special purpose financing facility.

[29] Pefindo Rating Summary 92024: PT Sarana Multi Infrastruktur (Persero).
[30] Moody's Ratings. 2024. Rating Action: Moody's assigns first-time Baa2 issuer rating and (P)Baa2 EMTN program rating to Sarana Multi Infrastruktur; outlook stable.

PT SMI's *2024 Sustainable Financial Action Plan* highlights several achievements in 2023, including the following:

(i) As Energy Transition Mechanism country platform manager, working with ADB on several possible transactions that could bring forward the closure date of coal-fired power plants.
(ii) Implementation of a de-risking loan facility for the geothermal resource risk mitigation program with the World Bank with a total loan value of $150 million, to be blended with a GCF loan value of $7.5 million and GCF grant funds.
(iii) Investments in geothermal and mini hydropower plant projects, thereby bringing the value of new financing for active new and renewable energy projects to Rp4.205 trillion by September 2023 (approximately $275 million at prevailing September 2023 exchange rate).
(iv) Distribution of de-risking instrument support for renewable energy projects in the form of investment grants from the British government for three projects.
(v) Technical support for project preparation in the form of carbon footprint calculations for two projects in collaboration with SIO partners.

7.2.7 Commercial Model, Operational Performance, and Financial Sustainability

PT SMI generates revenue through various financing instruments such as loans, guarantees, and syndications. Revenue sources include

(i) interest income from loans where PT SMI acts as a lender to project developers, generating a spread between borrowing and lending rates;
(ii) loan fees on loans originated and processed; and
(iii) underwriting fees where PT SMI underwrites bonds issued by project developers to raise capital for climate projects

PT SMI also receives grants from the Government of Indonesia to support specific climate-related initiatives or subsidize interest rates for project developers.

PT SMI operates with a degree of financial autonomy from the Government of Indonesia but benefits from explicit and implicit government support. Given the market failures that PT SMI is addressing in climate change mitigation and adaptation, fiscal support for PT SMI and the LCCR projects it is undertaking may be economically justified and is consistent with the activities of all governments worldwide. However, it is important that any such fiscal support be identified, acknowledged, accounted for, and reported.

As of year-end 2020, PT SMI maintained a capital adequacy ratio well above the Basel II guidelines, with total assets of $7.1 billion, and a growing infrastructure loan portfolio with about $4.4 billion in lending. Operating income was robust at about $407 million, and its average liquidity was at 25%, as reflected in its Fitch ratings. At the subproject level, ADB noted PT SMI's risk assessment processes and robust underwriting criteria. Assessments of sample subprojects from the indicative SDG Indonesia One-Green Finance Facility pipeline also showed positive financial internal rates of return of 2–3 percentage points above the weighted average cost of capital. A financial analysis of standalone SIO-Green Finance Facility cash flows—under an extreme scenario with conservative assumptions for on-lending to subprojects—showed SIO-Green Finance Facility to be sustainable with a debt service coverage ratio of more than 1.5 and the ability to catalyze additional funds from public investment corporations equal to at least 3 times the amount of ADB financing (footnote 20).

Notwithstanding ADB findings, PT SMI's annual report shows a 2022 return on equity of 5.64%, with the figure in 2018–2021 ranging from 4.5% to 5.35%. If the Government of Indonesia's borrowing comes at a higher cost of capital than this, forgoing part of its return on capital could represent an implicit subsidy. The yield on the Government of Indonesia's 10-year bond—a good proxy for its cost of capital—is 7.1% as of 2024. These funds must be recovered by reducing expenditures elsewhere or increasing the government's revenue.

The value of an asset on an SOE (and hence the Government of Indonesia) balance sheet is defined by future cash flows it can create. If these cash flows provide a return lower than the Government of Indonesia's cost of capital, then the "asset" is equivalent to an implicit subsidy. While it is acceptable in principle for the Government of Indonesia to subsidize PT SMI investment in infrastructure (and, by extension, LCCR investment), and all else is equal, it is ultimately not sustainable. In the case of countries with considerably less fiscal space than Indonesia, returns below the government's cost of capital that do not achieve the off-balance sheet objective is often given as the reason for setting up a climate finance vehicle.

7.2.8 Conclusion and Recommendations

PT SMI stands as a testament to the potential of climate finance vehicles to play a vital role in climate adaptation and mitigation. The Government of Indonesia has turned to PT SMI—an SOE that operates on a commercial basis, with strong governance, risk systems, project development systems and the ability to leverage capital—and requests that it apply the same level of professionalism to Indonesia's necessary investments in climate adaptation and mitigation. PT SMI's experience offers several valuable lessons to other DMCs looking to establish finance vehicles for supporting climate action:

(i) **Build on institutions, where possible and practical.** The Government of Indonesia decided to expand PT SMI's mandate rather than create a new financing vehicle for climate action. In this way, the government could leverage PT SMI's considerable expertise, capability, and robust systems and policies and apply these to a new investment class rather than build a new institution from scratch. This mandate can still evolve as the climate change agenda evolves, as has been the experience up until 2024.

(ii) **Strong, independent governance is key to effective performance.** PT SMI's governance—reflecting a blended representation of government and infrastructure finance expertise—has enabled robust and disciplined investment processes to be applied to important Government of Indonesia policy priorities. This is reinforced by clearly articulated investment mandates, comprehensive risk management strategies, plans, and execution, and rigorous due diligence on specific transactions.

(iii) **Financial sustainability and leverage are key to longevity.** PT SMI maintains hurdle rates of return to ensure financial sustainability, using blended finance (e.g., investment grants) to lower capital costs as required. This allows it to maintain a strong balance sheet without needing recourse to that of the state, enabling it to be sustainable for the long term. At the same time, financial leverage—i.e., the ability of PT SMI to facilitate additional, typically private sector finance—is a key operational priority and performance metric, with targets generally being met and exceeded. This is a critical role for a national climate vehicle, given the considerable financing required to support climate action, much of which will need to come from private investors and financiers.

(iv) **Inclusive stakeholder engagement is critical to a joined-up approach.** Engaging a wide range of stakeholders—including local communities, private sector participants, and international organizations—has allowed PT SMI to align its projects with broader societal goals and ensure community buy-in.

(v) **Strong public investment management and public fiscal management capacity are critical to the success of climate finance vehicles.** Indonesia has strong PIM and PFM practices, which have helped establish an enabling environment and developed a steady pipeline of investable projects for PT SMI to thrive.

7.3 Thailand Energy Efficiency Revolving Fund

7.3.1 Overview

Energy demand in developing Asia is growing faster than the world average, with missed opportunities to realize energy efficiency in the region due to various market and nonmarket barriers, including a lack of access to capital through suitable finance mechanisms.[31] Energy efficiency investment has multiple benefits, including increasing electricity affordability by reducing demand, supporting energy security, and reducing environmental impacts.

Thailand has a strong record of promoting energy efficiency market development and has developed policies and financing mechanisms to enhance energy efficiency investments. In response to rising energy demand, Thailand developed the Energy Conservation Promotion Act 1992 (ENCON) to guide energy efficiency and renewable energy development. The act outlines three key areas for energy conservation:

(i) A mandatory program for large commercial and industrial energy consumers comprising 4,500 "designated facilities" that requires them to undertake energy efficiency audits and reporting.[32]
(ii) A voluntary program targeting SMEs that offers capacity building and technical assistance.
(iii) The establishment of the Energy Conservation Promotion Fund (ENCON Fund)—which became operational in 1995—provides financial support to private and public–private partnership projects for energy efficiency and renewable energy programs. A tax on petroleum products financed the fund.

Following Thailand's 1997 financial crisis, energy security was a major concern, resulting in several sector targets, including energy cost savings and reducing energy imports. In 2010, the government established the 20-Year Energy Efficiency Development Plan, 2011–2030, which stipulated a national target to reduce energy intensity by 25% by 2030 compared to 2005.[33] In 2015, the energy efficiency plan was renamed and included a revised target to reduce energy intensity by 30% by 2036 compared to a 2010 baseline.[34]

Through establishing primary legislation and targeted policy action, the Government of Thailand made substantial efforts to address supply and demand drivers of the energy efficiency market development and transition toward an energy-efficient economy. Despite strong leadership in supporting both the mandatory program and voluntary measures, they achieved limited success. Although the ENCON Act required large commercial and industrial energy users to undertake energy audits and develop energy efficiency projects under the ENCON Fund, demand-side interventions failed to spur significant demand for energy efficiency investment, partly due to a lack of enforcement of noncompliance. Thus, many planned investments did not materialize, and energy intensity rates remained unchanged.[35]

Many energy efficiency measures are financially viable for investors but are inhibited by various market failures and barriers. Thailand's banks have traditionally lacked the expertise and understanding of energy efficiency projects, resulting in barriers for developers to access financing. As such, local banks have provided inadequate energy efficiency lending, particularly to SMEs and energy service

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31 Expected to grow by 2.9% per year to 2035, compared to the world average of 1.6%, according to the International Energy Outlook 2011, cited in ADB. 2012. Energy Efficiency in Asia and the Pacific: 12 Things to Know. 22 August.
32 Thailand's ENCON Act defines "designated facilities" as industrial consumers with electrical demand greater than 1.0 MW or annual energy use of more than 20 terajoules per year of electrical energy equivalent.
33 Government of Thailand, Ministry of Energy. 2010. *Thailand 20-Year Energy Efficiency Development Plan (2011–2030).*
34 ASEAN Centre for Energy (ACE). 2019. *Energy Efficiency Financing Guideline in Thailand.*
35 D. R. Limaye et al. 2013. Unlocking Commercial Financing for Clean Energy in East Asia. Directions in development: energy and mining. World Bank Group.

companies (ESCOs). Small companies and ESCOs lack the balance sheets to provide sufficient collateral for loans, whereas future cost savings are typically not considered in the lending process. Inadequate institutional capacity and enabling legislation to drive energy efficiency finance have been significant constraints in Thailand's mobilization of greater private sector investment.

Thailand's EERF was established in 2003 to stimulate private investment in energy efficiency and renewable energy projects.[36] It lies within the framework of the ENCON Act. It is a subprogram under the ENCON Fund, aiming to address previous limitations in implementing the ENCON Act and barriers to accessing finance. The fund provides soft loans with low-interest credit lines to Thai banks that can on-lend to energy efficiency customers. This enables them to facilitate increased debt financing availability to project developers and minimize borrowing costs and government intervention. The fund also provides capacity building to local banks to familiarize them with project bankability.

Originally structured as a 3-year pilot program from 2003 to 2006 with 6 participating commercial banks, the fund was extended via lines of credit through 6 (and a sixth extended) implementation phases to 2019 and an expanded partnership between the Government of Thailand and 11 participating banks. The Energy Efficiency Revolving Fund (EERF) provided the basis for Thailand to shift its focus from an incremental approach focused on energy audit and reporting to a measurable results-based approach, expedited implementation of energy efficiency projects, and market-based project development.[37]

Other energy efficiency financing mechanisms under the ENCON Fund include the following (Figure):

Direct subsidies. The following subsidy rates are for designated and non-designated buildings and factories to replace equipment and machinery with approved high-efficiency or innovative energy-efficient technologies.[38]

(i) **20%** for designated buildings and factories to be replaced with high-efficiency equipment and machinery.
(ii) **30%** for designated buildings and factories to be replaced with approved innovative technologies.
(iii) **30%** for non-designated buildings and factories, community enterprises, or start-ups.
(iv) Grant financing contribution of up to 3 million Thai baht (B) per applicant with a maximum 7-year payback period.

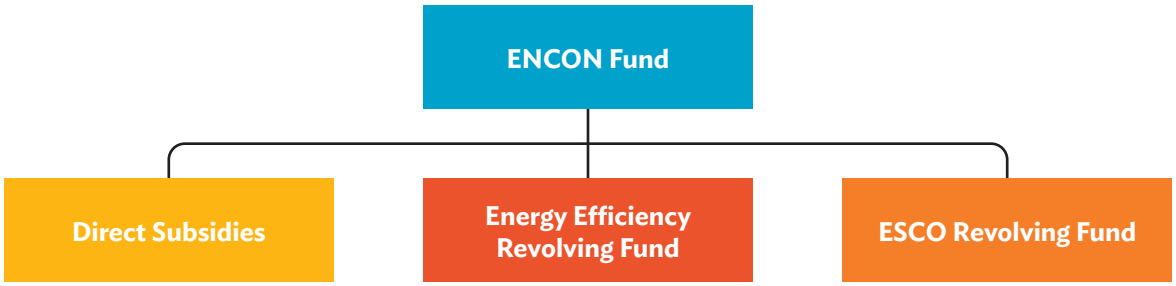
Energy service company revolving fund. Targeted at SMEs and ESCOs, the fund commenced in 2008 with an initial budget of B500 million. The fund provides turnkey-based services for energy efficiency or renewable energy projects and access to funding specifically for ESCO projects.

[36] Energy Futures Australia Pty Ltd and DMG Thailand. 2005. Thailand's Energy Efficiency Revolving Fund: A Case Study. Government of Australia, Department of Industry, Tourism and Resources. Prepared for APEC Energy Working Group.

[37] S. Vongsoasup et al. 2002. *Piloting the way to a more effective energy strategy: Thailand's simplified subsidy and finance initiatives.* ACEEE Summer Study on Energy Efficiency in Buildings. *Commercial Buildings: Program Design and Implementation - 4.363*.

[38] Asia Pacific Energy Research Centre. 2015. *Compendium of Energy Efficiency Policies of APEC Economies: Thailand*.

Figure: Energy Conservation Promotion Fund Energy Efficiency Financing Mechanisms



ENCON = Energy Conservation Promotion Fund, ESCO = energy service company.
Source: Author.

7.3.2 Strategy and Mandate

The objective of the EERF is to provide access to capital for energy efficiency projects, reduce greenhouse gas emissions, increase knowledge, and overcome market failures and barriers within the financial sector to expedite the implementation of such programs. Barriers include the following:

(i) Low capacity, awareness, and prioritization of energy efficiency financing opportunities among banks.
(ii) Banks have a high-risk perception, with investors unsure if expected future savings will be realized.
(iii) Lack of banking sector liquidity due to Thailand's 1997 economic crisis.
(iv) Complex bureaucratic application and reporting procedures under the ENCON Act.
(v) Challenges in obtaining the high up-front finance required for investing in energy efficiency.
(vi) In reality, there is a lack of incentives and measures to improve energy efficiency and achieve energy savings.
(vii) In some cases, energy efficiency projects must also be aggregated to generate a sufficient economic scale.

The EERF's strategy is to facilitate and promote Thai commercial bank engagement and appetite in financing energy efficiency and renewable energy through capacity building, incentives, and streamlined lending procedures that simplify project appraisal and financing processes, research, and development.

7.3.3 Governance

Thailand's Department of Alternative Energy Development and Efficiency (DEDE), within the Ministry of Energy, is responsible for implementing energy efficiency under the ENCON Act and leads the administration of the EERF program. Since establishing the EERF, DEDE strived to enable the private sector to take greater leadership and responsibility in program implementation to expedite investments in energy efficiency projects. DEDE's role includes

(i) setting program regulations, standards, and guidelines and ensuring that projects focus on genuine energy savings over solely equipment replacement;
(ii) undertaking research and development for energy efficiency improvement;
(iii) promoting energy conservation activities; and
(iv) supporting banks and their clients with technical assistance to undertake project appraisals.

(v) providing data on energy use, conducting feasibility studies, and developing targets for improving nationwide energy-saving measures.
(vi) undertaking mandatory energy audits in >8,000 designated factories and buildings.
(vii) monitoring bank performance to meet their energy efficiency projects, lending, and repayment targets.
(viii) evaluating projects and performance and measuring total energy savings.

The ENCON Fund Committee leads the overall management of the ENCON Fund, which comprises the deputy prime minister as vice chair, key ministries, and representatives from government agencies. The committee also receives guidance from the National Energy Policy Council. The Ministry of Energy, which consists of the DEDE and the Energy Policy and Planning Office, is responsible for implementing the ENCON Fund. An ENCON Fund subcommittee—comprising officers from DEDE, the Energy Policy and Planning Office, and the Ministry of Finance—is responsible for making recommendations to the ENCON Committee on using money in the fund.

DEDE and the participating banks are equally responsible for the education, publicity, and promotion of the EERF. However, DEDE does not have a set budget allocation for promotional activities. Project developers are responsible for identifying energy efficiency project opportunities and undertaking feasibility studies and loan applications. Participating banks are accountable for the overall lending process, including financial viability, technical project assessment, appraisal, credit approval and disbursement, loan collection, and enforcement in any case of default. To implement the EERF, DEDE executes a contract that defines the terms and conditions for the fund's operations with each participating bank. To facilitate monitoring, the banks must submit regular project reports to DEDE identifying the investment in energy efficiency projects, equipment, and total energy and demand savings. With participating banks bearing all project risk, loan defaults, and responsibility for capital and financial oversight, the Government of Thailand carries no risk associated with loans from the EERF. During project implementation, DEDE maintains regular communication with stakeholders via biannual meetings.

Financial auditing oversight falls within the remit of the State Audit Office of the Kingdom of Thailand and independent advisors for energy savings. As annual reports and financial statements are not readily available for the ENCON Fund nor EERF, risk management policies, adherence to international standards regarding accountability, transparency, prudent investment, and good governance practices still need to be discovered.[39] Thailand's Office of Energy Regulatory Commission achieved an AA-level ranking in a 2022 integrity and transparency assessment.

7.3.4 Approach to Climate Investment

The "invisible income" generated through energy efficiency has also often been overlooked due to the perceived high financial risks and transaction costs. Revolving funds are publicly supported mechanisms that create self-sustaining funds to continually facilitate and finance investments in energy efficiency projects as other projects pay back their costs. They are noted to mobilize private investment and overcome barriers to energy efficiency investment. This provides the opportunity to use operational funds for capital investment. For the planning and design of the EERF, DEDE received technical assistance from the Government of Denmark, the Global Environment Facility, the World Bank, and the Industrial Finance Corporation of Thailand. The Industrial Finance Corporation of Thailand recommended that DEDE initiate a simplified loan program to promote industrial energy efficiency. The EERF business model provides a concessional loan facility through public and commercial banks for energy efficiency investments in buildings and industry and is designed to do the following:

[39] For example, the Santiago Principles, written by the 26 founding members of the International Forum of Sovereign Wealth Funds in 2008, and the 24 Generally Accepted Principles and Practices are the globally accepted standards for governance, investment and risk management practices for sovereign wealth funds.

Stimulate private sector energy efficiency investment and interest. The EERF stimulates investments in commercial and large-scale industrial projects by increasing the availability of debt financing for energy efficiency and renewable energy projects while minimizing project developer borrowing costs.[40] The conditions and interest rates are attractive to potential applicants. Along with capacity building for banks to understand the bankability of energy efficiency projects, banks are encouraged to design suitable financial services to manage risk. The fund also allows private sector participants to use paid-back "revolving" funds when the projects go to operational and implementation stages. Since the EERF commenced, DEDE has actively promoted clean energy lending and the fund to all Thai banks, with staff visiting to share knowledge and training on the application process and eligibility criteria.

Facilitate commercial lending for energy efficiency. The ENCON Fund initially released funds at 0.0% interest through the EERF to the banks. The model changed over time, with rates increasing to 0.5% to cover administrative costs. Thai banks on-lend EERF funds to energy efficiency project developers at below-market fixed interest rates, capped at 4.0% per annum, making the loans attractive to customers. Banks use their criteria to assess loan applications by focusing primarily on the project developer's balance sheet, value, and collateral quality. Loan criteria do not assess potential savings from the energy efficiency project and are asset-based, not project-based lending.

Initially, only large energy-consuming factories and buildings for "designated facilities" were eligible to apply for EERF loans; however, during the initial months of the fund operation, the uptake of loans was low. DEDE expanded eligible entities to include owners of any industrial or commercial facilities and ESCOs. Banks often hesitate to loan to third parties because they typically cannot offer adequate collateral. For eligibility, the project must be an energy efficiency or energy conservation project according to the Energy Conservation Promotion Act, B.E. 2535. Project developers may identify projects through an ESCO energy audit of the facility and then undertake a technical feasibility study to estimate the potential energy and cost savings, financing needs, and loan repayment requirements. Apart from the maximum loan size, project eligibility criteria are quite broad and do not set a required minimum level of energy savings. A project may include several smaller, separate energy efficiency measures, or developers may apply for more than one loan to structure larger, more expensive energy efficiency measures into several projects. Loans can finance medium-size energy conservation or energy-saving projects such as

(i) the purchase and installation of energy efficiency equipment;
(ii) costs for engineering design, control, supervision, and savings guarantee fees for ESCOs;
(iii) costs of installation and operation of energy efficiency appliances;
(iv) civil works or components necessary for the project; and
(v) demolition costs, transportation, import taxes and duties, and related value-added tax.

Some renewable energy projects may fall under the categories above, however ineligible investments include land and land improvement costs, building construction, and costs not specifically needed for the project's main transformers and substation.[41]

[40] International Energy Agency (IEA). 2017. Energy Efficiency Revolving Fund (EERF) – Policies - IEA.
[41] Frankfurt School-UNEP Collaborating Centre for Climate and Sustainable Energy Finance. 2012. Case Study: The Energy Efficiency Revolving Fund.

The EERF loan process requires a facility owner to apply to a participating bank to conduct a project appraisal. If the bank deems the results are acceptable, the application is forwarded to DEDE. DEDE then assesses the project against specific criteria and conditions, including the technical feasibility of the proposed energy-saving measures. Once approved by DEDE, the bank disburses funds. As there is no available methodology for project selection, it is unclear if it is aligned with the Climate Bonds Taxonomy and Climate Bonds Standards.

Offer simplified procedures. The EERF strived to simplify the administrative process and reduce bureaucratic burden to engage the banking community further. With no specific criteria, any commercial bank can participate in the EERF. Application and reporting processes are kept short and easy, and since applicants were required to submit their project feasibility studies, application rejection rates were low. Government involvement in the financing process was minimized, with banks leading loan management and reporting and DEDE monitoring bank performance and program energy savings. This approach helped to leverage bank finance.[42]

Reduce risk. Banks must repay loans to the EERF in case of default, designed to remove government credit risk. To recover losses, banks can restructure loans or terminate past-due loans. However, the fund does not use interest rate pricing variability to allocate risk across projects. As such, there may be higher or lower risk carried by project developers than the project warrants. [43]

Provide capacity building and training. DEDE facilitates seminars and training for prospective clients and banks, and advertising campaigns to share knowledge about energy efficiency opportunities. Private investment can be more readily mobilized by training commercial financial institutions to consider the energy-saving potential of projects and the ability to translate these savings into profit. The fund also stimulates communication between key stakeholders and has created networks of private banks and ESCOs to enhance knowledge sharing and understanding of funding requirements. ESCOs have further developed technical and policy training courses to teach banks about energy efficiency projects through successful case studies and policy frameworks for tax incentives. The fund also pays for technical assistance programs, energy audits, and feasibility studies.

Project monitoring and appraisal to maximize climate outcomes. The energy efficiency and renewable energy conservation programs under the ENCON Fund include quantitative targets that will be achieved in 5 years, facilitating performance monitoring and evaluation (footnote 43). Although monitoring and evaluation systems to measure impacts vary between programs, DEDE maintains robust energy data. DEDE uses a series of key performance indicators to monitor the performance of the EERF and its projects, including (i) marketing of the fund, (ii) approval time for loan applications, (iii) number and value of loans approved, (iv) development of the project pipeline, (v) installation and continuing operation of the energy efficiency measures, (vi) the energy efficiency measures, (vii) estimated and actual energy savings per project, (viii) progress of funded projects, and (ix) bank performance (footnote 38).

[42] Center for Clean Air Policy. Revolving and ESCO Funds for Renewable Energy and Energy Efficiency Finance: Thailand.
[43] Irawan et al. 2012. *Case Study Report: Thailand Energy Conservation Fund.* A UNDP working paper.

7.3.5 Capital Structure

The EERF was funded through the ENCON Fund, with an initial allocation of B2 billion (about $55 million) in 2002, to be repaid over 10 years (footnote 38). An energy efficiency market assessment study that cooperated with commercial banks determined this amount (footnote 37). The ENCON Fund's source of capital is derived from government levies on petroleum products (between B0.07–B0.25 per liter) (footnote 41). It is one of the biggest non-budgetary funds promoting and financially incentivizing investments in energy efficiency and renewable energy in Asia and the Pacific. By utilizing the polluter pays principle, the government can manipulate market prices to influence the use of fossil fuel products and allocate the revenues to support sustainable financing of energy conservation projects (footnote 43).

Expenditure estimation under the ENCON Fund is reviewed and adjusted every 5 years, in line with Thailand's rolling Five-Year Energy Conservation Program (footnote 43). The annual budget received and managed under the ENCON fund is around B7 billion ($200 million at prevailing September 2024 exchange rate) (footnote 43), and in 2017, it had a capital of about $1.1 billion (footnote 34). This budget is significantly higher than the amount allocated by the government to renewable energy and energy efficiency annually, which in 2011 was about B2 billion. Other sources of capital for the ENCON Fund as prescribed by the law can include the following (footnote 43):

(i) Electricity surcharges collected from designated factories or buildings that violate or fail to comply with ministerial regulations.[44]
(ii) Government subsidies.
(iii) Money or property received internationally and locally from the private sector.
(iv) Interests and other benefits incurred from the ENCON Fund; however, generating interest or dividends through investing the ENCON Fund's capital and assets in financial markets is restricted by regulation.

The initial six major Thai banks selected to participate in the EERF were provided with no-interest credit lines ranging from B100 million to B400 million (about $2.9 million–$11.4 million at prevailing September 2024 exchange rate), to be repaid to the EERF within 10 years. Over time, the EERF signed agreements with 11 commercial banks. As financing volumes increased and banks began to cofinance projects, DEDE imposed a 0.5% interest charge to banks to cover administrative costs.[45] In the sixth phase of the EERF, DEDE eliminated this interest charge, reverting to 0.0%, and reduced the banks', on-lending interest rates to project proponents from 4.0% per annum to a cap of 3.5%. DEDE maintained the ability to tailor credit lines to suit each bank's requirements for energy efficiency investments; however, as the ENCON Fund only released funds as needed to meet loan drawdowns, credit lines only acted as targets.

The banks can on-lend capital to energy efficiency and renewable energy project developers with a below-market interest rate capped at 4.0% (on a negotiable basis) to cover their risks, management, and administration costs. Loans could cover up to 100% of project costs with a maximum size from the EERF of B50 million ($1.4 million at prevailing September 2024 exchange rate) per project, to be paid back over 7 years maximum. Loans of this smaller size would typically only be sufficient to finance medium-sized energy efficiency projects. With no set conditions around the leverage ratio for each project, higher volume projects that required over B50 million could solicit additional debt financing from commercial banks, usually at a higher interest rate.

[44] P. G. J. Saculsan and A. Mori. 2018. What can the Philippines learn from Thailand`s ENCON Fund in overcoming the barriers to developing renewable energy resources. *Journal of Clean Energy Technologies*. 6(4). pp. 278–283.
[45] USAID. 2009. *Innovative Approaches to Financing Energy Efficiency in Asia*. August.

DEDE directs loan repayments straight to the ENCON Fund rather than through the EERF. The funds are used to finance new energy efficiency and renewable energy projects, hence the fund's "revolving" design. When each phase reaches total commitment, the EERF submits a proposal to the ENCON Fund for funding replenishment. According to DEDE, the repayment rate has been highly satisfactory. In 2015, DEDE commenced the sixth phase of the EERF with a total allocation of almost B4.5 billion ($129 million at prevailing September 2024 exchange rate), the highest budget so far, which ran until 2017 before receiving a phase six extension to December 2019.

7.3.6 Progress

Since 2015, the Bangkok Bank, Bank of Ayudhya, CIMB Thai, TMB Bank, Siam City Bank, Siam Commercial Bank, Kasikorn Bank, Exim Thai Bank, SME Bank, and UOB have participated in the EERF and successfully funded numerous energy-saving projects. Typical building types included hospitals, hotels, offices, factories, textiles, chemical, food, beverage, and tobacco entities. Leverage ratios from the government to the private sector in the EERF have been achieved between 1:3 to 1:4.[46] The fund, however, took about 3–4 years before achieving a reasonable application rate, with an initial slow uptake in bank learning processes around energy efficiency technologies, risks, and costs. By outsourcing most of the administrative responsibilities of the EERF to banks, investments in energy efficiency projects have been expedited.

From 2003 to 2019—combined with technical assistance, awareness-raising campaigns, and simple application guidelines—DEDE's EERF successfully stimulated bank interest in energy conservation and efficiency. This resulted in the approval of 455 projects, an investment of B18.92 million (approximately $538 million), and B7.32 billion (about $208 million) of energy savings per year across 6 (and the sixth extended) phases. The table summarizes the resulting achievements in each phase.

Table: Summary of Energy Efficiency Revolving Fund Results from Phase 1–6 (extended)

Phase	# of Projects	Total Investment (B million)	Investment via ENCON Fund (B million)	Investment via Bank/Applicant (B million)	Energy Saved (ktoe)	Cost Saving (B million)
1	78	3,427	1,902	1,525	98	1,805
2	83	3,330	1,735	1,595	99	1,713
3	98	5,878	2,702	3,176	93	2,329
4	12	1,282	377	905	13	421
5	24	2,042	489	1,554	17	539
6	76	1,284	1,215	69	7.3	236
6 extended	84	1,681	1,641	40	5.7	276
Total	**455**	**18,924**	**10,061**	**8,864**	**333**	**7,319**

B = Thai baht, ktoe = kiloton of oil equivalent.
Source: Government of Thailand, Department of Alternative Energy Development and Efficiency. 2023. Energy Efficiency Policies and Measures.

The EERF has not measured social impacts. However, increased job employment has been noted in some rural areas where banks have provided renewable energy products. Overall, the EERF has achieved its mandate, and no defaults have been indicated when returning loans to the ENCON Fund. The EERF has since been hailed internationally as one of the best energy efficiency and renewable energy financial instruments in Asia and the Pacific (footnote 43). DEDE is now striving to address previous complex

[46] V. Streitferdt and S. Chirarattananon. 2015. Energy efficiency finance support in Thailand: lessons learned from the energy efficiency revolving fund. *Journal of Sustainable Energy and Environment*. 6. pp. 13–16.

legal issues in enforcing the compliance ratio for designated building reporting rates on energy use. Enforcement policing agencies, however, require knowledge building in mandated energy efficiency auditing requirements under the law.

7.3.7 Commercial Model, Operational Performance, and Financial Sustainability

The "revolving" fund structure of the EERF is sustainable by ensuring a consistent flow both in and out for funding energy efficiency measures (footnote 41). This form of innovative upfront financing creates further sustainability by alleviating pressure on government budgets. The general flow of the fund earns interest on investments when mature, which, although very low, is adequate in covering any potential loan defaults and administrative costs. This interest is then used to pay back original loans to DEDE.

The fund has not been without various challenges. From a sustainability perspective, it has had issues establishing energy efficiency finance as business-as-usual in bank portfolios consistently throughout its multiple phases. It could have reduced bank incentives to develop commercially sustainable solutions. Although DEDE trained banks, key technical and credit lending advice often needed to be communicated. This resulted in only 1 of the original 11 participating banks actively providing energy efficiency lending programs at the end of the fund's fourth phase in 2015 due to a failure in shifting bank underwriting processes away from requiring collateral toward cash flow. With banks assuming all the credit risk, such financing models favored larger enterprises, resulting in persistent difficulties for SMEs and ESCOs acquiring loans (footnote 46).

At the end of the fifth phase, DEDE considered discontinuing the EERF to focus on technical assistance and training and promote more cofinancing from the banks. The EERF was designed to end when Thai financial institutions increased their capacity to understand energy efficiency projects and lead clean energy investment independently.[47] Several Thai banks now offer special interest rates for their green products, often funded by tapping institutional investors through green bond issuances; however, the degree to which this is a result of the EERF is difficult to assess. The Thai government is prioritizing a new phase of support for SME investment in energy efficiency through an energy efficiency crowdfunding platform that matches SME project proposals with potential investors. With the EERF closed in 2019, concerns persist about whether facility owners may lose momentum in project implementation without a revolving fund to offer incentives to maintain energy efficiency improvement in industry. Additional challenges include the following (footnote 34):

(i) Funding disbursement and implementation of energy efficiency measures.
(ii) Incorrect and/or incomplete proposal documents by banks and project developers.
(iii) Limited marketing of EERF by banks.
(iv) Staff turnover in banks results in the need for retraining, revision, and re-coordination.
(v) Including renewable energy financing in the EERF may have compromised energy efficiency finance due to bias toward renewable energy projects based on their size and attractiveness.
(vi) Revolving funds can revolve quite slowly.

[47] A. Vivatpinyo. 2022. Thai Financial Institutions Open A New Era for Energy Efficiency Financing in Thailand. *Asia Clean Energy Partners*. 10 November.

7.3.8 Conclusion and Recommendations

Before establishing the EERF, only a few energy efficiency projects were funded by commercial banks.[48] Thailand's strong national leadership in developing the EERF during the later period of the ENCON Fund resulted in a success story of how governments can support mainstreaming energy efficiency and renewable energy development, overcome market barriers, and leverage private investment. Following are the critical success factors, key learnings, and recommendations to address the limitations of the EERF.

Building an enabling environment. The Government of Thailand—in developing a strong suite of legislation guiding energy efficiency and renewable energy and the ambitious sector targets to achieve energy security due to the 1997 financial crisis—helped to build an environment that drives energy efficiency. Efforts in creating an enabling environment for clean energy investment, including finance legislation, transparency in public investment, and financial management practices, and revising subsidies in the fossil fuel industry will be vital to the success of national climate funds.

Simplified fund design, procedures, and strong governance arrangements. Revolving funds are noted to mobilize private sector investment and overcome barriers to energy efficiency investment. With technical assistance from international partners, including the Government of Denmark, the Global Environment Facility, the World Bank, and the Industrial Finance Corporation of Thailand, DEDE designed a simplified loan program to promote industrial energy efficiency and overcome barriers such as perceived high financial risks and transaction costs. By supplementing the ENCON Funds' previous mandatory obligations with voluntary programs, DEDE improved its support for addressing demand-side issues. Developing appropriate enforcement mechanisms for energy efficiency auditing requirements will be critical for countries considering mandatory programs. Implementing and replicating international best practices is further key in developing national funds.

A notable success factor in the design of the EERF is the simplified procedures for loans that overcame previous barriers to accessing funding under the ENCON Fund due to complex bureaucratic requirements. Earlier limitations in project implementation were addressed by outsourcing most of the administrative responsibilities of the EERF to banks, thereby enabling expedited project implementation. Transparent governance, roles, and responsibilities between DEDE and the banks further ensured project and program efficiency.

The design and monitoring of the EERF focused on managing reduced portfolio risk and write-offs. With administration costs and loan defaults primarily falling on banks and project developers, commercial risk was transferred from the government to commercial banks. Whether the risk transfer model was optimized remains somewhat uncertain, with instances where some project proponents carried risk levels that were not matched to their project. Ongoing effective project monitoring and appraisal are recommended to maximize climate outcomes.

Leveraging private sector investment and interest and facilitating commercial lending. The EERF enabled large industrial and commercial energy project proponents to obtain bank financing with attractive conditions and interest rates to potential applicants and participating banks. Utilizing commercial bank client relationships to market energy efficiency improvement was notable in this success. From 2003 to 2019, the EERF successfully stimulated the banking community's interest in energy conservation and efficiency, with leverage ratios from public to private investment between 1:3 to 1:4 and about B7.32 billion (about $208 million) of energy savings.

[48] International Energy Agency (IEA). 2011. *Joint Public–Private Approaches for Energy Efficiency Finance*.

Financial sustainability and funding adequacy. The revolving fund structure of the EERF—where repaid loan principal can be used to recycle the loan into new loans—creates a reliable funding mechanism for energy efficiency with long-term financial sustainability that alleviates pressure on government budgets. In particular, sourcing revenue from carbon pricing or environmental taxation to finance climate-related activities can be an example for countries across Asia and the Pacific. The design and terms of such funds should be straightforward to meet changing local market conditions and prevent the fund from distorting the financial market and hindering commercial and sustainable development.

With banks assuming all the credit risk in the EERF model, SMEs and ESCOs—who lack high collateral capacities—experienced difficulties in acquiring loans. To provide financing to untapped potential, supporting banks to shift from asset-based to project-based lending is necessary for scaling up activity. Leveraging further support for loans to SMEs by reviewing bank evaluation criteria and facilitating credit enhancement would enhance the EERF's impact. Opportunities to devise more suitable finance mechanisms, such as risk guarantees or energy efficiency investor matching crowdfunding platforms, could be better suited to supporting SME investment in energy efficiency. Further to enhancing funding adequacy, fund designs might consider avoiding combined energy efficiency and renewable energy funds to avoid bias toward renewable energy due to banks favoring projects based on their size and attractiveness and increasing the maximum loan size to finance larger projects.

Provide capacity building and training. The EERF's provision of capacity building, training, and knowledge sharing enhanced energy efficiency awareness among multiple stakeholders. Although staff turnover in banks resulted in retraining, revision, and re-coordination, ongoing communication and training are needed to address key skills and knowledge gaps, including technical and credit lending advice. Banks are also encouraged to design suitable financial services to manage risk.

Prioritization of investment and mainstreaming energy efficiency. Despite a precise range of successes, accelerated investment is required to meet Thailand's target to reduce energy intensity by 30% by 2036. Thai banks still need to prioritize and mainstream the development of energy efficiency portfolios into their business-as-usual processes. The EERF has not been without limitations and challenges. However, many large Thai banks now have a greater understanding of energy efficiency investments and their potential to meet net-zero climate targets. The Thai Bankers' Association introduced *Sustainable Banking Guidelines for Responsible Lending* in 2019 and began implementing environmental, social, and governance frameworks for approving green loans. The Central Bank of Thailand also has an important role in setting bank regulations; developing green taxonomies; environmental, social, and governance; and disclosing climate risks.

With the EERF finalized in 2019, concerns persist about maintaining momentum without a revolving fund to offer incentives to maintain energy efficiency improvement in industry. Many private banks continue to drive clean energy investment and green finance by issuing green and sustainability bonds and other tools.[49] This indicates a growing desire to maintain competitiveness in clean energy markets through energy efficiency investment and will enable banks to receive more income from higher loan applications, reduce greenhouse gases, and enhance energy security in the industrial and commercial sectors (footnote 47).

[49] Climate Bonds Initiative. 2021. Green Infrastructure Investment Opportunities Thailand Report.

8. CONCLUSIONS AND RECOMMENDATIONS

The transition to a low-carbon and climate-resilient (LCCR) economy is imperative for DMCs seeking to meet their climate targets and SDGs. However, this transition requires financial resources that go beyond the capacities of public finance alone. Mobilizing private sector investment is critical, yet market imperfections often hinder this. National climate finance vehicles can be crucial by leveraging public financing to support private investment that is aligned with national policy objectives.

International case studies show several key readiness requirements and design criteria that should be considered to ensure such vehicles can operate efficiently and effectively. This section presents key conclusions informed by international case studies and recommendations for DMC policymakers on assessing and overcoming key constraints to developing a national climate finance vehicle that can contribute to achieving LCCR transition objectives.

Strategic importance. National climate finance vehicles can be pivotal in mobilizing climate finance, particularly from the private sector. These vehicles are strategically designed to leverage public funds to attract private investments, thus filling the financing gap for climate projects otherwise perceived as too risky or unprofitable. The case studies demonstrate that when coupled with strong alignment with national climate policies and embedded within solid institutional frameworks, they can effectively channel resources toward LCCR initiatives.

Leveraging public and private finance. The successful operation of national climate finance vehicles hinges on their ability to leverage public finance to de-risk investments and crowd in private capital. For instance, Indonesia's PT Sarana Multi Infrastruktur (PT SMI) and Australia's Clean Energy Finance Corporation (CEFC) have shown that a mix of financial instruments—such as equity, debt, and guarantees—can be used to make LCCR projects more attractive to institutional investors. These vehicles also play a crucial role in demonstrating the commercial viability of LCCR investments, which helps to build market confidence and stimulate further investment.

Sector-specific approaches. Governments must tailor the design of national climate finance vehicles to address the needs and challenges of targeted sectors. For example, Thailand's Energy Efficiency Revolving Fund (EERF) utilized a financial intermediation approach through commercial banks to aggregate small-scale energy efficiency projects while building the technical capabilities of financiers.

Governance and institutional strengthening. Strong governance is a cornerstone of establishing an effective national climate financing vehicle. The case studies highlight the importance of establishing clear mandates, independent oversight, and robust decision-making processes to ensure that investments are transparent, accountable, and aligned with national climate objectives. Institutional strengthening—particularly in PFM and PIM—is crucial to ensure climate finance is deployed efficiently and effectively.

Recommendations

Many DMCs face constraints that would reduce the effectiveness of a climate financing vehicle, including under-developed governance frameworks, a lack of human resources capacity, a lack of funding sources, and structural investment barriers. ADB can support DMCs in planning and implementing strategies to mobilize scaled-up climate financing, including establishing dedicated climate finance vehicles. Technical assistance and financing products like ADB's policy-based lending can support DMCs to design and implement readiness activities and broader sector reforms, while financial intermediary loans can address a financing vehicle's funding needs. The following recommended steps can guide a DMC's process and approach:

(i) **Conduct a comprehensive readiness assessment.** A thorough readiness assessment can evaluate whether a DMC's financial, legal, and institutional context is conducive. This assessment can identify gaps in PFM and PIM systems, legal frameworks, and structural barriers to climate investment. Understanding these gaps will allow for targeted capacity building and the design of reform programs before taking the first steps to designing and operationalizing a national climate financing vehicle.

(ii) **Strengthen the investment enabling environment.** Sector reforms can support the financial sustainability and investment environment in targeted sectors. This includes establishing stable and predictable legal and regulatory frameworks, strengthening policy alignment, and reducing uneconomic incentives. For example, in the energy sector, fossil fuel subsidies undermine the investment case for renewable energy technologies, while non-cost-reflective tariffs can erode a utility's bankability while restricting investment in transmission infrastructure required for renewable energy integration. Upstream policy interventions can drive transformational impact compared to committing scarce public finance that only addresses downstream investment barriers.

(iii) **Identify resources, reinforce public investment management and public fiscal management, and develop the capacity of public institutions.** Strengthening PFM and PIM systems is crucial to establishing effective processes and capacity for public funds to be managed efficiently and transparently. Capacity-building efforts should target the development of technical expertise within public institutions to improve the identification, preparation, and execution of climate-related projects. Sufficient resources must be available to fund the establishment, staffing, and initial capitalization of a climate finance vehicle.

(iv) **Clearly define the rationale, mandate, and process for vehicle establishment.** Develop a business case and implementation plan for establishing the vehicle. A proposed investment and operating mandate needs to define the market area in which it will operate, broad guidelines for investing and managing risk, its funding strategy, and how the vehicle is positioned within the broader objectives of national development and climate policy. Governance principles and mechanisms should be consistent with a DMC's statutory requirements for public bodies, including the responsibilities, powers, and statutory duties of office holders such as the board, chair, and chief executive officer. Employee duties, functions, and skill sets should also be defined. How the vehicle works and interacts with other public agencies and external institutions—such as development finance institutions—should also be considered.

(v) **Design with flexibility and clarity.** The design of national climate finance vehicles should balance flexibility and clarity. While there is a need to have clear mandates and strategic objectives that align with national climate policies, there should be flexibility to adapt to changing market conditions and emerging priorities. The investment strategy may include a mix of financial instruments to address the diverse needs of LCCR projects. However, risk management must be prioritized, and therefore, a phased approach may be taken in line with building the capabilities to carry out the risk management function. Moreover, the overall aim of investment should be to return at least the government's cost of capital to ensure fiscal sustainability while also allowing for investments in projects with significant environmental or social benefits that may offer lower financial returns.

(vi) **Ensure robust governance.** Establishing strong internal governance structures is essential to safeguard the integrity of national climate finance vehicles. This includes setting up independent boards with clear decision-making authority, ensuring transparency in investment processes, and establishing mechanisms for monitoring and evaluating performance. Governance frameworks must be designed to prevent political interference and ensure investments are made based on sound financial and environmental criteria. Strong governance should include supreme state audit authority oversight to ensure appropriate financial reporting, sound procurement processes, transparency, and corruption-free conduct.

(vii) **Engage the private sector.** Engaging with the private sector is crucial for success. Governments and national climate finance vehicles should actively seek to build partnerships with institutional investors, offering them investment-ready projects that match their risk–return profiles. This can be facilitated through blended finance mechanisms, which combine public and private resources to de-risk investments and make them more attractive to private investors. Additionally, collaboration with international climate finance institutions, such as the Green Climate Fund (GCF) and Climate Investment Funds (CIF), can enhance credibility and attract additional funding. Leverage targets assist in maintaining focus on private sector engagement, even if there is a transition period before targets can be achieved.

(viii) **Focus on capacity building and technical assistance.** Continuous capacity building is essential to ensure that public and private sector stakeholders can effectively engage with and benefit from climate financing vehicles. This includes training on project preparation, financial management, and climate risk assessment, as well as providing technical assistance to develop a pipeline of bankable projects. Capacity building efforts should also focus on strengthening the ability of national institutions to manage and deploy climate finance effectively.

In conclusion, national climate finance vehicles offer a powerful tool for mobilizing and deploying the financial resources needed to achieve a low-carbon and climate-resilient future. By carefully designing these vehicles and ensuring the necessary readiness conditions are in place, DMCs can significantly enhance their ability to attract private investment, bridge the climate finance gap, and accelerate progress toward their climate and development goals.

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National Climate Finance Vehicles

Best Practice Insights from International Case Studies

This working paper—developed under ADB's NDC Advance technical assistance platform—sets out the important role that national climate finance vehicles can play in stimulating investment in low-carbon and climate-resilient development. It presents a model design framework and readiness criteria for clarifying the key factors supporting effective operation and achieving prioritized climate outcomes and sustainable development. The paper presents three case studies of national financing vehicles from Australia, Indonesia, and Thailand, identifying success factors and lessons learned. The paper concludes with key recommendations for developing member countries to inform the approach to designing and operationalizing a climate finance vehicle.

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