MCDF Connectivity Infrastructure Report Series

CATALYZING CONNECTIVITY IN SOUTHEAST ASIA

IFI Support for Cross-Border Transport, Energy, and Digital Infrastructure

MULTILATERAL
COOPERATION CENTER
FOR DEVELOPMENT FINANCE

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IFI Support for Cross-Border Transport, Energy, and Digital Infrastructure

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Foreword

Every region faces an imperative to strengthen its cross-border connectivity to drive trade and prosperity, both within the region and with the rest of the world. Connectivity takes many different forms, including the movement of people and goods (transport connectivity), electrons (energy connectivity), and data (digital connectivity). Each requires not only large-scale physical infrastructure but also policies and institutions to facilitate its use.

Countries need help at many levels to establish hard and soft connectivity infrastructure across borders. Regional organizations play an essential coordination role, but international financial institutions (IFIs) can also act as catalysts through their unique combination of technical expertise, financial firepower, and multilateral mandate.

MCDF was established to promote high-quality connectivity infrastructure investments through partnerships with IFIs and to share their standards and practices with developing country governments and financiers. The *MCDF Connectivity Infrastructure Report Series*, launched with this report on Southeast Asia and its sister report on Central and West Asia, will make a strong contribution to this mission.

This report lays out not only the big picture of the connectivity projects IFIs are financing in transport, energy, and information and communication technology but also provides practical details from project reports and evaluations on their impact and on how IFIs work with countries and other financiers to develop and finance them. It builds on the recent G20 report to explore how best to support physically cross-border projects. Finally, it channels the views of IFI staff on future priorities.

We look forward to working with governments, investors, and our partner IFIs to help implement these priorities and build a more connected world.

Zhongjing Wang
Chief Executive Officer
Multilateral Cooperation Center for Development Finance

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Abbreviations

ADB	Asian Development Bank
AI	artificial intelligence
AIIB	Asian Infrastructure Investment Bank
APG	ASEAN Power Grid
ASEAN	Association of Southeast Asian Nations
BIMP-EAGA	Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area
CBTA	Cross-Border Transport Facilitation Agreement
COVID-19	coronavirus disease
EGAT	Electricity Generating Authority of Thailand
EIB	European Investment Bank
EIRR	economic internal rate of return
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
GDP	gross domestic product
GHG	greenhouse gas
GMRA	Greater Mekong Railway Association
GMS	Greater Mekong Subregion
ICT	information and communication technology
IDA	International Development Association
IFAD	International Fund for Agriculture Development
IFC	International Finance Cooperation
IFI	international financial institution
IMT-GT	Indonesia-Malaysia-Thailand Growth Triangle
IsDB	Islamic Development Bank
JICA	Japan International Cooperation Agency
km	kilometer
kV	kilovolt
MCDF	Multilateral Cooperation Center for Development Finance
MDB	multilateral development bank
MOU	memorandum of understanding
MPA	multiphase programmatic approach
MW	megawatt
O&M	operation and maintenance
OCR	ordinary capital resources
PCR	project completion report
PPP	public–private partnership
RIF	Regional Investment Framework
SKRL	Singapore Kunming Rail Link
SPS	sanitary and phytosanitary
TCR	technical assistance completion report
UTIA	U-Tapao International Airport
VLP	Vientiane Logistics Park Co. Ltd

Executive Summary

Cross-border connectivity in the transport, energy, and digital sectors has transformative potential increasingly recognized by the international community. It supports many dimensions of sustainable development: facilitating international trade and boosting economic growth and jobs; enabling clean energy to be fully harnessed through power trading, reducing costs and facilitating the energy transition; and expanding equitable access to information and public services. But the projects' scale and complexity often prevent that potential from being fulfilled. The Multilateral Cooperation Center for Development Finance (MCDF) was established to support cross-border connectivity projects aligned with international financial institution (IFI) standards and good practices, drawing on IFIs' rich experience in developing countries. The G20, under the presidencies of Brazil and South Africa, has also acknowledged the importance of cross-border infrastructure and the role of IFIs, commissioning them to identify good practices and tools for project design and implementation.

This report synthesizes the financing, priorities, practices, and impacts of cross-border connectivity infrastructure projects supported by IFIs in Southeast Asia. It is one of the first two reports in a series produced by MCDF to share practical information on IFI-supported connectivity projects in developing countries by region. The report covers cross-border connectivity projects — both hard and soft — of the seven IFIs active in the region that have joined MCDF's Collaboration Platform and whose projects were approved in the past 15 years. It includes physically cross-border connectivity projects as well as national connectivity projects with direct cross-border impacts. The analysis draws on IFI project documents, sector reports, a short online survey, and peer review discussions with IFI sector specialists for the region.

Southeast Asia's efforts in improving cross-border connectivity infrastructure

In Southeast Asia — a region marked by geographic diversity, open economies, environmental vulnerability, and strong political will for regional integration — improving cross-border connectivity infrastructure has been a key development priority. Rapid economic growth, expanding trade and investment, and, most notably, concerted regional efforts to foster cross-border economic cooperation and build a seamlessly integrated Association of Southeast Asian Nations (ASEAN) Community — supported by strong political commitment at the highest levels — have driven this progress.

Regional cooperation platforms have helped overcome the coordination failures often associated with developing cross-border connectivity infrastructure. These platforms include ASEAN, the Greater Mekong Subregion (GMS) Economic Cooperation Program, the Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area (BIMP-EAGA), and the Indonesia–Malaysia–Thailand Growth Triangle (IMT-GT). By bringing together neighboring countries with shared challenges and opportunities, the platforms have created a conducive environment for resolving differences, building consensus, and coordinating infrastructure development.

Through these cooperation platforms, Southeast Asian countries have launched several ambitious and mega projects and initiatives to guide cross-border connectivity development. In transport, these include the ASEAN Highway Network, the Singapore–Kunming Rail Link (SKRL), and various framework agreements on cross-border transport and trade facilitation. In energy, the ASEAN Power Grid (APG) seeks to improve regional energy security, accessibility, affordability, and sustainability by integrating ASEAN members' power infrastructure. In information and communication technology (ICT), successive ASEAN master plans and framework agreements aim to develop the digital economy. These initiatives have served as strategic road maps for regional integration; garnered public support; attracted private investment; and fostered collaboration among governments, IFIs, and the private sector.

Southeast Asian countries have adopted the economic corridor approach to strengthen cross-border transport connectivity. Unlike traditional transport corridors focused solely on roads, railways, waterways, ports, and airports, economic corridors integrate infrastructure development with trade facilitation, industrial growth, and urban and rural development. This integration supports economic diversification, job creation, and improved livelihoods, yielding broader economic and social benefits. By aligning infrastructure investments with broad development goals, the economic corridor approach has encouraged closer collaboration among ASEAN members and helped ensure that cross-border connectivity projects deliver transformative, sustainable outcomes.

Despite strong political will and encouraging progress, Southeast Asian countries continue to face significant challenges in improving cross-border connectivity. The development of the envisioned economic corridors remains a work in progress. The APG has advanced bilateral power trading, with about half of the 18 identified projects operational as of May 2023. However, progress toward subregional and multilateral trading — the APG's ultimate goal — has been limited. Although the region has significantly improved access to ICT services and strengthened digital connectivity, a large digital divide persists within and across countries. The Master Plan on ASEAN Connectivity 2025 highlights common barriers to implementing cross-border infrastructure projects, including financing, decision-making, and implementation constraints.

IFI support for improving cross-border connectivity infrastructure

IFIs have long partnered with Southeast Asian countries to improve cross-border connectivity infrastructure, with the report's project database offering unique insights into the role they have played. The IFIs have not only provided financing but also policy support, project development and transaction advisory services, capacity building, and technical assistance. From 2010 to 2024 (up to June), the seven IFIs[1] approved 98 interventions totaling $16,196.1 million to support cross-border connectivity in Southeast Asia. These included project investments and policy-based lending across hard and soft infrastructure. Transport accounted for the largest share of the financing, receiving 85% of the total, followed by ICT at 11% and energy at 4%. In addition, the IFIs approved about 60 technical assistance projects, mostly grants, worth $130 million, primarily to support capacity building, policy advice, institutional development, and knowledge solutions. The Asian Development Bank contributed the largest share of the financing at 59%, followed by the World Bank at 25% and AIIB at 10%. Although fluctuating, the overall level of IFI financing remained relatively constant over the period. The Philippines was the biggest recipient, followed by Indonesia, Viet Nam, and Myanmar. Brunei Darussalam, Malaysia, and Singapore did not receive IFI financing during the review period.

IFI-financed projects have supported regional and national priorities for cross-border connectivity in Southeast Asia. Most transport projects focused on roads to advance economic corridors. In energy, IFIs have shifted to clean energy sources such as hydropower and wind, while promoting regional power trading aligned with the APG. In ICT, investments have included satellites to connect remote areas and underserved areas, along with data centers, telecom towers and mobile networks, and fiber-optic cables.

[1] The Asian Development Bank, the Asian Infrastructure Investment Bank, the European Investment Bank, the International Finance Corporation, the International Fund for Agriculture Development, the Islamic Development Bank, and the World Bank.

All IFI-financed cross-border connectivity infrastructure projects were reported to be economically viable, with the economic internal rate of return (EIRR) exceeding the social discount rates set by the respective IFI policies. Among 25 cross-border road projects that reported the EIRR at project appraisal or project completion, one-third had EIRR of 9%–16% (average: 14%), another third had 16%–22% (average: 16%), and the rest had 23%–43% (average: 26%). The overall simple average EIRR was 20%, well above the required threshold.

IFI-financed cross-border connectivity projects have delivered substantial development impacts. These include the following:

- creating jobs for low-income households and helping alleviate poverty;
- improving business environments for private investment and micro, small, and medium-sized enterprises;
- expanding access to essential services — such as health care, education, electricity, internet, and broadband — for underserved populations, particularly in remote and border areas; and
- strengthening local and regional economies through increased foreign exchange earnings and fiscal revenues.
- many projects have supported climate mitigation by reducing carbon emissions, with energy projects advancing the transition to green and clean energy sources.

IFIs have prioritized environmental and social safeguards to ensure that the projects they support are financially viable, environmentally sustainable, and socially inclusive. For non–revenue-generating road projects, designs often include measures to secure maintenance funding by assessing fiscal capacity, exploring alternatives such as road user taxes or dedicated road funds, and adopting performance-based maintenance contracts. To support environmental sustainability and social inclusion, IFIs conduct comprehensive environmental and social impact assessments and implement targeted mitigation strategies that often cover environmental management, biodiversity conservation, resettlement planning, and the protection of indigenous communities.

A substantial share of IFI support for cross-border connectivity has focused on developing soft infrastructure. Many hard infrastructure projects include soft components such as road safety measures, capacity building for local contractors, asset maintenance, project implementation, and border-crossing management. IFIs have also financed projects dedicated to building soft infrastructure. These include funding strategic and master plan studies on cross-border connectivity; facilitating cross-border transport agreements; helping harmonize regulations and technical standards; modernizing customs and border facilities; promoting policy and institutional reforms; advancing trade facilitation, such as improving sanitary and phytosanitary systems for agricultural products; supporting the creation of regional transport organizations, such as the Greater Mekong Railway Association; promoting knowledge sharing and institutional development for power trading; and creating an enabling environment for ICT development.

IFI support for cross-border connectivity infrastructure in Southeast Asia has largely focused on national projects with direct cross-border impacts. Out of the 63 hard infrastructure projects reviewed, only 5 —1 road and 4 in energy — meet the report's definition of physically cross-border projects. The small number of physically cross-border projects may be explained by various factors: the focus on road investments, which are easier to implement as single-country operations than railways or transmission lines; the prevalence of island countries, which by definition lack land borders; the greater complexity of multicountry infrastructure projects; and the tendency of IFI funding to be allocated to individual countries rather than regionally.

These 5 projects highlight the importance of adhering to practices for cross-border implementation recently recommended by the G20. These practices include (i) developing a regional infrastructure plan among participating countries to guide long-term strategic planning and project coordination; (ii) conducting feasibility studies that assess how the benefits and costs are shared across countries; (iii) ensuring inclusive planning with broad stakeholder consultations;

(iv) securing cooperation agreements among high-level political leaders; (v) aligning policies, legal and regulatory frameworks, and technical standards; and (vi) establishing intergovernmental arrangements to narrow capacity and coordination gaps.

Most IFI-supported cross-border hard infrastructure connectivity projects approved and completed during 2010–2024 received satisfactory performance ratings. Out of the 33 road projects approved during this period, 12 have been completed. Performance ratings are available for eight, all of which were evaluated as successful or satisfactory, either through project completion reports prepared by the IFIs' project departments or by their independent evaluation departments.

However, many IFI-supported projects faced significant implementation delays. Seven of the 12 completed road projects reported their implementation schedules, and all experienced delays, ranging from 3 to 60 months, with an average delay of 34 months. Contributing factors to the delays included (i) lengthy procurement and approval processes, (ii) setbacks in resettlement and land acquisition, (iii) changes to project scope and design, (iv) counterpart funding shortfalls and contractor cash flow issues, (v) adverse weather, and (vi) coronavirus disease (COVID-19)–related restrictions. The delays often led to higher project costs, lower economic returns, and additional financing needs.

IFIs often serve as both project developers and financiers in supporting cross-border connectivity infrastructure. In Southeast Asia, they provide project development support at three levels. At the regional level, IFIs help develop multiyear investment programs and project pipelines for key regional and subregional cooperation initiatives, including ASEAN, GMS, BIMP-EAGA, and IMT-GT. At the country level, they prepare country partnership strategies or frameworks to guide operations and identify project pipelines aligned with national priorities. At the project level, IFIs assist in developing and designing individual investments, often financing feasibility studies through dedicated project preparatory facilities.

IFIs have used a diverse range of instruments to finance cross-border connectivity infrastructure projects in Southeast Asia. They have promoted cofinancing as a strategic way to increase the impact and efficiency of development efforts. The seven IFIs financed about half of the total cost of the 63 hard infrastructure projects approved in 2010–2024, while cofinancing partners shouldered the rest.

Among IFIs' own financing sources, market-based sovereign loans made up the largest share, accounting for 28.1% of the total project cost of all the hard infrastructure projects reviewed in the report. These were followed by concessional sovereign loans (12.6%), nonsovereign loans (8.0%), grants (1.5%), and equity investments (0.8%). Among total cofinancing sources, official bilateral contributions (loans or grants) accounted for 18.3%, followed by government counterpart funding (14.8%), commercial sources (11.5%), IFI cofinancing (2.5%), and other official sources (1.8%). This diversified financing approach has allowed IFIs to leverage additional resources and expand the scale and impact of cross-border connectivity initiatives.

But financing sources vary significantly across the three sectors. Transport projects rely more on IFI sovereign financing, government counterpart funding, and bilateral official cofinancing, while energy and ICT projects depend more on IFI nonsovereign financing and commercial cofinancing. These differences reflect the nature of the projects; transport investments, mostly non–revenue-generating roads, typically require government support for capital and operation and maintenance. In contrast, energy and ICT projects generate revenue and require little or no government funding.

IFIs have actively promoted public–private partnerships (PPPs) to support cross-border connectivity infrastructure in Southeast Asia. Among the 63 hard infrastructure projects reviewed, 12 were structured as PPPs. These include 4 energy generation projects, 4 ICT projects, 2 airport projects, 1 road project, and 1 dry port project. Most of these were implemented under concession agreements awarded to special purpose vehicles established by project sponsors to manage and execute the projects. Financing came from a mix of sources, including IFI sovereign and nonsovereign loans, syndicated commercial loans, and equity investments by project sponsors. The PPP model is widely seen as an effective way to combine public and private sector strengths, but the PPP projects reviewed are either still under construction or only recently completed and so their performance and long-term sustainability cannot yet be evaluated.

Future priorities and IFI recommendations for strengthening cross-border connectivity infrastructure

Significant gaps and investment needs in cross-border connectivity infrastructure across Southeast Asia make continued IFI support essential. However, sustained economic growth, rapid technological change, structural shifts, regional integration, and emerging development challenges continue to reshape the region's priorities. To remain effective, IFIs must align their support with the evolving needs of their clients. A review of 158 IFI-financed projects — including project investments, policy-based lending, and technical assistance — highlights several priorities for continued engagement with Southeast Asian countries:

- Build a more balanced portfolio of cross-border connectivity projects
- Promote PPPs and risk-sharing mechanisms while fostering a business environment that attracts greater private capital
- Strengthen soft infrastructure to complement hard infrastructure investments
- Improve project readiness and reduce implementation delays
- Embrace innovative project designs
- Align investments with regional and national priorities

Based on these priorities, the IFIs consulted for the report identified the following recommendations as especially important for governments, IFIs, and other development partners in the region:

- **Transport connectivity.** Expand the use of cross-border railways, green ports and airports, and advanced logistics solutions in addition to roads; and advance the implementation of cross-border transport agreements
- **Energy connectivity.** Support the APG Financing Framework and put in place energy reforms across the region to support it
- **Digital connectivity.** Prioritize last-mile digital connectivity and improve the business environment to attract private sector investment in digital infrastructure
- **Crosscutting support measures.** Continue and deepen regional coordination; provide technical assistance for project preparation, capacity building, and project readiness; conduct in-depth project case studies to supplement this report with detailed lessons on project design and implementation; and continue investing in knowledge and analytics to respond to changing regional dynamics

1 Introduction to the Report and the *MCDF Connectivity Infrastructure Report Series*

1. Introduction to the Report and the *MCDF Connectivity Infrastructure Report Series*

1.1. Overview

The Multilateral Cooperation Center for Development Finance (MCDF) is the only global facility dedicated to cross-border connectivity infrastructure and has launched the *MCDF Connectivity Infrastructure Report Series* as a core knowledge product to support its mission. Established in 2021 by seven countries and 11 international financial institutions (IFIs), MCDF is a multilateral initiative to support high-quality cross-border connectivity infrastructure in developing countries through partnerships and the promotion of IFI standards and best practices. The Series shows how partner IFIs are helping develop and finance cross-border connectivity infrastructure in different regions, providing insights that may inform the work of governments and other financiers. The first two reports focus on Asia (one on Central and West Asia and the other being this publication). Future editions will cover other regions.

This report on Southeast Asia synthesizes and shares practical information on cross-border connectivity infrastructure projects financed by IFIs. It covers interventions by seven IFIs in transport, energy, and information and communications technology (ICT), highlighting activities undertaken from 2010 to 2024 and outlining future priorities. The report outlines the approaches used to develop and finance these projects, including national connectivity projects with direct cross-border impacts and physically cross-border projects, which offer high impact but face greater implementation challenges.

This introduction provides the background for the report series and this report. It explains what cross-border connectivity infrastructure is and why it matters; defines the rationale, objectives, and methodology of the Series; and outlines the report's structure.

1.2. What cross-border connectivity infrastructure is and why it matters

Cross-border connectivity infrastructure takes various forms:

- Transport networks that link cities, regions, and countries, such as roads and highways, railways, waterways, ports, airports, bridges, and tunnels
- Power generation for export, along with electricity grids and gas or oil pipelines that support energy trading
- Satellites, fiber-optic cables, and data centers that enable high-speed internet and communications
- Customs and border facilities that help ensure the smooth movement of goods and people

Cross-border connectivity involves not only physical facilities or hardware (hard infrastructure) but also non-physical components or software (soft infrastructure). Soft infrastructure such as policy, regulatory, and institutional frameworks, guides the planning, investment, operation, and management of hard infrastructure. Examples include cross-country investment coordination and planning processes, transport agreements, harmonized regulations and standards, and streamlined border and customs procedures.

Cross-border connectivity infrastructure plays a critical role in driving economic growth and social development. It facilitates international trade, attracts domestic and foreign investment, promotes regional cooperation and integration, improves mobility and communication, creates jobs, expands access to services, and raises living standards — especially for communities in border areas. Cross-

border energy connectivity also supports environmental sustainability, while ICT connectivity broadens access to knowledge, promotes innovation and technological advancement, boosts productivity, and fosters culture exchange. With rapid globalization and technological progress in recent decades, investing in cross-border connectivity has become a priority for countries and their development partners around the world.

Compared with domestic projects, cross-border connectivity infrastructure projects are more complex across multiple dimensions. Because they either span two or more countries or have direct cross-border impacts, these projects are often harder to plan, finance, and execute. Different development priorities among participating countries can lead to disagreements over project selection. Project designs and varying levels of economic development can cause unequal distribution of costs and benefits between countries and communities, causing conflicts among stakeholders. Divergent regulatory frameworks and technical standards can further complicate planning and implementation. Cross-border projects tend to be larger, involve more and varied stakeholders, and carry higher transaction costs and risks. All these factors can give rise to coordination failure, leading to suboptimal levels of cross-border connectivity infrastructure development.

The international community has recognized the need to give special attention to cross-border connectivity infrastructure. MCDF was established to provide additional resources to help IFIs prepare cross-border projects, build capacity to ease key bottlenecks, and support coordination among governments and financiers. Under Brazil's 2024 G20 presidency, the Asian Infrastructure Investment Bank (AIIB), the European Bank for Reconstruction and Development (EBRD), and the Inter-American Development Bank (IDB) drafted a report analyzing the challenges and offering recommendations.[2] Other key reports on this topic have been published by the Global Infrastructure Hub,[3] the European Investment Bank (EIB),[4] and the Asian Development Bank Institute.[5]

1.3. Rationale

As the sole global infrastructure facility explicitly focused on connectivity, MCDF identified the *MCDF Connectivity Infrastructure Report Series* as a way to fill a key knowledge gap. A review of research and reports on connectivity revealed the need for a series of knowledge products on cross-border connectivity incorporating the following aspects:

- **Project-focused.** While many sector reports address high-level strategic issues, information on the practical details of designing and implementing connectivity infrastructure projects is lacking.
- **Maximizing connectivity.** The Series should examine how projects strengthen cross-border connectivity by facilitating the movement of goods, people, and data and by integrating hard and soft infrastructure.
- **Project development and financing.** The Series should explore how IFIs collaborate with governments and other stakeholders to prepare projects, and what mix of financing instruments — such as concessional resources, risk mitigation tools, and cofinancing — is most effective in harnessing public and private capital.
- **Overcoming cross-border challenges.** The Series should deepen the analysis of the G20 report by highlighting good practices for overcoming coordination challenges posed by physically cross-border infrastructure.
- **IFI-focused.** IFIs are global leaders in designing and implementing high-quality, sustainable connectivity projects in developing countries. As part of MCDF's mandate to promote IFI standards and best practices, the Series should focus on IFI-financed projects and showcase the practices they follow.

[2] AIIB, EBRD, and IDB, "Delivering Cross-Border Infrastructure: Conceptual Framework and Illustrative Case Studies" (2024).
[3] Global Infrastructure Hub, *Reference Guide Connectivity Across Borders: Global Practices for Cross-Border Infrastructure Projects* (2021).
[4] EIB, *Cross-Border Infrastructure Projects* (2023).
[5] Manabu Fujimura and Ramesh Adhikari, "Critical Evaluation of Cross-Border Infrastructure Projects in Asia," ADBI Working Paper No. 226 (Asian Development Bank Institute, 2010).

- **Multisectoral.** Solutions in transport, energy, and ICT need to be considered together, such as to support e-mobility. A coordinated approach is also essential for developing economic corridors.
- **Region-specific.** Reviewing IFI projects across multiple sectors is feasible only when the analysis focuses on one region at a time. A consistent approach across each regional report will support lesson sharing and allow future reports to compare practices across regions.

1.4. Objective

The objective of the Series is to synthesize and share practical information on IFI-financed cross-border connectivity infrastructure projects in developing countries, organized by region. The projects reviewed include both hard and soft infrastructure. The goal is to promote good practices for high-quality connectivity and strengthen coordination among IFIs, other financiers, and governments involved in these projects.

1.5. Methodology

The methodology for producing the first two reports comprised the following:

- **Region selection.** The reports focus on Central and West Asia and Southeast Asia, two subregions with extensive experience in IFI-supported cross-border connectivity projects that promote regional integration.
- **IFI selection.** The reports target IFIs that have joined MCDF's Collaboration Platform, as these institutions are among the world's leading development financiers and have committed to sharing information. Seven IFIs active in lending for cross-border infrastructure projects in Southeast Asia are included: ADB, AIIB, EIB, the International Finance Cooperation (IFC), the International Fund for Agriculture Development (IFAD), the Islamic Development Bank (IsDB), and the World Bank. Although this list does not cover all IFIs in the region, it offers a significant and representative sample.
- **Definition of "cross-border connectivity infrastructure."** The proposed definition of "hard" cross-border connectivity infrastructure includes projects spanning two or more countries, as well as national projects with significant cross-border impact.[6] Physical cross-border projects will be referred to as "cross-border projects," while national projects with significant cross-border impacts will be termed "national connectivity projects." This broad definition goes beyond the G20's focus on physically cross-border projects but aligns closely with definitions used by MCDF and the G20's Global Infrastructure Connectivity Alliance (GICA).[7] For "soft" cross-border infrastructure, the proposed criteria focus on its necessity for implementing or maximizing the use of hard infrastructure and its relevance to policies or facilities used by market agents. Examples include connectivity strategies, regulatory reforms to attract private investment, trade facilitation measures, and facilities that enhance agricultural exports.
- **Sector selection.** The report covers transport, energy, and ICT, with trade facilitation included as a subsector under transport.
- **Project completion status.** The primary analysis focuses on IFI projects approved in 2010–2024 (up to June), allowing time for some projects to be completed and lessons to be learned. The June 2024 cutoff reflects the report's deadline for data collection. The analysis will be supplemented with information from IFIs on more recent innovations and forward-looking features of upcoming projects, gathered through an online survey and peer review discussions.

[6] The source for the hard definition of "cross-border infrastructure projects" is Fujimura and Adhikari, "Critical Evaluation of Cross-Border Infrastructure Projects in Asia."

[7] Established in 2016 at the World Bank, which defines it as "the linkages of communities, economies and nations through transport, communications, energy, and water networks across a number of countries. It incorporates the inseparability of services — in trade, logistics, human mobility, and information — from the underlying infrastructure to improve the flow of goods, people and data." World Bank, Global Infrastructure Connectivity Alliance (2016).

- **Example projects.** A lighter-touch review of the full sample of IFI projects is supplemented by a more detailed analysis of selected examples. These projects were chosen to reflect a balance of sectors, countries, IFIs, and financing modalities. Key findings are integrated throughout the report, with highlights presented in the Appendix.
- **Data sources.** The primary source is IFI project documents — such as project appraisal documents, completion reports, and evaluations — as well as information from IFI websites. These materials were used to build a project database. For IFIs that do not publish detailed information online, data was provided directly by IFI staff. Additional sources include IFI corporate and sector strategies, documents from regional cooperation processes, and input from an online survey and peer review discussions with IFI sector specialists. These helped provide deeper insight into challenges, lessons, and future priorities.
- **Diplomatic or political factors.** The formulation and implementation of connectivity infrastructure projects are shaped by evolving global and regional dynamics, including diplomatic and political factors. While these factors are reflected in the discussion of certain example projects, the reports do not seek to judge them.

1.6. Data limitations

The primary limitation stems from the broad scope of the reports, which made it impractical to engage directly with IFI project leads and other stakeholders to supplement the information in project documents. As a result, the depth of analysis for individual projects is limited. IFIs have recommended that MCDF consider conducting follow-up project case studies (see Chapter 8).

Another limitation is that, although most project data was sourced from IFI websites, some of it may be outdated or incomplete. IFIs were given the opportunity to verify the data, but this did not occur in all cases, so some eligible projects may not have been included.

More broadly, the reports cannot address all important issues related to cross-border connectivity infrastructure. The authors welcome feedback to help improve future reports in the Series.

1.7. Structure of the report

The rest of the report is organized as follows:

- **Chapter 2** introduces the region and provides an overview of IFI financing.
- **Chapters 3–5** examine transport, energy, and ICT projects, respectively. Each section highlights key cross-border connectivity challenges and opportunities, recent IFI interventions (both hard and soft), and future priorities.
- **Chapter 6** focuses on project development and financing, covering preparation and phasing, financing modalities, cofinancing, and private capital mobilization.
- **Chapter 7** explores the challenges of developing and financing physically cross-border infrastructure, along with good practices supported by IFIs, drawing on recommendations from the G20 report.
- **Chapter 8** summarizes key findings and presents recommendations expressed by the IFIs in the peer review discussions, aligned with the future priorities outlined in the report.
- The **Appendix** provides highlights of example IFI projects.

2 Southeast Asia: Regional Context and Overview of IFI Connectivity Financing

2. Southeast Asia: Regional Context and Overview of IFI Connectivity Financing

2.1. Introduction to the region

This report defines Southeast Asia as the 10 Association of Southeast Asian Nations (ASEAN) members: Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. Southeast Asia is one of the world's most economically dynamic regions, with average annual gross domestic product (GDP) growth of 4.4% in 2010–2022, well above the global average of about 3%.

The region includes countries with varying levels of development and access to IFI financing. According to the World Bank's latest classifications, Cambodia, Lao PDR, and Myanmar are low-income countries, where most IFI financing consists of grants and concessional sovereign loans. Indonesia, the Philippines, and Viet Nam are lower-middle-income countries, and Malaysia and Thailand are upper-middle-income countries, where IFI financing is primarily through market-based sovereign lending, nonsovereign loans, equity investments, and guarantees. Brunei Darussalam and Singapore are high-income countries, where IFI support is limited to nonsovereign and private sector operations.

Cross-border connectivity infrastructure is particularly important for Southeast Asia. Geographically, the region — home to 680 million people — features diverse terrain, including numerous islands, peninsulas, and mountainous areas, making physical connectivity a challenge without robust cross-border infrastructure. Economically, Southeast Asia has a combined GDP of $3.8 trillion and consists largely of small, open economies where trade drives growth and job creation. During 2010–2020, trade in goods averaged more than 90% of GDP on average, compared with 34% for South Asia, 35% for Central and West Asia, and 52% for East Asia. Efficient cross-border infrastructure is critical to boosting both intra- and interregional trade, especially in the context of rising global protectionism. It supports the shared use of resources, knowledge exchange, and people-to-people communication by removing physical and nonphysical barriers. Environmentally, integrated infrastructure systems strengthen resilience to natural disasters and climate change, to which the region is particularly vulnerable. Politically, ASEAN aims to build an integrated, peaceful, and stable community with shared prosperity.[8]

A salient feature of efforts to overcome coordination challenges in building cross-border connectivity infrastructure in Southeast Asia is the reliance on regional cooperation. Regional cooperation involves countries working together on an equal footing to plan and coordinate common actions that benefit all, such as the construction of cross-border infrastructure. It allows countries to resolve differences, negotiate the distribution of costs and benefits, pool resources, share knowledge, manage risks, and build political trust.

ASEAN has been the primary driver of regional cooperation. Established in 1967, it has played a crucial role in promoting peace, stability, and economic integration among its members. Over the years, ASEAN has expanded its membership and broadened its focus to include political, security, economic, and socio-cultural cooperation. This led to the formation of the ASEAN Community in 2015, built on three pillars: the ASEAN Political-Security Community, the ASEAN Economic Community, and the ASEAN Socio-Cultural Community.

[8] ASEAN Secretariat, *ASEAN Community Vision 2025* (2015).

ASEAN members recognize that strong regional connectivity underpins the pillars of the ASEAN Community. The Master Plan on ASEAN Connectivity 2025, adopted by all 10 ASEAN members in September 2016 (superseding the 2010 plan), sets out a vision for a seamlessly and comprehensively connected and integrated ASEAN, aligned with the broader ASEAN Community Vision.[9]

The plan defines connectivity in three dimensions: physical (e.g., transport, ICT, and energy); institutional (e.g., trade, investment, and services liberalization); and people-to-people linkages (e.g., education, culture, and tourism). To strengthen these areas, it calls for developing sustainable infrastructure, promoting digital innovation, enhancing seamless logistics, achieving regulatory excellence, and improving people's mobility (Box 1).

Box 1: Master Plan on ASEAN Connectivity 2025: Vision, Areas, and Strategic Objectives

Vision. Achieve a seamlessly and comprehensively connected and integrated ASEAN that will promote competitiveness, inclusiveness, and a greater sense of community

Areas. Physical connectivity, institutional connectivity, and people-to-people connectivity

Strategic objectives:

- **Sustainable infrastructure.** Develop infrastructure projects that are environmentally friendly and resilient, ensuring long-term sustainability
- **Digital innovation.** Promote the adoption of digital technologies and enhance digital infrastructure to support the digital economy
- **Seamless logistics.** Improve logistics and supply chain efficiency to facilitate the smooth movement of goods and services across the region
- **Regulatory excellence.** Harmonize regulations and standards to create a more conducive environment for trade and investment
- **People mobility.** Ease the movement of people within the region through improved transport networks and visa facilitation

Source: ASEAN Secretariat, Master Plan on ASEAN Connectivity 2025 (2016).

Cooperation on cross-border infrastructure in Southeast Asia extends beyond the 10 ASEAN members to subregional initiatives that complement ASEAN efforts:

- **The Greater Mekong Subregion (GMS) Economic Cooperation Program.** Established in 1992 with support from ADB, it promotes economic cooperation and development among Cambodia, China (Yunnan and Guangxi provinces), Lao PDR, Myanmar, Thailand, and Viet Nam.[10] It aims to strengthen connectivity, competitiveness, and community through infrastructure investment.
- **The Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area (BIMP-EAGA).** Launched in 1994, it targets the development of less-developed areas in the four member countries by boosting trade, investment, and infrastructure. Cooperation is organized around five strategic pillars, with connectivity as the top priority.[11]
- **The Indonesia–Malaysia–Thailand Growth Triangle (IMT-GT).** Initiated in 1993, it aims to accelerate economic growth and development in the border areas of its three members through joint projects and investments. It focuses on seven strategic pillars, including transport and ICT connectivity, along with food security, tourism, the environment, socio-cultural cooperation, and education.[12]

[9] ASEAN, *Master Plan on ASEAN Connectivity 2025* (2016).
[10] "About the Greater Mekong Subregion," Greater Mekong Subregion, accessed March 19, 2025.
[11] "BIMP-EAGA," Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area, accessed March 19, 2025.
[12] "Vision 2036," Indonesia–Malaysia–Thailand Growth Triangle, accessed March 19, 2025.

- **Other global and regional initiatives play an important role in advancing cross-border connectivity infrastructure in Southeast Asia.** These include, among others, China's Belt and Road Initiative,[13] the Asian Highway Network and Trans-Asian Railway Network under the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP),[14] the Asia-Africa Growth Corridor led by India and Japan, the European Union Strategy on Connecting Europe and Asia,[15] the European Union Global Gateway,[16] Japan's Free and Open Indo-Pacific Strategy,[17] India's Act East Policy,[18] and the G7 Partnership for Global Infrastructure and Investment.[19]

- **Two major trade agreements are expected to drive more investment in cross-border connectivity in Southeast Asia.** These are the Regional Comprehensive Economic Partnership (a free trade agreement among 15 Asian and Pacific countries)[20] and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (a trade agreement among 12 countries).[21]

2.2. Overview of IFI connectivity financing

Southeast Asia's regional cooperation on building cross-border connectivity infrastructure has received strong support from development partners, particularly IFIs. In recent decades, cross-border connectivity infrastructure has become a priority for development assistance in the region. IFIs bring distinct advantages to this work: long-term engagement with client countries; a development mandate and multicountry operations; a commitment to good quality, sound governance, and transparent implementation; and a reputation for neutrality and credibility. Initiatives have included the following:

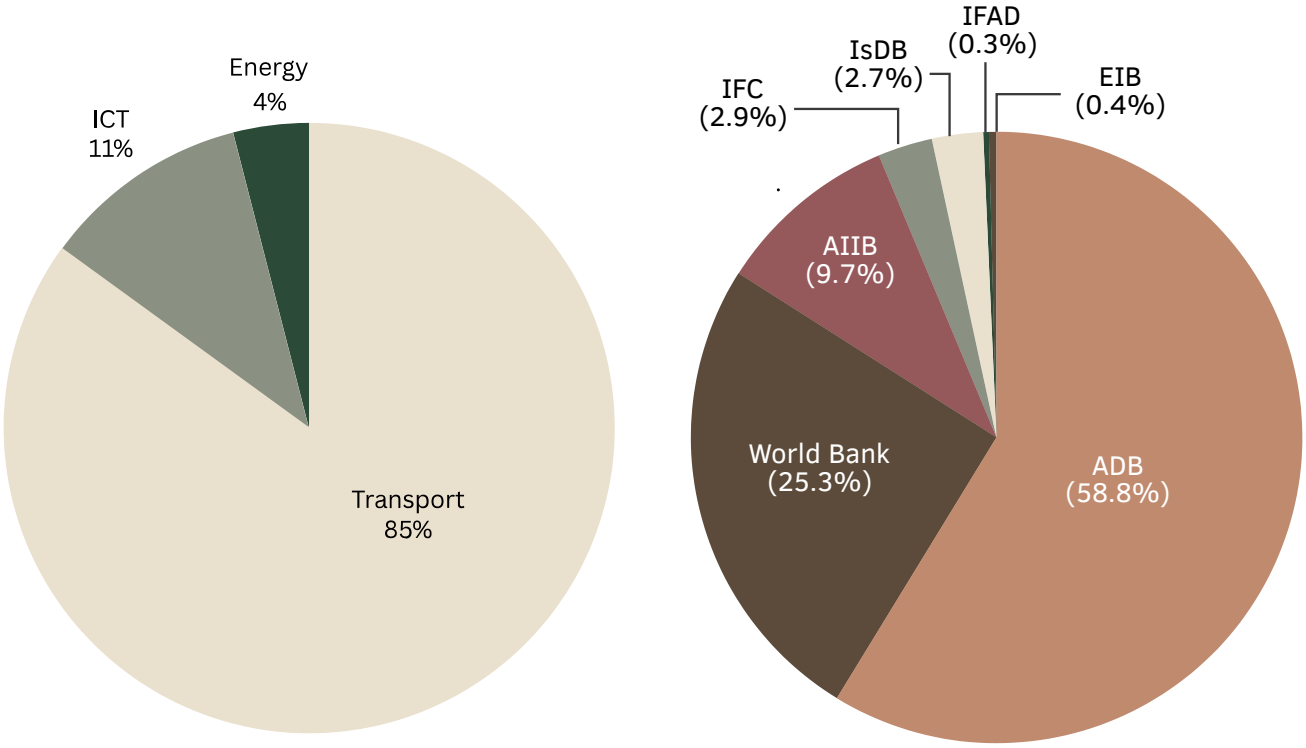
- **ADB** has supported cross-border connectivity infrastructure in Southeast Asia through its three subregional cooperation programs — GMS, BIMP-EAGA, and IMT-GT — alongside its engagement with ASEAN and country operations. Under its corporate results framework, 2025–2030, ADB has set a target of at least 30% of committed operations to contribute to regional cooperation and integration, including regional public goods, by 2030.[22]
- **AIIB**, a newcomer among IFIs, has set a target to allocate 25%–30% of its financing to cross-border connectivity projects by 2030.
- The **World Bank** is increasingly adopting a regional approach to development by supporting shared physical and institutional infrastructure in key sectors such as transport, energy, and ICT.[23] Its International Development Association (IDA) Regional Window provides additional funding for projects that promote regional cooperation and integration, benefit multiple countries, enhance connectivity, manage shared resources, and tackle transboundary challenges.[24]
- **Other IFIs** operating in Southeast Asia have demonstrated strong interest in financing cross-border connectivity infrastructure. These include IFC, IsDB, EIB, and IFAD.

This report's project database offers unique insight into the role of IFIs in providing long-term development financing for cross-border connectivity infrastructure in Southeast Asia. From 2010 to 2024, the seven IFIs approved 98 projects totaling $16.2 billion, including project investments and policy-based lending for hard and soft infrastructure (Table 1). The average IFI loan size was $165 million.

Transport accounted for the largest share of financing, receiving 85% of the total, with ADB as the leading IFI (Figure 1). Transport received support through 76 projects totaling $13.8 billion. ICT followed with 16 projects (11%, $1.8 billion), and energy with six (4%, $574 million). By IFI share, ADB led with 59%, followed by the World Bank at 25% and AIIB at 10%. IFC and IsDB each contributed about 3%, while EIB and IFAD each accounted for less than 1%.

[13] "Belt and Road Portal - BRI Official Website," Belt and Road Initiative, accessed March 19, 2025.
[14] "Regional Land Transport Connectivity and Logistics | ESCAP," United Nations ESCAP, accessed March 19, 2025.
[15] "Connecting Europe & Asia: The EU Strategy," European Union, accessed March 19, 2025.
[16] "Global Gateway," European Commission, accessed March 19, 2025.
[17] "Japan's Effort for a 'Free and Open Indo-Pacific," Ministry of Foreign Affairs of Japan, accessed March 19, 2025.
[18] Institute of Peace and Conflict Studies, "16th ASEAN-India Summit: Five Years of India's Act East Policy," Special Report 207 (2020).
[19] Institute of Peace and Conflict Studies, *16th ASEAN-India Summit: Five Years of India's Act East Policy* (2020).
[20] "Regional Comprehensive Economic Partnership Agreement (RCEP)," Australian Government Department of Foreign Affairs and Trade (DFAT), accessed March 19, 2025.
[21] "Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)," DFAT, accessed March 19, 2025.
[22] Asian Development Bank, Steering ADB's Corporate Strategy to Success: Corporate Results Framework 2025–2030, (2024).
[23] "Overview of World Bank Regional Integration," World Bank, accessed March 19, 2025.
[24] "IDA Regional Window," IDA–World Bank, accessed March 19, 2025.

Figure 1: IFI Funding for Cross-Border Connectivity Projects by Sector and Institution, Approved in 2010–2024

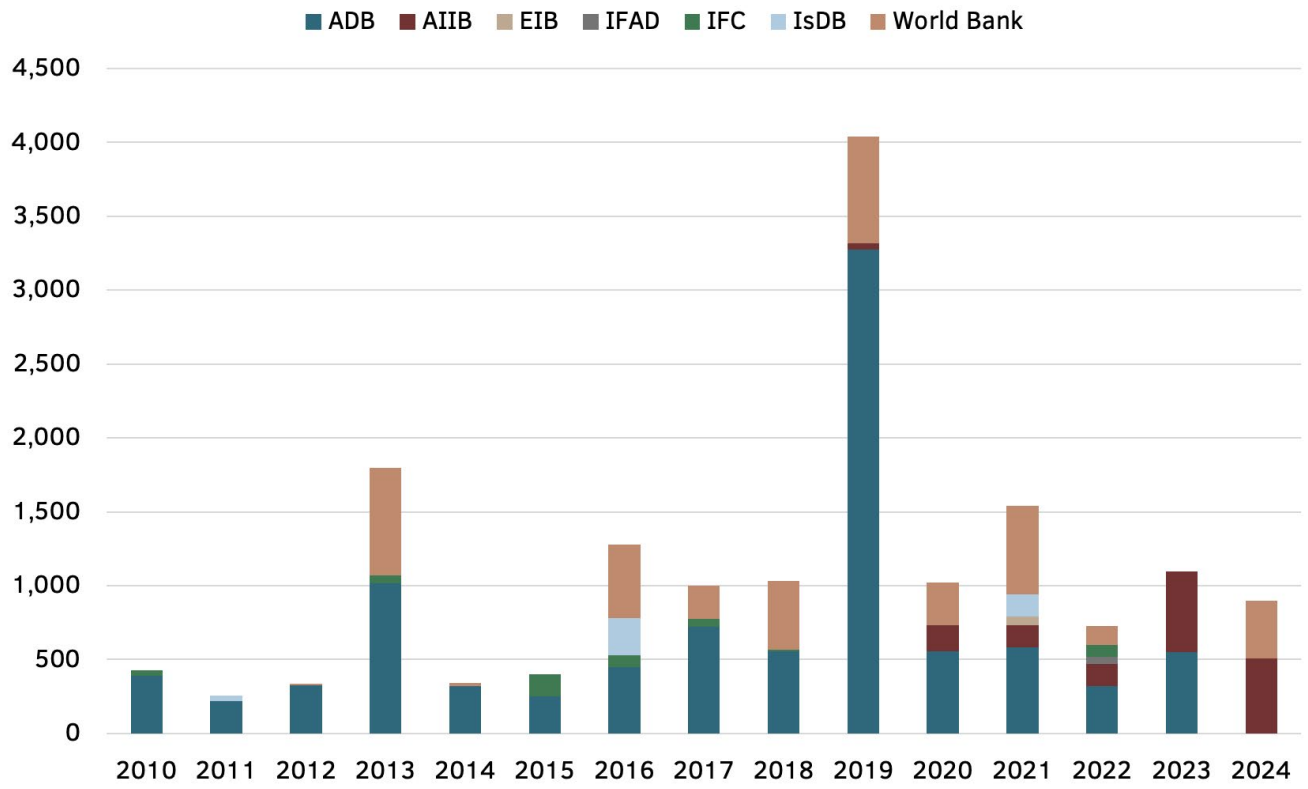


ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, ICT = information and communication technology, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Figure 2 shows how IFI financing evolved in 2010–2024. The data is dominated by ADB's $2.8 billion commitment to the Malolos–Clark Railway Project in 2019 in the Philippines, the largest IFI-supported project during the period. Although the coronavirus disease (COVID-19) does not appear to have had an immediate impact, financing for hard infrastructure in 2023 was notably low, consisting mainly of policy-based lending to support connectivity reforms. This may reflect a lagged effect of the pandemic. By mid-2024, however, IFI commitments had already nearly matched the 2023 total. No discernible trend emerges across individual IFIs, with year-to-year volatility reflecting the lumpy nature of infrastructure financing. The exception is AIIB, which has shown a steady increase in its lending portfolio since 2019.

Figure 2: IFI Funding for Cross-Border Connectivity Projects by Year and Institution, Approved in 2010–2024
($ million)



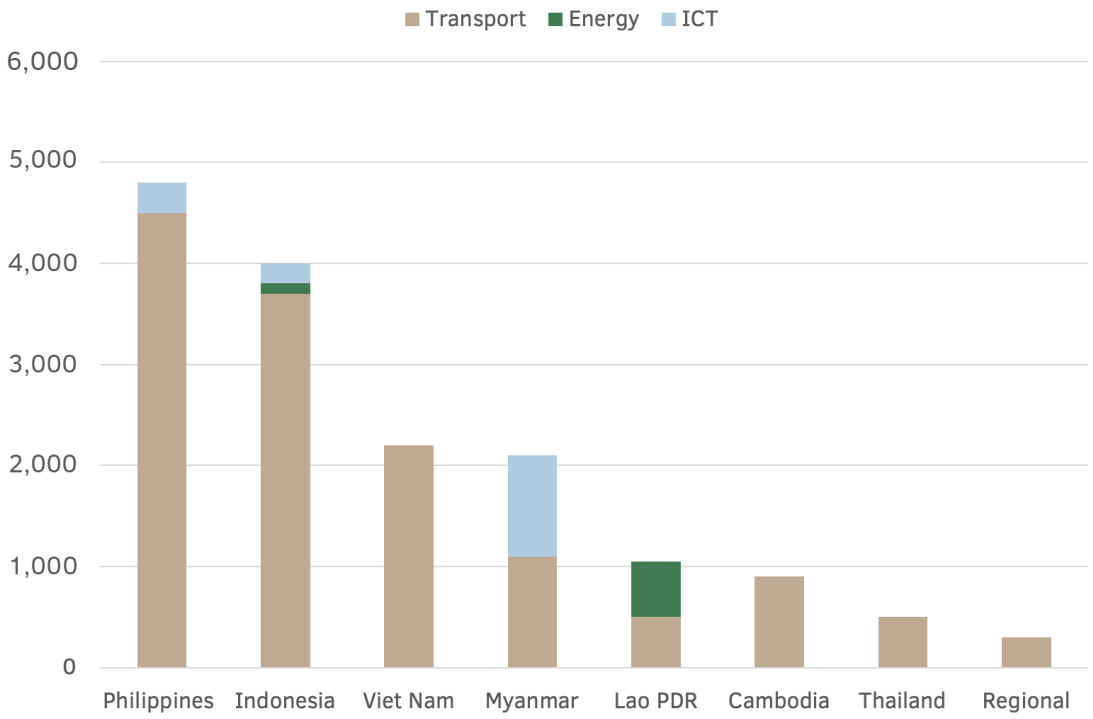
ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.
Note: Data are available until June 2024 due to the cutoff date for data collection for this report.

Source: Authors' estimates from data on IFI websites.

Figure 3 presents the allocation of IFI financing across the 10 Southeast Asian countries and for regional projects, along with the sector breakdown for each country. The Philippines received the largest share — $4.9 billion (30%) — driven by the Malolos–Clark Railway Project, followed by Indonesia at 25%. Viet Nam (15%) and Myanmar (13%)[25] sit in the middle range, while Lao PDR (7%), Cambodia (5%), Thailand (3%), and regional projects (2%) received smaller shares. Brunei Darussalam, Malaysia, and Singapore did not receive IFI financing during the review period, having either graduated from IFI support or no longer requiring sovereign borrowing. The sector profiles show that cross-border energy loan projects were concentrated in Lao PDR and, to a lesser extent, Indonesia. ICT loan projects were limited to Indonesia, Myanmar, and the Philippines. For further details, see the sector chapters of the report.

[25] Since 2021, many IFIs have suspended sovereign project disbursements and new contracts in Myanmar.

Figure 3: IFI Funding for Cross-Border Connectivity Projects by Country and Sector, Approved in 2010–2024
($ million)

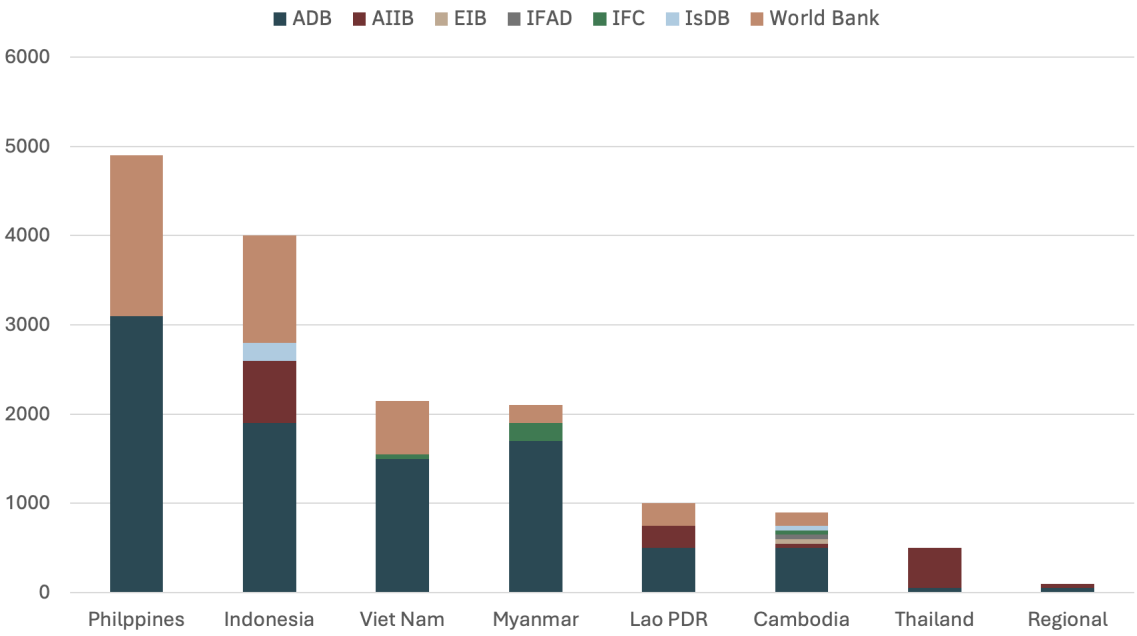


ICT = information and communication technology, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates from data on IFI websites.

Figure 4 shows IFI financing by institution for each country. ADB is the only IFI with active operations in all countries that received loans during the review period. IsDB's support is concentrated in Indonesia, as only Indonesia and Malaysia are members of the institution.

Figure 4: IFI Funding for Cross-Border Connectivity Projects by Country and Institution, Approved in 2010–2024
($ million)



ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank, Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates from data on IFI websites.

In addition to the loan projects listed in Table 1 and Figures 1–4, IFIs approved around 60 technical assistance projects totaling approximately $130 million. These were mostly grants aimed at supporting soft infrastructure to promote cross-border connectivity. Given their importance, these projects are also covered extensively in the sector chapters.

Table 1: IFI Funding for Cross-Border Connectivity Projects by Sector and Country, Approved in 2010–2024

	Transport			Energy			ICT			Total		
	#	$ million	%	#	$ million	%	#	$ million	%	#	$ million	%
Brunei Darussalam	-	-	-	-	-	-	-	-	-	-	-	-
Cambodia	15	855.2	6.2	-	-	-	-	-	-	15	855.2	5.3
Indonesia	13	3,807.5	27.5	1	49.5	8.6	2	200.0	11.1	16	4,056.5	25.0
Lao PDR	16	555.1	4.0	5	524.0	91.4	-	-	-	21	1,079.1	6.7
Malaysia	-	-	-	-	-	-	-	-	-	-	-	0.0
Myanmar	7	1,114.0	8.1	-	-	-	7	1,024.4	57.0	14	2,138.4	13.2
Philippines	6	4,493.3	32.5	-	-	-	4	398.0	22.1	10	4,891.3	30.2
Singapore	-	-	-	-	-	-	-	-	-	-	-	-
Thailand	2	522.5	3.8	-	-		-	-	-	2	522.5	3.2
Viet Nam	15	2,363.9	17.1	-	-	-	-	-	-	15	2,363.9	14.6
Regional	2	114.3	0.8	-	-	-	3	175.0	9.7	5	289.3	1.8
Total	**76**	**13,825.7**	**100**	**6**	**573.5**	**100**	**16**	**1,797.4**	**100**	**98**	**16,196.1**	**100**

= number of projects, % = dollar value of financing, Lao PDR = Lao People's Democratic Republic.
Note: Regional projects refer to those involving two or more countries as borrowers or grant recipients, or investment funds spanning multiple markets.

Source: Authors' estimates from data on IFI websites.

3 Cross-Border Connectivity Infrastructure: Transport

3. Cross-Border Connectivity Infrastructure: Transport

3.1. Cross-border transport connectivity challenges and opportunities

Southeast Asia has made remarkable progress in improving cross-border transport connectivity in recent years, driven by various regional cooperation initiatives. Cross-border transport infrastructure encompasses roads and highways, railways, bridges, tunnels, and waterways that either span two or more countries or are located within a single country but have direct cross-border impacts. It also includes ports, airports, and logistics facilities that handle international passenger and freight traffic. These projects enable trade and the movement of people by linking borders or providing access.

Seamless cross-border transport connections strengthen regional production networks and boost tourism, the region's two key drivers of growth and job creation. Compared with other developing regions, Southeast Asia has made notable progress in cross-border transport connectivity over the past several decades, led by initiatives under ASEAN, GMS, BIMP-EAGA, and IMT-GT.

Enhancing cross-border transport connectivity has been a key priority for cooperation among ASEAN members in building the ASEAN Community. Major cooperation initiatives include the ASEAN Highway Network project, the Singapore–Kunming Rail Link (SKRL) project, and efforts to establish integrated systems for inland waterways, maritime transport, and multimodal transport. To strengthen institutional connectivity, ASEAN countries are also advancing transport facilitation measures, establishing single aviation and shipping markets, and building border management capacity.

Proposed in the 1990s, the ASEAN Highway Network consists of transit transport routes, which are designated highways that connect major cities, ports, and economic zones across all ASEAN members.[26] The SKRL, proposed in 1995 under the ASEAN–Mekong Basin Development Cooperation, aims to build a circular rail link connecting the capital cities of all mainland ASEAN countries (Thailand, Cambodia, Lao PDR, Viet Nam, and Myanmar); Singapore; and Kunming, China.[27]

ASEAN countries have embraced the concept of economic corridors, where transport links serve as the backbone for national development and regional integration, with the most notable progress made in GMS. An economic corridor refers to areas — usually along major roads, railways, or waterways — that support a range of economic and social activities such as factories, tourism, and trade. In GMS countries, three economic corridors have been identified and are under active development: the North–South Economic Corridor, the East–West Economic Corridor, and the Southern Economic Corridor (Box 2 and Figure 5).[28]

The development of these corridors is driving industrial growth, trade, and commercial activity along transport links. In turn, demand for improved cross-border connectivity infrastructure is growing, enhancing the economic viability of connectivity projects. Stronger connectivity attracts greater public and private investment, both domestic and foreign. By reinforcing each other, economic corridors and cross-border infrastructure create a robust foundation for sustainable economic growth, benefiting local communities and national economies.

[26] ASEAN, *ASEAN Connectivity Project Information Sheets* (2012).
[27] "The Singapore-Kunming Rail Link (SKRL)," Business in Asia, accessed March 19, 2025.
[28] "Economic Corridors in the Greater Mekong Subregion," GMS, accessed March 19, 2025.

Building cross-border infrastructure is at the heart of economic cooperation under the BIMP-EAGA and IMT-GT frameworks. The IMT-GT Blueprint 2017–2021, adopted at the 10th IMT-GT Summit in 2017 in Manila, Philippines, identified a pipeline of priority connectivity projects valued at about $47 billion. These projects cover roads; railways and bridges; inland container depots and distribution centers; airports and seaports; and customs, immigration, and quarantine facilities.[29] BIMP-EAGA Vision 2025, developed with strong government support from the four member countries, outlines a rolling pipeline of projects worth more than $24.3 billion. These investments aim to improve air, land, power, and ICT networks through 2025.[30]

Despite strong political will and encouraging progress, Southeast Asian countries continue to face significant challenges in developing cross-border transport connectivity infrastructure. The Master Plan on ASEAN Connectivity 2025 highlights significant delays and limited progress in implementing several key initiatives. These include physical investments such as the ASEAN Highway Network and the SKRL, as well as institutional initiatives such as the framework agreements on facilitation of goods in transit, interstate transport, and multimodal transit; measures to facilitate interstate passenger land transport; the ASEAN Single Aviation Market; and efforts to strengthen border management.

The 2025 master plan identifies several common challenges affecting the prioritized projects under the Master Plan on ASEAN Connectivity 2015 and broader ASEAN connectivity efforts. These fall into three categories:

- **Financing barriers.** High risks and uncertain financial returns limit private sector participation in large-scale cross-border projects, while many ASEAN countries face fiscal constraints.
- **Decision-making barriers.** Conflicting national development priorities, institutional agency issues,[31] and limited access to reliable information on the true project benefits and costs hinder effective coordination.
- **Implementation barriers.** Challenges include limited capacity, skills, and technology; weak coordination across government agencies and subsectors; and the lack of harmonized technical standards, policies, protocols, and regulatory frameworks.

Box 2: Economic Corridors in the Greater Mekong Subregion

Greater Mekong Subregion (GMS) countries are working together to develop three economic corridors. They are also planning to expand these corridors and strengthen links between the region's capital cities.

North–South Economic Corridor. The corridor plays a critical role in providing Yunnan Province in China and northern Lao People's Democratic Republic (Lao PDR) access to important seaports. It connects to key markets through the existing road network from Singapore via Malaysia to Chiang Rai, and from Kunming to Beijing. The corridor comprises three routes along the north–south axis of GMS:

- **Western Sub-corridor.** Kunming (China)–Chiang Rai (Thailand)–Bangkok (Thailand) via Lao PDR or Myanmar
- **Central Sub-corridor.** Kunming (China)–Ha Noi (Viet Nam)–Hai Phong (Viet Nam) which connects to the existing Highway No. 1 running from the northern to the southern part of Viet Nam
- **Eastern Sub-corridor.** Nanning (China)–Ha Noi (Viet Nam) via the Youyi Pass or the Fangchenggang (China)–Dongxing (China)–Mong Cai (Viet Nam) route

[29] IMT-GT, *Implementation Blueprint 2017–2021* (2017).
[30] BIMP-EAGA, *BIMP-EAGA Vision 2025* (2017).
[31] Because of misaligned incentives among stakeholders, such as local residents resisting land acquisition and different government departments pursuing conflicting priorities.

GMS ministers have endorsed the following extensions and/or realignment for this corridor based on an ADB study:

- The Kunming–Dali–Ruili–Muse–Mandalay–Nay Pyi Taw–Yangon route, the main trade route between the PRC and Myanmar
- An extension to the Kunming–Dali–Ruili–Muse–Mandalay–Nay Pyi Taw–Yangon route to link Mandalay to Tamu at the border with India, using the Mandalay–Kalewa–Tamu route via Monywa or Shwebo
- The Boten–Oudomxay–Luang Prabang–Vang Vieng–Vientiane–Nong Khai–Udon Thani–Nakhon Ratchasima–Laem Chabang route, which will incorporate Vientiane, the capital of Lao PDR, into the GMS corridor network
- The Bangkok and Ha Noi link, using the Bangkok–Nakhon Ratchasima–Udon Thani–Sakon Nakhon–Nakhon Phanom–Thakhek–Na Phao–Chalo (via Route No. 12)–Vung Anh–Vinh–Ha Noi route
- The link between Vientiane and Ha Noi using the Paksan–Nam Phao–Cau Treo–Vinh route with an extension to Vung Anh

East–West Economic Corridor. It stretches 1,320 kilometers (km) from Da Nang Port in Viet Nam, through Lao PDR and Thailand to Mawlamyine Port in Myanmar. It intersects the North–South Economic Corridor in Thailand's Tak and Phitsanulok provinces. Key commercial hubs along the corridor include Mawlamyine–Myawaddy (Myanmar), Mae Sot–Phitsanulok–Khon Kae–Kalasin–Mukdahan (Thailand), Savannakhet–Dansavanh (Lao PDR), and Lao Bao–Hue–Dong Ha–Da Nang (Viet Nam).

GMS ministers have endorsed the ADB study's recommendation to extend the western end of the East–West Economic Corridor to Yangon–Thilawa in Myanmar, using the Myawaddy–Kawkareik–Eindu–Hpa-An–Thaton–Kyaikto–Payagi–Bago–Yangon–Thilawa route, with a possible extension to Pathein.

Southern Economic Corridor. This vital passageway links Cambodia with six provinces in Thailand, including Bangkok; four regions in Viet Nam, including Ho Chi Minh City; and six provinces in Lao PDR. It extends to Dawei in Myanmar. The corridor includes the following:

- **Central sub-corridor.** Bangkok–Phnom Penh–Ho Chi Minh City–Vung Tau
- **Northern sub-corridor.** Bangkok–Siem Reap–Stung Treng–Rattanakiri–O Yadov–Pleiku–Quy Nhon
- **Southern coastal sub-corridor.** Bangkok–Trat–Koh Kong–Kampot–Ha Tien–Ca Mau City–Nam Can
- **Inter-corridor link.** Sihanoukville–Phnom Penh–Kratie–Stung Treng–Dong Kralor (Tra Pang Kriel)–Pakse–Savannakhet, connecting the three Southern Economic Corridor sub-corridors with the East–West Economic Corridor

Figure 5: Configuration of Economic Corridors in the Greater Mekong Subregion

Source: "Economic Corridors in the Greater Mekong Subregion," GMS, accessed March 19, 2025; and Asian Development Bank, *Economic Corridor Development: From Conceptual Framework to Practical Implementation—Guidance Note* (2023).

3.2. IFI hard infrastructure interventions

Transport accounts for the largest share of cross-border connectivity infrastructure interventions by IFIs in Southeast Asia, both in number of projects and total financing. In 2010–2024, the seven IFIs approved 41 hard transport infrastructure interventions, representing about two-thirds of all hard infrastructure interventions across transport, energy, and ICT. The 41 interventions include 33 for roads, 1 for railway, 1 for waterways, 2 for airports, and 4 for ports and logistics. Among the seven IFIs, ADB leads with 19 interventions, followed by the World Bank with 10, AIIB and IFC with 4 each, IsDB with 3, and EIB with 1 (Table 2).

During 2010–2024, the seven IFIs committed a total of $8,000.3 million in new funding for cross-border transport connectivity hard infrastructure projects in Southeast Asia (Table 3). About 56% of this funding went to road projects, 34% to railways, 6% to airports, 2% to ports and logistics, and just over 1% to waterways.

Table 2: Number of IFI-Financed Transport Cross-Border Connectivity Projects in Southeast Asia, Approved in 2010–2024

	ADB	AIIB	EIB	IFAD	IFC	IsDB	World Bank	Total
Roads	17	3	1	–	–	3	9	**33**
Railways	1	–	–	–	–	–	–	**1**
Waterways	–	–	–	–	–	–	1	**1**
Airports	1	1	–	–	–	–	–	**2**
Ports and logistics	–	–	–	–	4	–	–	**4**
Total	**19**	**4**	**1**	**–**	**4**	**3**	**10**	**41**

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Table 3: IFI Funding for Cross-Border Transport Connectivity Projects in Southeast Asia, Approved in 2010–2024
($ million)

	ADB	AIIB	EIB	IFAD	IFC	IsDB	World Bank	Total
Roads	3,047.1	112.3	60.0	–	–	436.5	807.5	4,463.5
Railways	2,750.0	–	–	–	–	–	–	2,750.0
Waterways	–	–	–	–	–	–	107.0	107.0
Airports	75.0	423.1	–	–	–	–	–	498.1
Ports and logistics	–	–	–	–	181.8	–	–	181.8
Total	**5,872.1**	**535.4**	**60.0**	**–**	**181.8**	**436.5**	**914.5**	**8,000.3**

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Table 4: IFI Funding for Cross-Border Transport Connectivity Projects in Southeast Asia by Country, Approved in 2010–2024
($ million)

	Roads	Railways	Waterways	Airports	Ports and Logistics	Total
Cambodia	386.6	–	–	–	–	386.6
Indonesia	596.5	–	–	–	–	596.5
Lao PDR	410.1	–	–	–	48.0	458.1
Malaysia	–	–	–	–	–	-
Myanmar	778.5	–	–	–	95.0	873.5
Philippines	380.0	2,750.0	–	75.0	–	3,205.0
Singapore	–	–	–	–	–	-
Thailand	99.4	–	–	423.1	–	522.5
Viet Nam	1,700.6	–	107.0	–	38.8	1,846.4
Regional	111.8	–	–	–	–	111.8
Total	**4,463.5**	**2,750.0**	**107.0**	**498.1**	**181.8**	**8,000.3**

Lao PDR = Lao People's Democratic Republic.
Note: Regional projects refer to those involving two or more countries as borrowers or grant recipients, or investment funds spanning multiple markets.

Source: Authors' estimates from data on IFI websites.

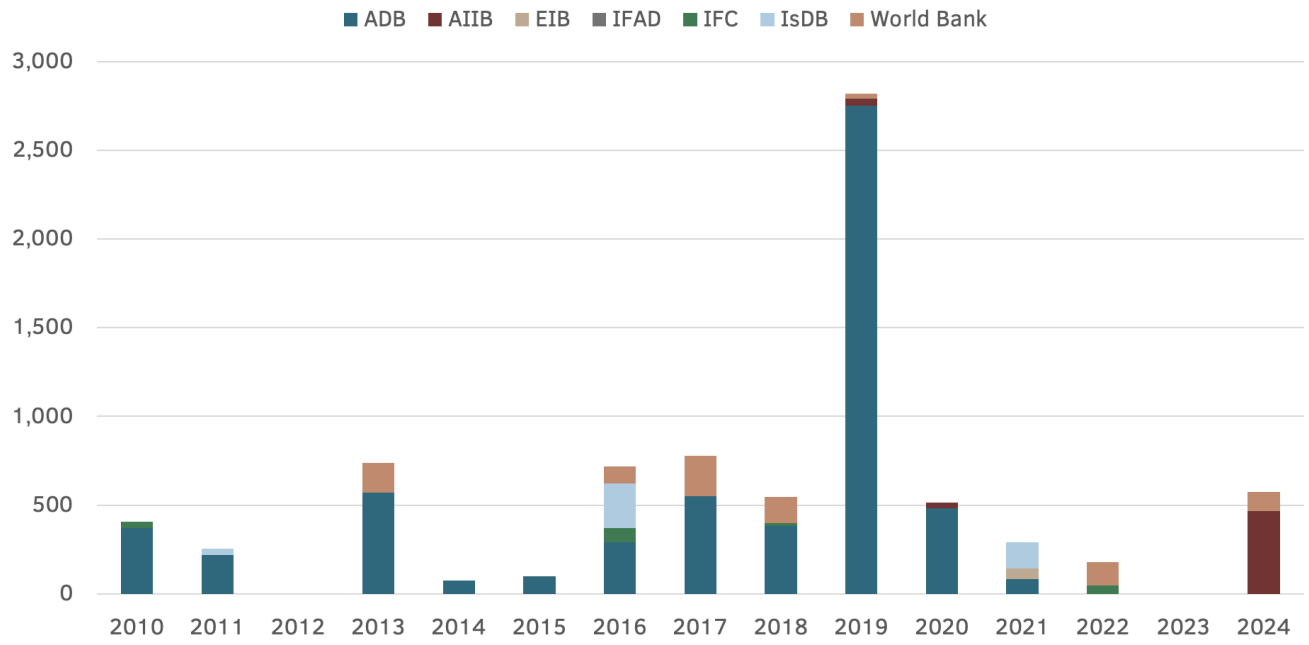
The Philippines received the largest share of IFI funding for transport, totaling $3,205 million (40%). Viet Nam followed with $1,846.4 million (23.1%), Myanmar with $873.5 million (10.9%), Indonesia with $596.5 million (7.5%), Thailand with $522.5 million (6.5%), Lao PDR with $458.1 million (5.7%), and Cambodia with $386.6 million (4.8%). Regional projects accounted for $111.8 million (1.4%) (Table 4).

Among the seven IFIs, ADB was the largest financier, contributing 73.4% of total funding. It was followed by the World Bank (11.4%), AIIB (6.7%), IsDB (5.5%), IFC (2.3%), and EIB (0.7%). Most of the funding from ADB, AIIB, and the World Bank supported road projects. IsDB and EIB focused on roads, while IFC funding was directed entirely to ports and logistics.

IFI funding for cross-border transport connectivity infrastructure fluctuated over time. The highest annual total was in 2019, reaching $2,818.5 million, followed by $778.1 million in 2017, $740 million in 2013, and $719.4 million in 2016 (Figure 6). In other years, funding remained below $740.0 million.

The spike in 2019 was driven by ADB's $2,750 million commitment to the Malolos–Clark Railway Project (Project Readiness Financing 1) in the Philippines. ADB was the largest financier in nearly all years except in 2021–2024. (Data for 2024 is only up to June, and ADB approvals are typically concentrated in the second half of the year).

Figure 6: IFI Funding for Cross-Connectivity Transport Infrastructure by Year and Institution, Approved in 2010–2024
($ million)



ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

ADB's dominance in funding cross-border transport projects reflects its institutional mandate to promote regional economic cooperation and integration, a key pillar of its corporate strategy and operational priorities mandated by its Charter. In recent years, AIIB's funding for cross-border connectivity infrastructure has also picked up, in line with its goal of allocating 25%–30% of total financing to such projects by 2030.

3.2.1. Roads

Recent investments

Most IFI-funded road projects supported the development of economic corridors in GMS:

- **ADB.** More than half of its 17 hard infrastructure road projects focused on upgrading (improving and widening) or maintaining road sections along the East–West Economic Corridor and the Southern Economic Corridor. The rest of the targeted roads connect to border crossings.
- **World Bank.** All its road projects aimed to improve sections along the Southern Economic Corridor and North–South Economic Corridor.
- **AIIB.** It financed three road projects, all focused on improving National Road 13 in Lao PDR, which forms part of the North–South Economic Corridor.
- **EIB.** It approved one transport connectivity project in 2010–2024, which also supported road improvements along the North–South Economic Corridor in Lao PDR.

- **IsDB.** It financed three road projects in Indonesia, which were designed to strengthen national and intra-provincial integration across Yogyakarta, Central Java, and East Java, and to improve international connectivity in the archipelago.

Many IFI-supported road projects include soft infrastructure components such as road safety, road asset management, and the implementation of cross-border transport agreements:

- **Lao PDR/Viet Nam: Second Northern GMS Transport Network Improvement Project**, implemented by ADB with cofinancing from the OPEC Fund for International Development, included road safety audits, awareness campaigns, installation of safety facilities, and training for local villages and students.
- **Lao PDR: Southeast Asia Regional Economic Corridor and Connectivity Project**, implemented by the World Bank, supported the execution of cross-border transport agreements, strengthened institutional and operation capacity for border facility management, harmonized customs processes and trade facilitation, and promoted agricultural trade and sanitary and phytosanitary (SPS) management.
- **Lao PDR: National Road 13 Improvement and Maintenance Project**, implemented by AIIB, included support for the Ministry of Public Works and Transport to manage the output- and performance-based road contract, as well as traffic safety activities, overloading control, environmental and social monitoring, and studies for future investments in other sections of National Road 13.

Cost–benefit analyses disclosed in IFIs' project documents suggest that most cross-border road projects deliver strong economic returns, based on estimates at appraisal or reevaluations at completion. Quantified benefits typically include savings in vehicle operating costs, reduced travel time for freight and passengers, lower road maintenance costs, and increased traffic. Some analyses account for reductions in road accidents and apply economic models to estimate wider economic benefits.

Among the 25 cross-border road projects with a reported economic internal rate of return (EIRR), one-third had an EIRR of 9.2%–15.7% (average: 14.1%), another third 16.4%–22.1% (average: 15.5%), and the rest 23%–43.4% (average: 26.3%). The simple average EIRR across all 25 projects was 20.3%, well above the threshold required under IFI policies.[32]

Compared with conventional road projects, those that form part of economic corridors or physically cross-border projects tend to generate wider economic benefits and broader development impacts. These include enhanced trade and commerce, increased business investment, higher property values, job creation, and poverty reduction.

Road improvements along economic corridors and in border areas are often supported by policy and regulatory reforms that strengthen the business environment and trade facilitation measures that lower trade barriers. In many countries, border areas are often among the least developed, with high poverty rates and poor access to public services. Improved transport connectivity in these areas can attract investment, stimulate trade, and create jobs for low-income households. Better roads expand access to education, health care, and other essential services, improving local communities' livelihoods.

In the case of the Second Northern GMS Transport Network Improvement Project, funded by ADB, the project completion report (PCR) shows significant trade growth in the project areas following implementation. Cross-border traffic along the corridor between Lao PDR and Viet Nam increased by 90% in passenger numbers and 600% in freight trucks. The total value of exports and imports through the Nam Soi–Na Meo border crossing rose by 300% in 2012–2020. Tourist arrivals increased by an average of 14% per year in 2011–2018. In Viet Nam's Thanh Hoa province, annual GDP growth

[32] The EIRR threshold level was 12% for the World Bank and ADB for a long time. In 2016, a guidance note of the World Bank produced an average estimate of the social discount rate at 6% (World Bank, *Discounting Costs and Benefits in Economic Analysis of World Bank Projects* [2023]). In 2017, ADB adjusted its EIRR threshold from 12% to 9%. AIIB's threshold rate is also 9%.

averaged 9.2% in 2010–2018, while the poverty rate fell from 25.4% to 8.8%. Interviews with beneficiaries in Lao PDR showed that household incomes along project roads rose 2.5 times in 2012–2022. While not all outcomes can be directly attributed to the project, it clearly played an important role in contributing to these broader development results.

Many IFI-funded cross-border road projects report benefits from reduced carbon emissions, resulting from improved road conditions and increased vehicle speeds:

- The **Road Connectivity Improvement Project in Cambodia**, funded by the World Bank, involved upgrading sections of National Road 7 to promote development in the Cambodia–Lao PDR–Viet Nam Development Triangle Area. It was estimated that the project could reduce net greenhouse gas (GHG) emissions by 34,120 metric tons of carbon dioxide equivalent over 20 years, generating $2.58 million in social benefits based on the social cost of emissions.
- The **Southeast Asia Regional Economic Corridor and Connectivity Project**, also funded by the World Bank, aimed to improve regional and domestic trade and climate-resilient transport connectivity in northern Lao PDR along the East–West Economic Corridor. It was estimated to have the potential to reduce net GHG emissions amounting to 111,542 metric tons of carbon dioxide equivalent over 20 years, with a corresponding social benefit of $3.35 million.
- The N**orthern Mountain Provinces Transport Connectivity Project in Viet Nam**, funded by ADB, upgraded 198 km of road connecting several towns and districts in Lai Chau, Lao Cai, and Yen Bai provinces to the Noi Bai–Lao Cai Expressway. The project was estimated to have the potential to generate $1.4 million in social benefits over 20 years through net GHG emission reduction compared with the without-project scenario.

Most IFI-supported cross-border connectivity hard infrastructure projects approved and completed in 2010–2024 received satisfactory performance ratings. Of the 33 road projects approved during this period, 12 were completed. Performance ratings are available for eight, all of which were evaluated as successful or satisfactory overall, based on PCRs prepared by IFI project departments or their independent evaluation units.

An independent evaluation of ADB's GMS Program during 2012–2020 reported strong performance, finding that all completed connectivity projects were rated successful or highly successful and achieved their expected outputs and outcomes.[33] The evaluation noted that ADB's transport support is likely to connect 19.2 million residents to the GMS economic corridor network along project sites, reduce transport costs (including vehicle operating and road maintenance costs), and improve economic efficiency.

However, many IFI-supported cross-border road projects encountered significant implementation delays. Of the 12 completed projects, 7 reported information on implementation schedules, and all 7 faced delays, ranging from 3 to 60 months with an average delay of 34 months, caused by:

- lengthy procurement and approval processes that delayed contract awards,
- setbacks in implementing resettlement and land acquisition plans,
- changes to project scope and design,
- counterpart funding shortfalls and contractors' cash flow issues,
- adverse weather conditions,
- COVID-19–related restrictions.

The delays often led to higher project costs, lower economic returns, and the need for additional financing from IFIs.

[33] Independent Evaluation Department (IED), ADB Support for the Greater Mekong Subregion Program, 2012–2020: Performance and Results (ADB, 2021).

The significant delays in implementing IFI-supported cross-border road projects underscore the critical importance of various factors for ensuring successful execution. These include the following:

- Sound feasibility studies
- Good project readiness
- Adequate capacity of executing and implementing agencies
- Streamlined consultant selection and procurement processes
- Effective resettlement and land acquisition plans
- Sufficient counterpart funding
- Financially sound contractors
- Strong stakeholder coordination
- Robust monitoring and supervision
- Comprehensive risk assessment and mitigation plans

The independent evaluation of ADB's GMS Program found that implementation delays were common in connectivity investment projects.[34]

Future priorities

IFIs should continue supporting the development of cross-border road networks that form the backbone of designated economic corridors in Southeast Asia. Roads will remain the dominant mode of transport across the region because of their flexibility and cost-effectiveness in capital investment and operations. The GMS Regional Investment Framework (RIF) 2022 — a medium-term pipeline aligned with the GMS Strategic Framework 2012–2022 and the Ha Noi Action Plan 2018–2022 — identifies 143 investment projects requiring $65.7 billion, along with 84 technical assistance projects requiring $295 million. Of the total investment needed, $39 billion (59%) has identified financing, leaving a funding gap of $27 billion (41%). Of the 143 investment projects, 85 are in transport, including 46 road projects and 12 stand-alone road-related border-crossing projects.

The GMS RIF 2024–2026 — a three-year rolling pipeline of near-term priority projects — aligns with the GMS Economic Cooperation Program Strategic Framework 2030, which was endorsed by the GMS leaders at the 7th GMS Summit in September 2021. The RIF identifies 128 projects, including investment and technical assistance, requiring $17.7 billion in financing from development partners, the private sector, and national and regional budgets. Of these, 34 are transport projects with a combined need of $7.2 billion; of these, 16 are road projects.

A survey of IFI transport leads in the region, along with a review of IFI road investment strategies, highlights several innovations and priorities for future IFI road interventions to enhance cross-border connectivity in Southeast Asia:

- Addressing key missing links
- Prioritizing the transformation of transport corridors into economic corridors
- Promoting cross-border transport facilitation
- Improving road asset management
- Mitigating the negative externalities of road transport, including local and global emissions, and enhancing road safety
- Building capacity for project development, management, and implementation
- Strengthening country ownership and making IFI support more demand-driven

[34] IED, *ADB Support for the Greater Mekong Subregion Program, 2012-2020: Performance and Results* (ADB, 2021).

3.2.2. Railways

Recent investments

Until recently, IFIs had not prioritized railways in developing cross-border transport connectivity infrastructure in Southeast Asia. This report identified only one railway project among the 41 IFI-funded hard transport infrastructure projects — either physically cross-border or with direct cross-border impacts — approved from 2010 to 2024. The Malolos–Clark Railway Project in the Philippines, funded by ADB under a multitranche financing facility with cofinancing from the Japan International Cooperation Agency (JICA), was still under construction as of early 2025, when this report was finalized. The project supports the development of two sections totaling 53.1 km of the North–South Commuter Railway, a 163 km suburban railway network connecting Clark and Clark International Airport in Central Luzon with Metro Manila and Calamba, Laguna.

The project's direct cross-border impacts stem from its role in relieving congestion at Ninoy Aquino International Airport and accommodating growing air travel demand by diverting more passengers to Clark International Airport. Once its terminal is completed, Clark is expected to handle up to 12 million passengers annually. ADB project documents state that the railway will boost local, national, and international connectivity by improving transport efficiency and capacity along the Manila–Clark corridor. The project's EIRR was estimated at 12.3%, exceeding the 9% threshold required by ADB policy. Key benefits include travel time savings for rail passengers, reduced congestion on parallel roads, and lower carbon dioxide emissions from road traffic.

Several factors explain the limited IFI involvement in cross-border railway projects in Southeast Asia:

- First, until recently, the region witnessed a marked shift from rail-based to road-based transport. In many countries, the length of railway networks per million people fell by nearly half, while road network length per million people doubled or even quadrupled during the same period.[35] China was the notable exception, with continued investments in railways. This shift partly reflects rapid growth of vehicle ownership and the flexibility and convenience offered by road transport.
- Second, investment priorities in transport infrastructure often align with a country's development stage. In early stages, governments often prioritize roads because of their lower costs, simpler technical requirements, and shorter investment timelines. Consequently, funds remain limited for more costly, technically complex transport modes with longer gestation periods, such as railways. This factor is particularly relevant for cross-border projects, which demand close cooperation in policy, regulation, and harmonization of technical standards (track specifications, power sources, and signaling systems) among countries.
- Third, the region's diverse landscapes — including mountains, hills, plains, and islands — pose significant challenges for railway construction.

Future priorities

IFIs should explore more investment opportunities in cross-border railways in Southeast Asia:

- First, renewed global and regional interest in railway transport reflects the growing need to reduce carbon emissions and mitigate climate change. Advances in railway technology — such as high-speed trains, smart signaling systems, and more efficient tunnelling machines — have made rail investments more attractive.
- Second, global and regional initiatives that promote cross-country connectivity — such as China's Belt and Road Initiative, Japan's Free and Open Indo-Pacific Strategy, and India's Act East Policy — are generating increased demand for cross-border infrastructure in Southeast Asia. Notable examples include the completed China–Lao PDR Railway and the ongoing China–Thailand Railway.

[35] ADB, Asia's Journey to Prosperity: Policy, Market, and Technology Over 50 Years (2020).

- Third, rising living standards across Southeast Asia are creating growing demand for higher-quality transport services, including high-speed rail. This trend is reflected in increasing interest and investment in railway development throughout the region.

Numerous proposed or planned cross-border railway projects in Southeast Asia present ample opportunities for IFI involvement. A 2017 ESCAP report noted that ASEAN remains the least rail-connected economic grouping in the ESCAP region, accounting for 38% — or 4,760 km — of the missing links of the Trans-Asian Railway network.[36]

The Master Plan on ASEAN Connectivity 2025, adopted by ASEAN members in 2016, identifies seven initiatives under the SKRL project:[37]

- Cambodia: Phnom Penh–Tra Peang Sre (Cambodia–Viet Nam border), 255 km
- Viet Nam: Loc Ninh (Cambodia–Viet Nam border)–Ho Chi Minh City, 129 km
- Implementation framework for seamless SKRL operations: identify and collect data needed for seamless operations; and adopt a common implementation framework.
- Viet Nam spur line: Complete feasibility study and/or detailed designs for the Mu Gia–Tan Ap–Vung Ang section, 119 km
- Lao PDR spur line: Complete feasibility study and/or detailed designs for the Vientiane–Thakhaek–Mu Gia section, 466 km
- Indonesia: Conduct a study on extending the SKRL to Surabaya and develop an action plan for implementation, where feasible
- Cambodia: Poipet–Sisophon, 48 km (completed)

The GMS RIF 2022, the medium-term pipeline of priority projects, identifies 15 railway investment projects out of the 85 transport investment projects. The GMS RIF 2024–2026, the near-term pipeline of priority projects, identifies 5 railway projects out of the 34 transport initiatives. Completing the missing links of the Trans-Asian Railway in ASEAN would advance the objectives of the Master Plan on ASEAN Connectivity 2025 while expanding transport options within ASEAN as well as between ASEAN and Northeast Asia via China, and between ASEAN and South Asia via India. A survey of IFI transport leads confirmed that IFIs remain committed to supporting all transport modes — through their own financing and cofinancing (whether joint or parallel) — in response to client country priorities.

3.2.3. Ports, waterways, and logistics

Recent investments

IFI public sector interventions in port, waterway, and logistics infrastructure in Southeast Asia remained limited during 2010–2024. ADB, AIIB, EIB, IsDB, and IFAD did not approve any public sector hard infrastructure projects in these subsectors. The World Bank approved one hard infrastructure project — the Southern Waterway Corridors and Logistics Development Project for Viet Nam — and two development policy lending operations supporting maritime logistics reform in Indonesia (see discussions on development policy lending projects in the next subsection).

The Southern Waterway Corridors and Logistics Development Project, approved in June 2024, aims to improve the capacity, efficiency, and safety of transport infrastructure along the East–West and North–South Waterway Logistics Corridors. The project involves rehabilitating and upgrading bottleneck sections to meet higher inland waterway standards in Viet Nam and to accommodate larger vessels. Its cross-border connectivity impact stems from the role these waterways play in linking the Mekong Delta region with ports handling international traffic. For example, Can Tho Port, a major harbor in the Mekong Delta city of Can Tho, holds strategic importance for the region's

[36] United Nations ESCAP, "Building the Missing Links in the Trans-Asian Railway Network" (2017).
[37] ASEAN, *Master Plan on ASEAN Connectivity 2025* (2016).

agricultural economy by supporting exports of rice, fruits, seafood, and other local products. It plays a pivotal role in facilitating regional trade and logistics. The project aims to strengthen connectivity by linking Can Tho Port with Ho Chi Minh City Port and the Cai Mep–Thi Vai Port Complex through Mang Thít and Cho Gao, and by connecting Dong Nai port with the same port cluster.

While IFI public sector funding in ports and logistics has been limited, IFI private sector windows have been active in recent years. IFC, which promotes sustainable private sector development through loans and equity investments to projects with development impact, has approved several investment transactions in these subsectors with direct cross-border impacts:

- A financing package — including loans and quasi-equity — to **Thanaleng Dry Port Sole Co. Ltd.**, a subsidiary of Vientiane Logistics Park Co. Ltd. (VLP) in Lao PDR. The project aims to expand access to advanced logistics services such as multimodal transport, transshipment, and value-added solutions. These improvements are expected to reduce costs and transit time and deliver substantial benefits to Lao PDR's cross-border trade with neighboring countries.
- A loan extended to **KM Terminal and Logistics Limited Myanmar** to support a dry port development sponsored by Kerry Logistics Network, an international logistics company. The project is expected to boost the growth of multimodal transport solutions, improving container traffic flows within the country and across its borders.

AIIB made an equity co-investment in EMP Belstar Superfreeze Group Holdings (Superfreeze) along with the CITIC Capital Pan Eurasia Fund. Superfreeze develops and operates a portfolio of cold-chain storage facilities using a unique technology that utilizes waste cold energy from liquid natural gas regasification to cool storage warehouses. Such facilities can contribute to practical waste-to-energy actions and reduce GHG emissions by minimizing food waste and grid power consumption. AIIB's co-investment will primarily fund a facility in Incheon, Republic of Korea. Superfreeze plans to expand into other Asian markets — including China, Singapore, and Viet Nam — and is in discussions with governments and strategic players in these markets.

The limited IFI public sector financing of hard infrastructure in ports, waterways, and logistics in recent years reflects several factors. Historically, support for port development was a major focus of IFIs in Southeast Asia's transport sector. During the 1970s, 1980s, and 1990s, ADB financed numerous loans and technical assistance projects to support port development and upgrades in Indonesia and the Philippines — the region's two island countries — as well as in Cambodia, Malaysia, Thailand, and Viet Nam, where ports played a central role in cross-border trade and economic growth. A major reason for the subsequent shift away from hard infrastructure investments in ports is that such projects typically generate financial returns and can attract private sector financing. Indonesia, Malaysia, and Singapore have more privately owned or operated ports than other countries. Rapid economic growth in Southeast Asia during the 1980s and 1990s attracted large capital inflows, reducing the need for IFI sovereign financing for ports. On the demand side, regional transport cooperation under GMS and ASEAN focused more on road development than on other transport subsectors.

Future priorities

Ports, waterways, and logistics are important components of cross-border connectivity infrastructure in Southeast Asia and continue to warrant IFI public sector financing support, although IFIs must demonstrate their added value. One key area is support for soft infrastructure, including policy and regulatory reforms, capacity building, and institutional strengthening to improve the productivity and efficiency of port operations, along with transaction advisory services to attract domestic and foreign private capital. IFI public sector investment in port, waterway, and logistics hard infrastructure could be expanded by adopting innovative financing models and project designs and by focusing on operational efficiency and environmental sustainability. The GMS RIF 2022 identified 11 port investment projects and 12 logistics investment projects involving border

crossing among the 85 transport investment priorities. BIMP-EAGA Vision 2025 identifies 8 port projects among the 34 transport investments under Strategic Priority 3 (improved infrastructure and facilities at designated priority seaports, airports, and land routes).[38]

IFIs are working on these innovations. From a survey of IFI transport leads in the region and a review of IFI operational strategies, key innovations and priorities for future interventions in these subsectors include the following:

- Promoting applications of ICT and digitalization in service delivery
- Supporting reforms to improve productivity and efficiency
- Supporting the development of multimodal transport systems
- Implementing interventions to reduce emissions and increase climate resilience
- Providing other interventions in response to client country requests

ADB has proposed the creation of a fund to support the development of a more sustainable and resilient maritime sector. It will do this through loans, equity investment, guarantees, and grants at three levels:

- **Upstream.** Support for the development of national efficient port policies and port or terminal green port strategies
- **Midstream.** Support for feasibility studies and project design focused on operational efficiency, resilience, and clean energy and fuels
- **Downstream.** Support for interventions such as smart port management, retrofits, energy-efficient equipment, LED lighting conversion, clean energy and fuels, shore power, solar and wind systems, battery-energy storage, zero-emission equipment and vehicles, alternative fuel bunkering, and resilience measures[39]

The World Bank is advancing effective policies for maritime transport and scalable interventions in the maritime ecosystem, focusing on greening ships and ports, digitalizing operations, and improving efficiency.[40] Shipping is considered a harder-to-abate sector, as ocean-going vessels travel long distances and face limited electrification options. Hydrogen-based fuels — such as green ammonia and methanol — are the leading candidates for decarbonizing the industry. The World Bank notes that many client countries have strong potential to produce these fuels and is committed to supporting them by developing global policy. Shipboard efficiency is closely tied to shoreside port terminal operations, and the vessel–port interface is becoming increasingly important. The World Bank identifies digital solutions as a key tool for optimizing port calls, reducing costs, and lowering emissions.

AIIB has actively supported green infrastructure projects, including initiatives in ports and shipping. One example is the Ningbo Green and Low-Carbon Port Development Project in China, which focuses on enhancing multimodal logistics, improving intermodal transport efficiency, and adopting low-carbon and smart technologies for port operations, with potential for replication in other countries. AIIB has prioritized investments in climate-resilient and low-carbon infrastructure in line with the goals of the Paris Agreement. Other IFIs are also promoting sustainable transport infrastructure.

[38] BIMP-EAGA, *BIMP-EAGA Vision 2025* (2017).
[39] ADB, "ADB's Role in Green Port Development and Maritime Decarbonization," PowerPoint presentation, accessed 24 April 2025; and update from ADB staff source.
[40] World Bank, "*Sustainable Development in Shipping and Ports*" (2023).

3.2.4. Airports

Recent investments

IFIs have supported airport hard infrastructure primarily through their private financing windows, similar to how they have approached investments in port, waterway, and logistics infrastructure. This report identifies two such interventions approved during 2010–2024: the ADB-funded Mactan–Cebu International Passenger Terminal Project in the Philippines and the AIIB-funded U-Tapao International Airport Expansion Project in Thailand.

The ADB-funded project supported the expansion of passenger terminals at Mactan–Cebu International Airport, a priority PPP initiative of the Philippines government. The airport is the second largest in the Philippines and serves as the southern hub of the national air transport system. Project components included (i) construction of a new passenger terminal, (ii) rehabilitation of the existing terminal, (iii) construction of an apron for the new passenger terminal, and (iv) operation and maintenance (O&M) and management of both terminals. The project was expected to boost the airport's capacity to 8 million passengers per year, easing current overcapacity. It aimed to (i) improve international and domestic air transport services in the Philippines and (ii) encourage greater private sector participation in airport PPPs. The new terminal was completed in 2018, and the existing terminal was rehabilitated in 2019.

AIIB funding for the U-Tapao International Airport (UTIA) Project supports the Thailand government's airport expansion and operations through a PPP scheme. The project, which is under implementation, involves constructing a second runway and taxiway at UTIA and forms a critical component of the airport's overall expansion. It aims to transform UTIA into a state-of-the-art commercial airport; enhance Thailand's international and regional connectivity; and support the development of the Eastern Economic Corridor, a key industrial and logistics hub. The project's EIRR was estimated at 30.1%, accounting for direct, indirect, induced, and catalytic operating benefits. A sensitivity analysis — assuming up to a 20% reduction in benefits and a 20% increase in costs — confirmed the project's economic viability under all scenarios. The project loan contributes to the viability gap financing under the concession agreement. The project's financial internal rate of return (FIRR) was estimated at 11.76%, with an equity FIRR of 12.39%, assuming the airport reaches its targeted capacity.

Future priorities

Air transport is a crucial catalyst for economic growth and development in Southeast Asia and continues to warrant IFI support, especially through private sector financing windows. It plays a crucial role in integrating national economies into the global economy by providing essential national, regional, and international connectivity. Air transport supports trade, promotes tourism, and creates jobs. BIMP-EAGA Vision 2025 identifies 11 airport projects among the 34 investment projects under Strategic Priority 3 (improved infrastructure and facilities at designated priority seaports, airports, and land routes).

A survey of IFI transport leads and a review of operational strategies and plans of IFIs active in Southeast Asia indicate a strong commitment to continued support for the airport sector. The goal is to establish a safe, functional, efficient, affordable, and reliable air transport network. Planned interventions may include investment in greenfield airport projects through private sector windows or PPP arrangements; policy and regulatory reforms and technical assistance to improve efficiency and safety; and economic sector work, research, and knowledge dissemination on air transport.

3.3. IFI soft infrastructure interventions to enhance connectivity

IFIs have placed strong emphasis on helping client countries strengthen soft infrastructure, which is essential to maximizing the connectivity impact of hard infrastructure investments. Some of this support was project specific — delivered as components of hard infrastructure projects or through attached technical assistance — and often focused on improving transport safety, strengthening asset management, or building capacity for executing and implementing agencies.

However, a large part of soft infrastructure support has been delivered through stand-alone and dedicated projects, which have focused on the following:

- Supporting strategic and master plan studies and high-level regional summits or meetings to strengthen cross-border connectivity
- Facilitating cross-border transport agreements
- Modernizing customs systems and advancing trade facilitation
- Harmonizing regulatory framework and technical standards to improve cross-border transport connectivity
- Providing policy-based lending that targets broad regulatory and policy frameworks for cross-border trade and connectivity
- Supporting regional transport organizations focused on technical coordination, capacity building, and knowledge sharing

Many of these projects have contributed to strengthening institutional connectivity among ASEAN members.

3.3.1. Support for strategic and master plan studies and high-level regional meetings

The ADB-funded technical assistance project Sustaining the Gains of Regional Cooperation in the GMS, approved in 2017, aimed to strengthen and transform the GMS Program into a more effective regional cooperation platform.[41] The project delivered three outputs:

- Strengthen coordination and decision-making mechanisms in economic cooperation. This involved capacity building for GMS national secretariats and support for GMS sector working groups, the GMS Summit, the Economic Corridors Forum, and the GMS Ministerial Conference.
- Improve project identification, resource mobilization, and results monitoring. Activities included updating the regional investment framework to support national project identification.
- Enhance knowledge-based strategic planning. This included support for the preparation of sector, country, and regional assessments to inform the preparation of sector strategies, country partnership strategies, and country operations business plans.

3.3.2. Facilitation of cross-border transport agreements and harmonization of regulatory and technical standards

ADB has provided support to implement the GMS Cross-Border Transport Facilitation Agreement (CBTA). The ADB-funded technical assistance project "Early Harvest" Implementation of the Cross-Border Transport and Trade Facilitation in the Greater Mekong Subregion, approved in 2020 and still under implementation, aims to support GMS transport and trade facilitation initiatives, specifically the implementation of the GMS CBTA.[42] The technical assistance project delivers three outputs:

[41] ADB, Sustaining the Gains of Regional Cooperation in the Greater Mekong Subregion (2017).

- Support the implementation of the Early Harvest CBTA. This includes developing interim customs transit arrangements pending the adoption of CBTA 2.0, monitoring implementation progress, integrating Myanmar into the GMS-wide Early Harvest memorandum of understanding (MOU), and negotiating CBTA 2.0.
- Enhance the capacity of transport operators to participate in a liberalized sector. This supports the private sector in building capacity to benefit from liberalized transport services under the Early Harvest MOU and future CBTA 2.0.
- Strengthen institutional mechanisms of the GMS CBTA.

The ADB-funded technical assistance project Support for Implementing the Action Plan for Transport and Trade Facilitation in the GMS aimed to enhance border management and coordination, streamline transit procedures, and expand traffic rights across GMS corridors. The project was designed to deliver 10 outputs, broadly grouped under three components of the GMS Trade and Transport Facilitation Action Plan: (i) transport facilitation, (ii) trade facilitation, and (iii) capacity building and regulatory response. Outputs included the exchange of traffic rights, the development of a customs transit system and improved border procedures, the establishment of the GMS Freight Transport Association, coordinated border management, enhanced SPS measures, national and subregional institutional strengthening, preparation of a regional trade logistics strategy, and legal and regulatory development.[43]

The technical assistance completion report (TCR) prepared by ADB concludes that the project helped establish a platform for increased trade and traffic among GMS countries. It notably advanced the liberalization of transport services through the signing and initial operations of the Early Harvest MOU and the protocol expanding border-crossing points and routes under the CBTA. The technical assistance succeeded in engaging customs agencies more actively in CBTA implementation. Based on these results, the technical assistance was rated successful overall.

3.3.3. Customs and border-crossing modernization

Support for customs and border-crossing modernization can include several key areas:

- Building capacity and training customs officials
- Upgrading border-crossing facilities such as roads, ports, and border posts
- Introducing modern ICT technology and systems for customs operations, including electronic data interchange and automated customs systems
- Developing and implementing policies and regulations that facilitate trade and improve customs procedures, such as national single windows

The World Bank–funded Philippines Customs Modernization Project is an investment project financing initiative aimed at improving the efficiency of the Bureau of Customs (BOC) and reducing trade costs. Approved in October 2020 and still under implementation, the project has three components:

- **Modernization of customs operations.** Supports the upgrade of BOC's core customs processing system, related technical infrastructure, and internal capacity to manage and operate a sophisticated ICT system, contributing to improved operational effectiveness, integrity, accountability, and organizational performance

[42] ADB, *"Early Harvest" Implementation of the Cross-Border Transport and Trade Facilitation in the Greater Mekong Subregion* (2020).
[43] ADB, *Completion Report: Support for Implementing the Action Plan for Transport and Trade Facilitation in the Greater Mekong Subregion* (2020).

- **Organizational development.** Supports BOC's modernization initiative to transition to modern customs administration
- **Project management and implementation support**

3.3.4. Policy-based lending to support policy and institutional reforms

The First Indonesia Logistics Reform Development Policy Loan, funded by the World Bank, aimed to reduce costs and improve the reliability of Indonesia's logistics chain. Approved in November 2016 and completed in September 2017, the program supported the government's priority of improving the movement of goods within and across borders, in line with its medium-term economic development and poverty reduction goals. This was the first in a planned series of two single-tranche operations supporting critical policy and institutional reforms to ease bottlenecks across the supply chain. The loan focused on the following:

- **Strengthen port governance and operations.** Clarify the role of port authorities vis-à-vis port operators and facilitate the entry of port services operators
- **Enable a competitive business environment for logistics service providers.** Increase competition in freight-forwarding services, storage and distribution services, and auxiliary shipping services
- **Improve trade processing efficiency and transparency.** Reduce licensing requirements for imports, facilitate traders' compliance with regulatory requirements, expedite the submission of documentation, and improve risk management by border agencies

The program included many results indicators to measure progress. According to the implementation completion report review by the World Bank's Independent Evaluation Group, most of these targets were achieved. The program's overall outcome was rated satisfactory. Key indicators included the following:

- An increase in the number of ports and terminals with internationally certified management systems
- Growth in the number of approved applications for the build–operate–transfer scheme for seaport development
- A reduction in the minimum and maximum ship waiting times at Tanjung Priok and Makassar seaports
- An increase in the number of new foreign licenses for freight forwarders, warehousing, and cold storage service providers
- An increase in the number of new shipping agents' licenses and foreign maritime cargo-handling licenses
- An increase in the number of operational logistics bonded centers
- A reduction in pre-clearance time at Tanjung Priok
- A reduction in dwelling time at the two main ports — Tanjung Priok and Tanjung Perak

3.3.5. Trade facilitation for particular sectors

IFIs' sector-specific support for trade facilitation has mostly focused on agriculture. Examples are provided below.

The ADB-funded technical assistance project Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion Trade aimed to make agriculture, food, and forestry (AFF) products in Cambodia and Lao PDR safer, more efficiently produced, and traded in greater quantities. The technical assistance focused on strengthening surveillance and

inspection programs for plant and animal health and food safety; improving regional cooperation and harmonization in SPS measures; and enhancing the education and university training of SPS specialists. The TCR disclosed by ADB indicates that the project supported the signing of 56 product-specific MOUs and market access agreements, and the grading of 3,059 tourist and food-processing enterprises on good hygiene and manufacturing practices. The project also helped establish credible SPS reporting systems for plant health, animal health, and food safety, which were acknowledged by GMS trading partners. These efforts contributed to increased formal trade in AFF products for Cambodia and Lao PDR. The project was rated successful overall and highly successful in its development impact, contributing to economic growth through increased exports of AFF products to other GMS countries.[44]

The Agriculture Services Programme for an Inclusive Rural Economy and Agricultural Trade for Cambodia, funded by an IFAD loan with cofinancing from EIB and currently under implementation, aims to increase incomes for rural producers and workers by supporting inclusive and sustainable agricultural growth, focused on both exports and domestic markets. One component of the project seeks to upgrade critical public services and related infrastructure to enable competitive export growth, with an emphasis on export-oriented plant health and quarantine services. Investments will include infrastructure and equipment upgrades, as well as capacity strengthening for institutions and staff.

Priority public services and infrastructure identified for investment and capacity strengthening include the following:

- Post-harvest reference centers to support export protocol negotiations for priority products and conduct scientific trials on optimal post-harvest handling and treatment
- Export quarantine inspection offices to deliver mandatory pre-export quarantine inspections and related services to exporters
- Plant health reference laboratories to help producers and exporters remain competitive while complying with SPS and market access requirements

IFAD's priority in establishing trade facilitation infrastructure — such as post-harvest reference centers, quarantine inspection offices, and plant health reference laboratories — is to ensure long-term sustainability through the preparation and validation of a sound institutional plan. These plans emphasize the importance of private sector partnerships for sustainability and pre-identify the revenue needed to cover O&M of the facilities.

IFAD's broader approach to facilitating agricultural exports focuses on strengthening value chains to connect smallholder farmers to markets. This includes expediting market access by improving infrastructure (roads, storage facilities); providing market information; supporting farmers' organizations to collectively market their products; and training farmers in improved agricultural practices, business management, and marketing.

3.3.6. Support for regional transport organizations

The ADB-funded regional technical assistance project Support for the Establishment of the Greater Mekong Railway Association (GMRA) resulted in the creation of GMRA in 2013 following the signing of the MOU by all GMS countries at the 19th GMS Ministerial Conference. GMRA is mandated to develop railway institutional capacity within GMS countries and to promote railway connectivity and interoperability across the subregion.

[44] Cambodia's AFF exports increased from $218 million in 2010 to $1,136.8 million in 2019 (growing 23.5% annually on average), while Lao PDR's AFF exports increased from $351 million in 2010 to $3,332.4 million in 2019 (growing 30.2% annually on average). This exceeded the target of a 15% annual average increase.

The technical assistance provided funding for the first two years of operations, including support for the association's secretariat and capacity development program.[45] ADB rates the technical assistance successful, as all technical assistance outputs were delivered and the technical assistance outcome was achieved. The TCR highlighted notable successes, including the establishment of GMRA working groups and the delivery of outputs related to rail connectivity, capacity development, and engagement with the private sector to advance the development of the GMS rail network (Box 3).

3.3.7. Future priorities

Investing in soft infrastructure for cross-border connectivity remains a top priority for IFI support in Southeast Asia. While countries have made significant efforts to strengthen soft infrastructure, more tangible results are needed to achieve the vision of a seamlessly and comprehensively connected and integrated ASEAN.

According to the Master Plan on ASEAN Connectivity 2025, the implementation of initiatives to enhance institutional connectivity has lagged far behind what was envisioned in 2010. For example, the situation as of the end of May 2016 was as follows:

- Of the six initiatives to operationalize the framework agreements on facilitation of goods in transit, interstate transport, and multimodal transit, only two had been completed.
- Neither of the two initiatives to facilitate interstate passenger land transport had been completed.
- Of the nine initiatives to develop the ASEAN Single Aviation Market, only two had been completed.
- Of the 15 initiatives to accelerate the free flow of goods within ASEAN by eliminating barriers to merchandise trade, only 4 had been completed.
- None of the three initiatives aimed at enhancing border management capabilities had been completed.

IFI support for building soft infrastructure to strengthen cross-border connectivity in Southeast Asia should place greater emphasis on implementing initiatives that have already been launched and agreements that have been signed, in order to achieve tangible results. The slow progress in institutional connectivity among ASEAN members suggests that while IFI interventions — through policy-based lending, technical assistance, and knowledge solutions — have delivered most of their planned outputs, many of these outputs have not yet translated into tangible outcomes.

ADB's independent evaluation of the GMS Program in 2012–2020 highlighted uneven progress in regional connectivity efforts. It found that "ADB operational support for connectivity has enhanced GMS physical links, especially roads, but less progress has been made on the necessary support policies and institutions," and that "implementation of the Cross-Border Transport Agreement and trade facilitation measures was a long process."[46]

[45] ADB, *Completion Report: Support for the Establishment of the Greater Mekong Railway Association* (2017).
[46] ADB, Support for the Establishment of the Greater Mekong Railway Association.

Box 3: Asian Development Bank Support for the Establishment of the Greater Mekong Railway Association

The Asian Development Bank (ADB)–funded technical assistance, approved in 2013, supported the establishment of three working groups (WGs) of the Greater Mekong Railway Association (GMRA): (i) WG1: Network Connectivity; (ii) WG2: Network Integration and Inter-operability; and (iii) WG3: Partnerships and GMRA Operations. WG1 achieved its output through agreement among Greater Mekong Subregion (GMS) Economic Cooperation Program member countries on nine priority regional railway links. WG2 made significant progress by developing and delivering sample multilateral and bilateral agreements for regional railway network development and operations. GMRA formally agreed to prepare and adopt a cross-border framework for railway operations within GMS. This framework will serve as a high-level strategic document, supported by a series of existing or new bilateral agreements, as required.

WG3 led to the GMRA board's agreement on the need for an international body overseeing regional rail development in the GMS and the evolution of GMRA into a legal entity to fulfill that role. WG3 engaged in dialogue with international organizations and the private sector to support GMRA's development. The establishment of the working groups and their meetings created opportunities to deliver capacity development programs for railway institutions in GMS member countries.

In 2019, ADB approved a follow-up technical assistance project, Connecting the Railways of the Greater Mekong Subregion, to support GMRA in accelerating the development of rail connections among GMS countries. The technical assistance aimed to strengthen GMRA's organizational structure, update the GMS railway strategy to guide the development of missing cross-border railway links and associated domestic connections, and identify bankable railway projects in GMS countries.

Sources: ADB, *Completion Report: Support for the Establishment of the Greater Mekong Railway Association* (2017); ADB, *Concept Paper: Connecting the Railways of the Greater Mekong Subregion, Phase 2* (2019).

4 Cross-Border Connectivity Infrastructure: Energy

4. Cross-Border Connectivity Infrastructure: Energy

4.1. Cross-border energy connectivity challenges and opportunities

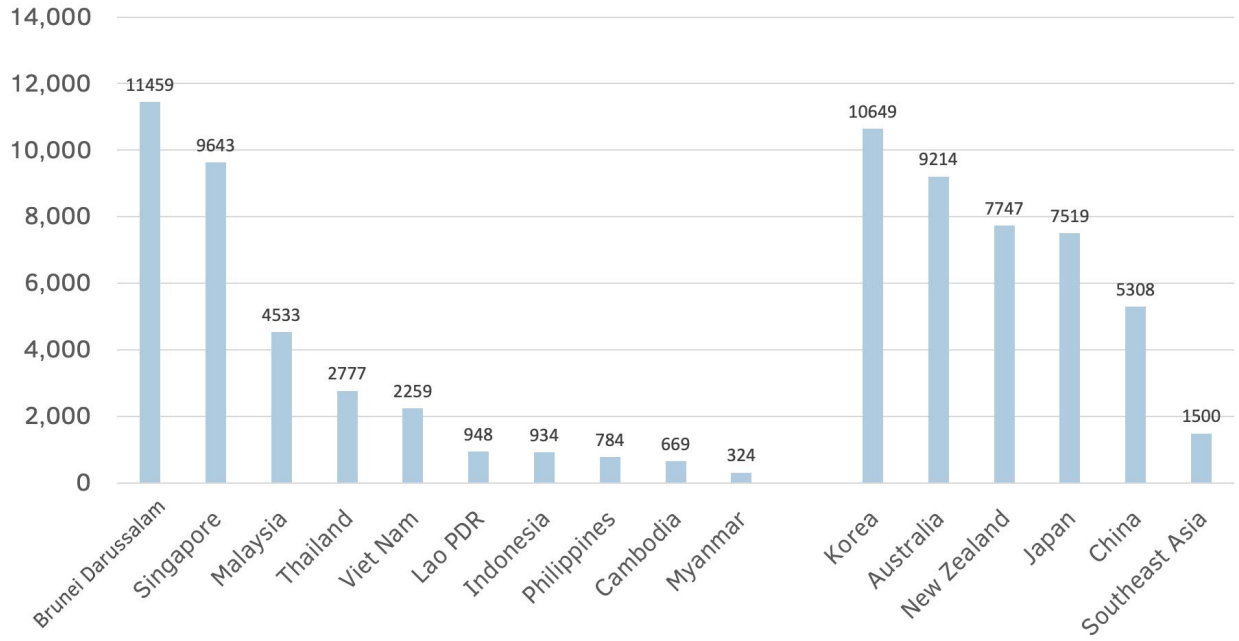
Southeast Asia faces significant challenges in narrowing energy consumption gaps and meeting growing energy demand. In 2021, the region's average per capita electricity consumption was less than 30% of China's level and less than 15% of the Republic of Korea's (Figure 7). With continued robust economic growth and population increases in the coming years, energy demand is expected to continue to rise.

Despite recent investments, energy infrastructure in many Southeast Asian countries remains inadequate, marked by limited power generation capacity and outdated, inefficient transmission and distribution networks. Tackling these challenges will require substantial new investment. Many energy systems still rely heavily on fossil fuel — coal, oil, and natural gas — much of which is imported (Figure 8). The region must urgently accelerate the transition to clean and renewable energy sources to reduce GHG emissions, a commitment all Southeast Asian countries have pledged to uphold.

Regional energy cooperation and cross-border power trading provide a key solution to Southeast Asia's energy challenges. Given the region's diverse energy reserves and geographic proximity, cross-border power trading offers numerous benefits. Lao PDR and Viet Nam possess rich hydropower resources. Brunei Darussalam, Indonesia, and Malaysia have significant oil and natural gas reserves. Indonesia, Malaysia, and the Philippines are advancing solar and wind power development.

Cross-border power trading enables energy-scarce countries to meet demand while allowing energy-rich countries to generate economic returns. It can reduce reliance on fossil fuel, support energy diversification, strengthen energy security, improve system efficiency, and lower overall energy costs.

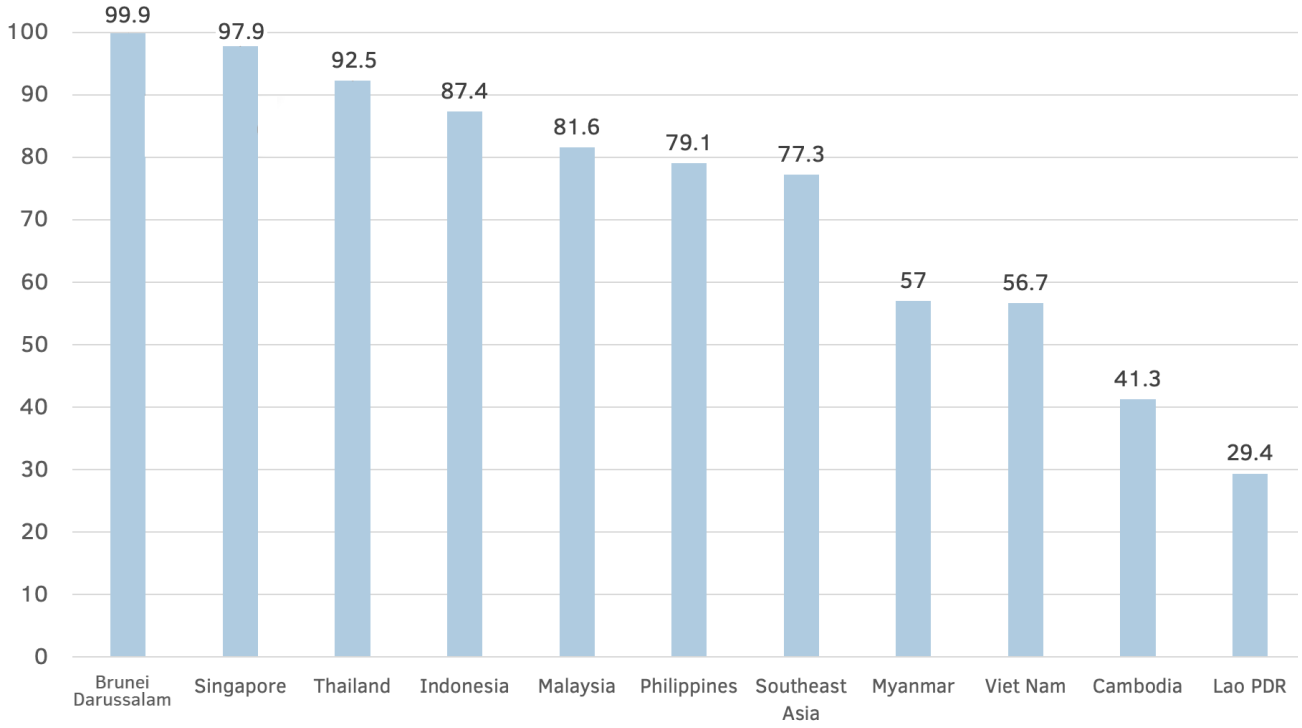
Figure 7: Electricity Consumption, 2021
(kilowatt-hours per capita)



Lao PDR = Lao People's Democratic Republic.

Source: Asian Development Bank, *Key Indicators for Asia and the Pacific 2024: Data for Climate Action* (2024).

Figure 8: Share of Combustible Fuels in Power Production, 2021 (%)



Lao PDR = Lao People's Democratic Republic.

Source: Asian Development Bank, *Key Indicators for Asia and the Pacific 2024: Data for Climate Action* (2024).

Cross-border power trading is a key component of economic cooperation among ASEAN members and is promoted through GMS, BIMP-EAGA, and IMT-GT. ASEAN Vision 2020, adopted in 1997, called for interconnecting arrangements in the field of energy and utilities — specifically electricity, natural gas, and water — through the ASEAN Power Grid (APG), the Trans-ASEAN Gas Pipeline, and the Trans-ASEAN Water Pipeline.

The APG aims to strengthen regional energy connectivity and support multilateral power trading among ASEAN members. Successive ASEAN plans of action for energy cooperation, along with the ASEAN Interconnection Master Plan studies, have laid out the blueprint for the APG. Power trading under the APG is designed to progress in three steps: starting with the bilateral level; scaling up to subregional trade within the north (ASEAN countries in GMS), south (Indonesia, Malaysia, and Singapore), and east (BIMP-EAGA countries); and eventually achieving full regional interconnection among all ASEAN countries.

The APG has made the most progress in bilateral cross-border trading. As of May 2023, 18 bilateral power trading projects had been identified,[47] with about half in operation and the rest pending confirmation. Progress has also been made toward subregional arrangements.

The first multilateral power trade pilot project — Lao PDR–Thailand–Malaysia–Singapore Power Integration Project — began in June 2022. It established multilateral cross-border electricity trade of up to 100 megawatts (MW) from Lao PDR to Singapore via Thailand and Malaysia, using existing interconnections for two years. In September 2024, Singapore's Energy Market Authority announced that the project would enter its second phase, doubling its capacity from 100 MW to 200 MW, with the enhancement including additional supply from Malaysia.[48] Singapore aims to import about 6 gigawatts of low-carbon electricity by 2035, which would account for roughly one-third of its energy supply by that time.[49]

[47] ASEAN Centre for Energy, "Status of Southeast Asia Interconnectivity under ASEAN Power Grid, ASEAN Centre for Energy," PowerPoint presentation, BBIN-LTMS WS, Asia Pacific Energy Forum, October 16, 2023.
[48] Energy Market Authority, "Singapore Doubles Power Import Capacity Under LTMS-PIP Phase 2," September 20, 2024.
[49] Energy Market Authority, "Regional Power Grids," accessed March 19, 2025.

Under the ASEAN Plan of Action for Energy Cooperation 2016–2025, Phase II: 2021–2025, ASEAN has committed to strengthening the APG by expanding multilateral electricity trading. The goal is to provide affordable and resilient electricity while supporting higher shares of renewable energy in the energy mix, advancing the energy transition and long-term sustainability.[50]

4.2. IFI hard infrastructure interventions

IFIs have been and remain long-standing partners in facilitating energy cooperation and investing in infrastructure for cross-border power trading. Supporting energy cooperation is a key focus of ADB's subregional cooperation programs for GMS, BIMP-EAGA, and IMP-GT. Support includes financing hard infrastructure, supporting high-level intergovernmental meetings on energy cooperation, funding master plans and feasibility studies for interconnection and power trading, and promoting policy and regulatory reforms.

ADB and the World Bank — individually or jointly — have funded several hydropower and transmission projects to promote power trading in GMS. These include Nam Song Hydropower Development (1992), Theun-Hinboun Hydropower (1994), Nam Leuk Hydropower (1996), and Nam Theun 2 Hydroelectric (2005) in Lao PDR; and Greater Mekong Subregion Transmission (2003) and Power Transmission Lines Co., Ltd. (2007) in Cambodia.[51] From 2010 to 2024, IFIs continued to support Southeast Asian countries in strengthening cross-border energy connectivity infrastructure (Tables 5–7).

Table 5: Number of IFI-Financed Energy Cross-Border Connectivity Projects in Southeast Asia, Approved in 2010–2024

	ADB	AIIB	EIB	IFAD	IFC	IsDB	World Bank	Total
Generation	2	2	–	–	–	–	–	4
Transmission	2	-	–	–	–	–	–	2
Total	4	2	–	–	–	–	–	6

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

[50] ASEAN, *ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–2025 Phase II: 2021–2025,* accessed March 19, 2025.
[51] In 2003, ADB and the World Bank jointly funded the GMS Transmission Project in Cambodia to facilitate power imports from Lao PDR. In 2005, they cofinanced the Nam Theun 2 Hydroelectric Project in Lao PDR, which involved developing, constructing, and operating a 1,070 MW hydroelectric plant in the country's central region, along with transmission lines to supply power to the domestic grid and export electricity to Thailand.

Table 6: IFI Funding for Energy Cross-Border Connectivity Projects in Southeast Asia, Approved in 2010–2024
($ million)

	ADB	AIIB	EIB	IFAD	IFC	ISDB	World Bank	Total
Generation	314.0	190. 0	–	–	–	–	–	504.0
Transmission	69.0	–	–	–	–	–	–	69.0
Total	383. 0	190. 0	–	–	–	–	–	573. 0

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Table 7: IFI Funding for Energy Cross-Border Connectivity Projects in Southeast Asia by Country, Approved in 2010–2024
($ million)

	Generation	Transmission	Total
Brunei Darussalam	–	–	–
Cambodia	–	–	–
Indonesia	–	49.0	49.0
Lao PDR	504.0	20.0	524.0
Malaysia	–	–	–
Myanmar	–	–	–
Philippines	–	–	–
Singapore	–	–	–
Thailand	–	–	–
Viet Nam	–	–	–
Total	504.0	69.0	573.0

Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates from data on IFI websites.

4.2.1. Power generation

With the rapidly changing energy landscape, IFIs have reoriented their energy interventions toward clean energy sources in recent years. The Sustainable Development Goals and the Paris Agreement on climate change set ambitious targets for ensuring reliable and sustainable energy access for all, while amplifying global calls for climate action and a transition to green energy. IFIs have responded by moving away from fossil fuel–based power generation toward renewable energy.

ADB's energy policy, updated in 2021, formalizes its practice of not financing new coal-fired power and heating plants and commits to helping member economies develop policy frameworks to manage the energy transition.[52] The World Bank has not financed a new coal-fired power project since 2010 and now considers renewable energy its first choice for energy investments.[53] AIIB's updated energy sector strategy is guided by six principles: promoting energy access and security, supporting the transition to clean energy, realizing energy efficiency potential, managing local and regional pollution, mobilizing private capital, and promoting connectivity and regional cooperation.[54] IsDB, EIB, and IFAD have all committed to supporting clean energy transitions in their client countries.

IFI support for power generation infrastructure that promotes cross-border power trading in Southeast Asia has centered on renewable energy. In 2010–2024, ADB and AIIB collectively financed three renewable export projects, all in Lao PDR:

- **Nam Ngiep 1 Hydropower Project (ADB).** Involved the construction and operation of a 290 MW hydropower facility on the Nam Ngiep River in Bolikhamxay and Xaysomboun provinces. The electricity produced will be exported to Thailand. Commercial operations started on September 5, 2019.
- **Monsoon Wind Power Project (ADB and AIIB).** Involves the development, construction, and operation of a 600 MW wind power facility, a 500-kilovolt (kV) substation, and a 500 kV transmission line in Sekong and Attapeu provinces. The electricity generated is expected to be sold to Viet Nam. The project is under implementation.
- **Xekaman Cross-Border Hydropower Project (AIIB).** Involves refinancing a portion of the existing debt of the Xekaman 1 Power Company Limited. Xekaman 1 Hydropower Plant sells 100% of its power output to the state-owned Viet Nam Electricity under 25-year power purchase agreements.

IFI support for power trading is expected to accelerate Southeast Asia's energy transition and generate broader development impacts. The Nam Ngiep 1 Hydropower Project will help avoid GHG emissions, reduce electricity costs for Thailand, and increase government revenue for Lao PDR. It aimed to help raise Lao PDR's national electrification rate from 82% to 92% by 2024, as part of the generated power supplied domestically.

The Monsoon Wind Power Project will produce green energy in Lao PDR for export to Viet Nam, supporting economic growth and reducing the carbon footprints of both countries. As the largest wind farm in Southeast Asia, it is expected to reduce more than 35 million tons of GHG emissions over its lifetime, contributing to global climate mitigation and ASEAN's commitments to energy cooperation and transition. The project will increase foreign exchange earnings and government revenues for Lao PDR and support its progress toward achieving the Sustainable Development Goals.

[52] "Energy Policy," ADB, accessed March 19, 2025.
[53] "Energy," World Bank, accessed March 19, 2025.
[54] AIIB, *Energy Sector Strategy: Sustainable Energy for Tomorrow* (2022).

4.2.2. Power transmission

In 2010–2024, IFIs supported two transmission projects in Southeast Asia that form part of the APG:

- The **Greater Mekong Subregion Northern Power Transmission Project** in Lao PDR, implemented by ADB, involved constructing 91 km of 115 kV transmission lines and a new substation, extending existing substations, installing 1,435 km of 22 kV distribution lines, and building an interconnection transmission line between Paklay (Lao PDR) and Thali (Thailand).
- The **West Kalimantan Power Grid Strengthening Project** in Indonesia, also implemented by ADB, included the construction of about 83 km of 275 kV double-circuit transmission line between the Bengkayang and the Sarawak (Malaysia) border, and a new 275/150/20 kV substation. It built about 145 km of 150 kV double-circuit distribution lines, a new 150/250 kV substation, a four-line distribution feeder extension, and new electricity connections to 8,000 households in West Kalimantan.

IFI-supported transmission projects have not only directly enabled power trading among Southeast Asian countries but also delivered broader development impacts:

- According to the PCR, the **Greater Mekong Subregion Northern Power Transmission Project** improved access to two-way power trade between Lao PDR and Thailand; provided reliable and affordable electricity to more than 8,000 poor households — 47% above target — significantly raising the national electrification rate; and helped the government prepare a draft strategy framework on energy efficiency and renewable energy. The draft was later incorporated into the final prime ministerial decree on energy efficiency and conservation policy frameworks, approved by the National Assembly.
- The PCR for the **West Kalimantan Power Grid Strengthening Project** notes that new transmission lines and a substation delivered reliable electricity connections to 303,929 customers — residential, social, business, government, and industrial — and helped reduce power blackouts. By enabling electricity imports from Malaysia, the project contributed to economic and environmental sustainability in the region, cutting 1.1 million metric tons of carbon dioxide equivalent annually since 2016.

4.3. IFI soft infrastructure interventions to enhance connectivity

IFIs play a vital role in building soft the infrastructure needed to support energy connectivity and cross-border power trading. Such trading requires close coordination among participating countries to ensure that projects are technically feasible, economically viable, financially sustainable, politically acceptable, and attractive to private investors.

Achieving this calls for the following:

- Sound technical design and cost–benefit analysis
- Fair and transparent negotiations to ensure equitable benefit distribution and cost sharing
- Clear and consistent policy and regulatory frameworks, including harmonized grid codes and standards
- Well-designed power markets that support cross-border trade and system resilience, including wholesale markets
- Sound financing arrangements
- Strong institutional capacity to manage power trading
- High-level political commitment

IFIs can serve as catalysts, conveners, mediators, and risk mitigators in cross-border infrastructure development. They can do so by providing funding (loans, grants, equity investment, and guarantees), policy advice, technical assistance, and capacity building; identifying bankable projects; and structuring financing packages.

IFIs have actively supported GMS countries in developing and strengthening soft infrastructure for energy connectivity and power trading. Since the 1990s, ADB and the World Bank have provided policy and knowledge support for GMS regional power cooperation. ADB has financed many key regional studies on power trading — including master plans and road maps, operating agreements, regulatory frameworks, environmental assessments, and benefit estimation — and produced numerous knowledge products. Two recent publications present rules, standards, techniques, and policy lessons relevant to government ministries, planning agencies, regulatory bodies, power utilities, and private sector investors in Southeast Asia.[55] ADB has supported institutional development by serving as the secretariat for GMS regional power cooperation and provided technical assistance to the Regional Power Trade Coordination Committee and its working groups.

A technical assistance project approved by ADB in December 2024 aims to help selected GMS and ASEAN members accelerate their energy transition and enhance regional power trade under the APG.[56] The project aims to accomplish the following:

- Update the ASEAN Interconnection Masterplan Study III and the APG project pipeline
- Develop an APG financing facility and assess opportunities for interconnection and renewable energy investment
- Strengthen regional capacity for multilateral power trade and a regional power market, including systems for tracking green power trade
- Reinforce regional cooperation to accelerate the energy transition

The technical assistance will introduce a holistic approach to advancing the APG. It will do so by expediting multilateral power trade arrangements and accelerating renewable energy development, with a focus on infrastructure, financing and de-risking mechanisms, and regulatory harmonization.

An independent evaluation of the performance and results of ADB's GMS Program in 2012–2020 notes its support for energy connectivity. ADB helped lay the groundwork for interconnecting the GMS power systems and developing a GMS power market through the organization and operations of the Regional Power Trade Coordination Committee.[57] ADB support has facilitated the preparation of performance standards and regulatory frameworks for multicountry power trade, the drafting of GMS regional grid codes, and the expansion of cross-border power trading from 14 cross-border lines with a total traded capacity of 4,030 MW in 2012 to 19 with 8,870 MW in 2020. ADB also helped strengthen government capacity to develop an environmentally sustainable power sector, including through the application of integrated resource planning with strategic environmental assessments and the improvement of regulations, policies, and programs for renewable energy and energy efficiency. A high-level limited survey of Regional Power Trade Coordination Committee members conducted by ADB reported positive feedback on the achievement of GMS energy cooperation and ADB support (Table 8).

[55] ADB, Harmonizing Power Systems in the Greater Mekong Subregion: Regulatory and Pricing Measures to Facilitate Power Trade (2020); ADB, *Facilitating Power Trade in the Greater Mekong Subregion: Establishing and Implementing a Regional Grid Code* (2022).
[56] ADB, Technical Assistance for Advancing Energy Transition and Regional Power Trade in the Greater Mekong Subregion and Southeast Asia (2024).
[57] ADB, "Evaluation of ADB Support to GMS Power Cooperation," PowerPoint presentation, accessed March 19, 2025.

Table 8: High-Level Limited Survey by the Asian Development Bank on Greater Mekong Subregion Energy Cooperation

Question	Average survey response (1 denotes strongly disagree and 10 denotes strongly agree)
1. The GMS energy sector cooperation has delivered a workable, relevant regulatory framework to support increased cross-border power trade	7. 6
2. The GMS energy sector cooperation has delivered a workable, relevant suite of performance standards and grid codes to support increased cross-border power trade	8. 0
3. Power sector planning in GMS countries using integrated resource planning and strategic environmental assessment has been strengthened	7. 2
4. Progress has been made in developing the right institutions to support regional energy cooperation	7. 5
5. The GMS energy cooperation has brought about increased energy trade	8. 0
6. The GMS energy cooperation has brought about increased energy security	7. 9
7. The GMS energy sector cooperation has played a significant knowledge-sharing and capacity-building role for GMS countries	7. 8
8. The combination of different ADB programs is useful to each country and well-coordinated with other GMS energy cooperation programs	8. 1

Source: Asian Development Bank, "Evaluation of ADB Support to GMS Power Cooperation," PowerPoint presentation, accessed March 19, 2025.

The World Bank and IFC have supported various aspects of power trading through policy and knowledge work. The World Bank has financed several studies on interconnected power market infrastructure in GMS, covering power trade strategy, market structure, regulatory systems and pricing principles, and business cases for cross-border trading.[58] IFC has provided transaction advisory services to promote power trading in GMS by supporting the development of bankable transmission projects for private sector participation, establishing project viability through pre-feasibility studies, and securing stakeholder consensus for implementation. Its Lao PDR Transmission Advisory Project, approved in March 2020 and completed in December 2021, included the following:

- Sector scoping and market assessment of Lao PDR's transmission sector to identify private investment opportunities
- Development of demonstration projects through identification and pre-feasibility analysis of transmission lines suitable for private sector involvement
- Engagement with neighboring governments and power sector agencies to secure buy-in on transmission corridors that facilitate bulk trade, with a focus on interconnections with Viet Nam and coordination among multiple stakeholders

[58] Energy Sector Management Assistance Program, "Greater Mekong Sub-Region Options for the Structure of the GMS Power Trade Market A First Overview of Issues and Possible Options," ESMAP Technical Paper 108/06 (2006); World Bank, Greater Mekong Subregion Power Market Development (2019); Energy Sector Management Assistance Program, "Development of a Regional Power Market in the Greater Mekong Sub-Region (GMS)," ESMAP Technical Paper 015 (2001); World Bank, "Power Trade Strategy for the Greater Mekong Sub-Region," World Bank Report 1 9067-EAP (1999).

4.4. Future priorities

While progress on the APG has been encouraging, the initiative remains a work in progress and continues to require IFI support. Building the APG involves not only expanding generation capacity and building transmission facilities but also creating soft infrastructure such as electricity trading mechanisms. ADB estimates that achieving economic growth and climate goals will require ASEAN members to invest about $300 billion in national power grid development, including $16 billion in investment for 18 interconnection projects to enable energy exchange among ASEAN members by 2040.[59,60,61] The ASEAN Plan of Action for Energy Cooperation 2016–2025, Phase II: 2021–2025 identifies soft infrastructure priorities for the APG. These include developing institutional and regulatory capacity (such as intergovernmental mechanisms, dispute resolution mechanisms, and trade models for a regional electricity market); harmonizing technical standards across power sectors; and integrating renewable energy and other digital technologies. These areas present significant opportunities for IFI support.

A survey of IFI energy leads confirms their intention to support the APG. They view the 18 interconnections, along with emerging subsea cable interconnections to Malaysia and Singapore, as a strong starting point for integrated grid operations in Southeast Asia. ADB is developing an APG financing facility as a comprehensive, end-to-end program to support the initiative's development and implementation. The facility aims to close critical gaps in project preparation, investment, and financing to accelerate the creation of a fully integrated, resilient, and sustainable regional power grid.[62] It will support all stages of the APG project life cycle — funding feasibility studies, preparing projects, and financing investments — and promote a coordinated approach to realizing the benefits of the APG holistically and progressively. A robust framework will assess the readiness of interconnections and prioritize projects, including links among Cambodia, Lao PDR, and Thailand, as well as potential subsea cable interconnections across ASEAN. To enhance private sector participation, the facility will include de-risking mechanisms to improve the bankability of private sector–led projects. It will support taxonomy reviews and provide inputs to reflect the role of grid infrastructure in the green energy transition, based on current taxonomies and emerging principles.

The World Bank and ADB are jointly developing the concept of the APG financing framework. The APG framework is envisioned as an umbrella framework under which various initiatives and solutions can provide end-to-end support for APG projects. It will cover three phases: project feasibility, advanced preparation, and investment, each with different corresponding technical assistance and financing support. The APG framework will serve as a platform for coordination and consultation with ASEAN, its members, and multilateral development banks (MDBs), ensuring that demand for technical and financial support is effectively met. The framework aims to mobilize private capital to help meet the significant investment needs already identified. The framework will incorporate Partners for ASEAN Connectivity in Energy, a coordinating body of donors and development institutions to facilitate consultation, coordination, and resource mobilization from various sources.

[59] The 18 interconnections (9 existing and 9 new) will expand the APG's transmission capacity from the current 7.7 GW (mainly bilateral in the GMS) to 17.6 GW by 2040.
[60] Asia Clean Energy Forum, "ASEAN Power Grid (APG): Powering ASEAN's Green Future," June 6, 2024.
[61] The International Energy Agency (IEA) estimates that the ASEAN region's total cumulative investment in the power sector from 2025 to 2030 needs to reach $350 billion under the IEA stated policies scenario and $490 billion under the sustainable development scenario. Randi Kristiansen and Lucila Arboleya Sarazola, "Southeast Asia Can Reach Clean Energy Targets by Investing in Transmission – Analysis," IEA, February 5, 2021.
[62] ADB, Technical Assistance for Advancing Energy Transition and Regional Power Trade in the Greater Mekong Subregion and Southeast Asia (2024).

The 42nd ASEAN Ministers on Energy Meeting, held in Vientiane, Lao PDR on September 26, 2024, underscored the substantial investment needed to bring regional interconnection projects to fruition, particularly the APG. The meeting noted the initiatives of ADB and the World Bank in supporting national and regional energy transition programs and facilitating ASEAN's energy integration. It further emphasized the importance of close coordination between MDB partners and ASEAN members in establishing the proposed financing facility.[63]

ADB is introducing a computable general equilibrium modeling study to measure the economic benefits of power trading. The study will measure short-, medium-, and long-term gains in terms of GDP growth, expansion of manufacturing and services, job creation, foreign direct investment, trade and value chain participation, and energy security for power-exporting and power-importing countries.

[63] ASEAN, "Joint Ministerial Statement of the 42nd Asean Ministers on Energy Meeting (AMEM)" (2024).

5 Cross-Border Connectivity Infrastructure: Information and Communication Technology (ICT)

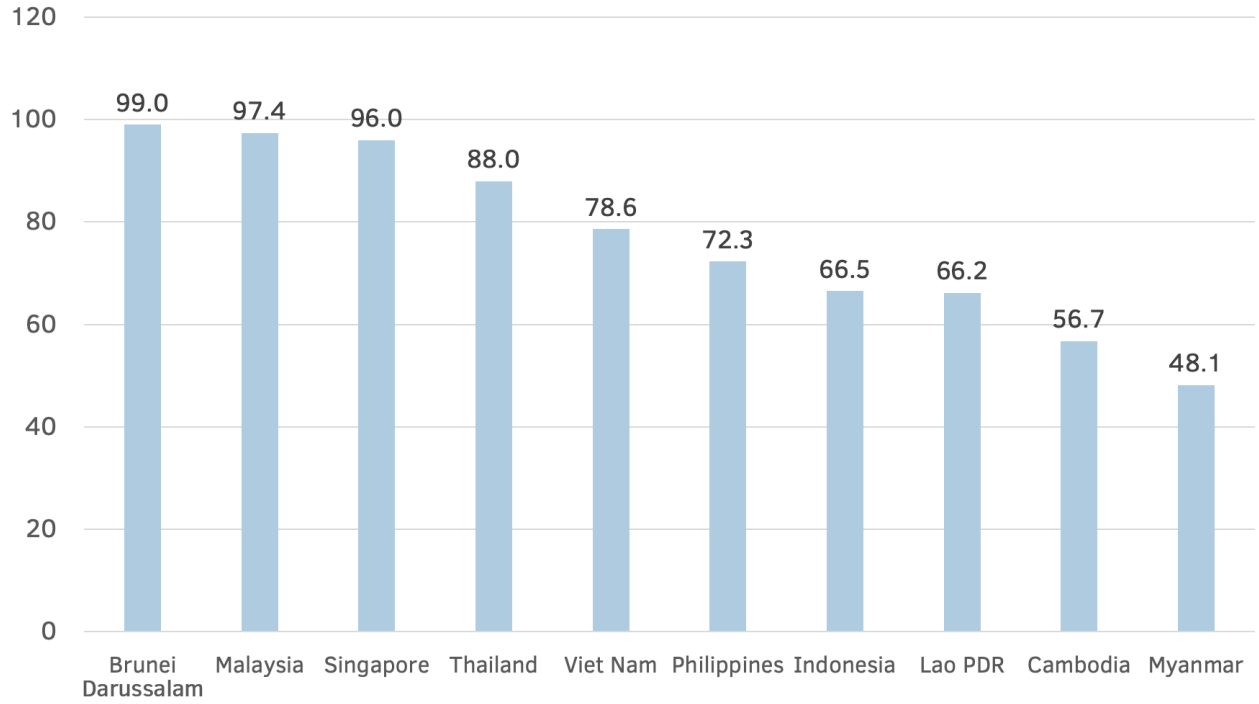
5. Cross-Border Connectivity Infrastructure: Information and Communication Technology (ICT)

5.1. Cross-border digital connectivity challenges and opportunities

Southeast Asian countries have made significant progress in developing ICT and providing their people with reliable access to ICT services. However, a significant digital divide persists across the region. In 2022, internet penetration exceeded 95% in countries such as Brunei Darussalam, Malaysia, and Singapore — driven by high levels of ICT investment[64] — but remained at less than 60% in Cambodia and less than 50% in Myanmar (Figure 9). While internet penetration rates do not vary excessively, many other indicators of ICT development differ widely across countries, such as the fixed broadband subscriptions per 100 people (Figure 10).

ICT services bring a multitude of benefits to the economy and society. They expand market reach, reduce trade and business costs, enhance competitiveness, support research and development and innovation, foster automation and artificial intelligence (AI) applications, and create jobs. A 10% increase in broadband coverage results in 1.4% GDP growth in developing countries.[65] ICT services — such as broadband internet and mobile applications — improve quality of life by broadening their access to knowledge, education, health care, finance, and public services; enhancing communications; and simplifying daily transactions. ICT supports community building, social inclusion, transparency, and better governance. Persistent digital divides, however, risk leaving lagging countries, regions, and population groups further behind.

Figure 9: Internet Penetration Rate in Southeast Asia, 2022 (%)

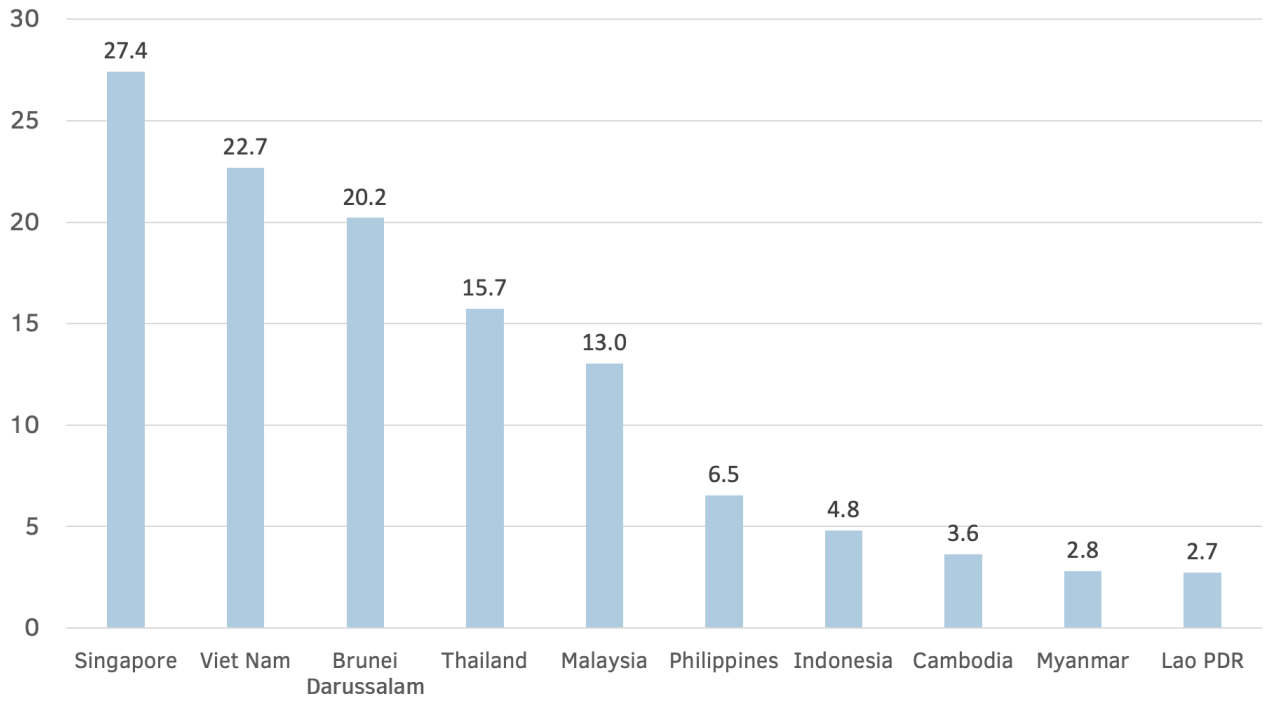


Lao PDR = Lao People's Democratic Republic.

Source: "Percentage of Individuals Using the Internet," UNdata, accessed April 21, 2025.

[64] From 2021 to 2023, Malaysia approved ICT projects worth RM89.7 billion (about $21.4 billion). Malaysian Investment Development Authority, "ICT Services" (2025).
[65] International Telecommunication Union and United Nations Educational, Scientific and Cultural Organization, *The State of Broadband 2019 Broadband as a Foundation for Sustainable Development* (2019).

Figure 10: Fixed Broadband Subscriptions per 100 People in Southeast Asia, 2023



Lao PDR = Lao People's Democratic Republic.
Note: Refers to fixed subscriptions to high-speed access to the public internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s divided by population and multiplied by 100.

Source: "Fixed Broadband Subscriptions," ITU DataHub, accessed April 21, 2025.

ICT cooperation and integration are integral to ASEAN Connectivity and the ASEAN Community. Since adopting the ASEAN Vision 2020 in 1997, Southeast Asian countries have made significant efforts to promote digital cooperation and integration, advancing the digital economy alongside the development of the ASEAN Community and working to narrow the digital divide. Successive ASEAN ICT master plans have outlined strategic thrusts and actions across a broad range of areas. These include ICT development policy, infrastructure development (such as intra-ASEAN submarine cables), and regulatory and product standard harmonization. Other focus areas include digital trade, cross-border e-commerce and digital payments, foreign direct investment in the digital and ICT sectors, human capital development, cybersecurity, AI governance and ethics, intellectual property rights protection, and the sharing of best practices. These efforts aim to foster a cohesive and progressive ASEAN Community, leveraging ICT as a catalyst for regional development and integration.

ASEAN countries have been working together to develop regional framework agreements for the ICT sector to serve as common principles and approaches. The agreements aim to promote legal and regulatory compatibility across ASEAN members, facilitating economic and social integration in the region and fostering an environment conducive to the growth of the digital economy and society. Among the framework agreements are the ASEAN Framework on Personal Data Protection, adopted in 2016; the ASEAN International Mobile Roaming Framework and ASEAN Digital Data Governance Framework, both adopted in 2018; and the ASEAN Digital Economy Framework Agreement, which is under negotiation and aims to accelerate ASEAN's transformation into a leading digital economy.

Southeast Asian countries face significant challenges in narrowing the digital divide:

- **Infrastructure gaps.** Many rural and remote areas lack the facilities needed for reliable internet connectivity. Building this infrastructure requires substantial investment and logistical planning
- **Affordability.** The cost of ICT services remains prohibitive for many households, especially in lower-income countries. Ensuring affordable access is crucial for widespread adoption.
- **Regulatory and policy barriers.** Complex regulatory environments and inconsistent policies across countries hinder the expansion of ICT services. Streamlining regulations and fostering a supportive policy environment are essential.
- **Digital literacy and relevant content.** Limited digital literacy and a lack of locally relevant content restrict effective use of the internet and ICT services. Education and training programs are needed to bridge this gap.
- **Coordination needs.** Overcoming these challenges calls for a coordinated effort by governments, the private sector, and development partners.

IFIs are scaling up support for ICT sector development and enhanced cross-border connectivity in Southeast Asia. Tables 9–11 present the number and value of IFI-supported ICT cross-border connectivity projects approved in 2010–2024 by subsector, IFI, and country.

Table 9: Number of IFI-Financed Information and Communication Technology Projects in Southeast Asia, Approved in 2010–2024

	ADB	AIIB	EIB	IFAD	IFC	ISDB	World Bank	Total
Data center	1	2	–	–	–	–	–	3
Fiber-optic cable	–	–	–	–	–	–	1	1
Satellite	1	1	–	–	–	–	–	2
Telecom	5	–	–	–	4	–	1	10
Total	7	3	–	–	4	–	2	16

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Table 10: IFI Funding for Information and Communication Technology Projects in Southeast Asia, Approved in 2010–2024
($ million)

	ADB	AIIB	EIB	IFAD	IFC	ISDB	World Bank	Total
Data center	500.0	150.0	–	–	–	–	–	650.0
Fiber-optic cable	–	–	–	–	–	–	287.2	287.2
Satellite	25.0	150.0	–	–	–	–	–	175.0
Telecom	382.4	–	–	–	280.8	–	21.9	685.1
Total	**907.4**	**300.0**	**–**	**–**	**280.8**	**–**	**309.1**	**1,797.4**

ADB = Asian Development Bank, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, IFAD = International Fund for Agriculture Development, IFC = International Finance Cooperation, IsDB = Islamic Development Bank.

Source: Authors' estimates from data on IFI websites.

Table 11: IFI Funding for Information and Communication Technology Projects in Southeast Asia by Country, Approved in 2010–2024
($ million)

	Data center	Fiber-optic cable	Satellite	Telecom	Total
Brunei Darussalam					
Cambodia	–	–	–	–	–
Indonesia	–	–	150.0	50.0	200.0
Lao PDR	–	–	–	–	–
Malaysia	–	–	–	–	–
Myanmar	500.0	–	–	524.4	1,024.4
Philippines	–	287.2	–	110.7	398. 0
Singapore	–	–	–	–	–
Thailand	–	–	–	–	–
Viet Nam	–	–	–	–	–
Regional	150.0	–	25.0	–	175.0
Total	**650.0**	**287.2**	**175.0**	**685.1**	**1,797.4**

Lao PDR = Lao People's Democratic Republic.

Source: Authors' estimates from data on IFI websites.

5.2. IFI hard infrastructure interventions

From 2010 to June 2024, IFIs approved a wide range of projects to support ICT hard infrastructure development in Southeast Asia, including satellites, data centers, telecom tower and mobile networks, and fiber-optic cables. Given the sector's dominance by private actors and its generally high profitability, IFI projects have focused on national ICT infrastructure with public or semipublic goods characteristics, expanding access to remote areas and underserved populations and catalyzing private sector investment.

5.2.1. Satellites

Satellites play a crucial role in expanding connectivity, especially in remote and underserved areas. They enable internet access, support real-time communications — including during crises — and facilitate a wide range of applications such as broadcasting, navigation, and emergency response.

ADB's Asia-Pacific Remote Broadband Internet Satellite Project entails the construction, launch, and operation of a shared, geostationary earth orbit, high-throughput satellite (Kacific-1).[66] Approved in 2019, the project aims to provide low-cost, high-speed, accessible broadband internet services across Asia and the Pacific, especially benefiting the population in remote areas. To fund the $222.8 million project, ADB approved (i) a $25 million nonrecourse project finance loan from its private sector ordinary capital resources (OCR); and (ii) the administration of a $25 million loan by the Leading Asia's Private Sector Infrastructure Fund (LEAP), in partnership with JICA, to Kacific Broadband Satellites International Limited.[67] The satellite was launched by SpaceX in December 2019, completed in-orbit testing in January 2020, and began commercial operations in March 2020. ADB's annual review report rated the project's contribution to private sector development and ADB's strategic development goals satisfactory. Most of the design and monitoring framework's outcome and output indicators were achieved, including job creation, increased data transmission capacity, and expanded wholesale contracts targeting unserved and underserved areas.[68]

The AIIB-financed Multifunctional Satellite PPP Project for Indonesia provided sovereign project financing to a special purpose vehicle company — PT Satellite Nusantara Tiga. The project sponsor was responsible for the construction, launch, and operation of a 150-gigabit-per-second, high-throughput satellite with Ka-band frequency. Approved in 2020, the $150 million project aimed to support the government's goal to provide connectivity to more than 149,000 public service points — including schools, local villages, health centers, and local government offices — across the country. The estimated number of individual beneficiaries is 45 million, of whom 23 million are female.

5.2.2. Data centers

Data centers are key components of modern digital infrastructure. They store, manage, and distribute vast volumes of data for businesses, governments, and individuals and support cloud computing, e-commerce, social media, scientific research, and financial transactions.

The AIIB-financed Data Center Development in Emerging Asia Project involved investment in the development of data centers primarily serving emerging Asia, through Keppel Data Centre Fund II, LP, a closed-end private equity vehicle managed by Alpha Investment Partners Ltd. Approved in October 2021, AIIB's total funding commitment included $100 million in nonsovereign investment

[66] The satellite will cover Bangladesh, Bhutan, Indonesia, Malaysia, Myanmar, Nepal, New Zealand, the Pacific islands, Papua New Guinea, and the Philippines.
[67] A Singapore-based company established in 2013 by experienced industry experts to develop a wholesale broadband internet satellite solution to deliver affordable broadband internet to underserved, remote areas of Asia and the Pacific.
[68] ADB, *Extended Annual Review Report: Kacific-1 Limited and Kacific Broadband Satellites International Limited Asia–Pacific Remote Broadband Internet Satellite Project (Regional)* (2023).

through a parallel fund structure and $50 million through co-investments. The project aims to promote greener digital infrastructure — such as floating data centers (Box 4) — and help bridge the digital divide in emerging Asia. It will leverage Alpha's expertise in data center operations, sustainable technology, and energy efficiency to develop better and greener data centers. It supports Alpha in creating climate finance monitoring indicators, applying the joint MDB methodology for tracking climate finance, and establishing an environmental and social management system for the fund's operations.

The AIIB-supported DigitalBridge Emerging Market Digital Infrastructure Fund Project aimed to increase sustainable digital infrastructure capacity and improve the quality of mobile and internet connectivity in AIIB members in emerging Asia. It involved investing in DigitalBridge Group, a leading global digital infrastructure investor. The group sponsors parallel vehicles for platform investments alongside its flagship series funds in existing and future portfolio companies.

Box 4: Environmental Benefits of Floating Data Centers

Floating data centers are typically housed on barges or ships and offer several green advantages over traditional land-based data centers:

1. **Energy efficiency and renewable integration**
   - **Seawater cooling.** Floating data centers can use seawater or lake water for cooling rather than traditional power-hungry heating, ventilation, and air conditioning systems, significantly reducing energy consumption.
   - **Wave, tidal, or offshore wind power.** These facilities can be positioned near renewable energy sources such as offshore wind farms or tidal energy generators, reducing reliance on fossil fuels.

2. **Reduced land footprint and urban strain**
   - **No land use or deforestation.** Unlike land-based data centers, floating ones do not require real estate development, preserving forests and agricultural land.
   - **Coastal and urban relocation flexibility.** They can be placed near coastal cities where space is scarce, reducing the need for long-haul data transmission and improving latency.

3. **Waste heat utilization**
   - **Aquaculture or desalination support.** Waste heat from servers can be repurposed for aquaculture (e.g., fish farming) or even desalination, turning excess heat into useful resources.

4. **Disaster resilience and sustainability**
   - **Rising sea-level adaptation.** As climate change raises sea levels, floating data centers remain operational while land-based ones face flooding risks.
   - **Disaster recovery and edge computing.** They can be deployed quickly to disaster-struck areas to provide emergency computing power with minimal infrastructure buildup.

5. **Modular and circular economy design**
   - **Easier recycling and relocation.** Many floating data centers are designed to be modular, allowing for repurposing or relocation rather than requiring costly demolition.
   - **Decommissioning with lower environmental impact.** Since they can be moved and retrofitted, they avoid becoming stranded assets that contribute to e-waste.

Source: AIIB staff.

The platform investment strategy enhances cash flows of digital infrastructure companies through economies of scale and reduces risks by aggregating digital infrastructure assets. A parallel fund for AIIB was formed in 2022 with a 10-year term, including a four-year investment period. The fund provides growth capital to eligible digital infrastructure platform businesses in AIIB members in emerging Asia across five verticals: data centers, cell towers, fiber-optic cable networks, small cells, and edge infrastructure. Through the fund, AIIB has invested in two data center platform companies — AIMS and Vantage APAC — to meet exploding data demand in Southeast Asia.

5.2.3. Telecom towers and mobile networks

Telecom towers and mobile networks are essential for wireless communication. They provide the infrastructure necessary to ensure signal coverage and reliable connectivity and are critical for expanding network coverage, especially in rural and remote areas.

IFC provided corporate financing to Irrawaddy Green Towers, PT Professional Telekomunikasi Indonesia, Ooredoo Myanmar Limited, and CREI Phils to expand their telecom services. The financing of $52.5 million (loan and equity) to Irrawaddy Green Towers, an independent telecom tower company headquartered in Yangon, Myanmar, supported the expansion of towers for multi-tenant usage, allowing the company to lease tower space to multiple mobile operators. The loan of $50 million to PT Professional Telekomunikasi Indonesia was used to expand its nationwide network of telecom towers, which were leased to Indonesian mobile phone operators under long-term agreements. The $150 million loan to Ooredoo Myanmar Limited supported the roll-out of telecom services in Myanmar. A $28.3 million loan to CREI Phils, an independent tower company in the Philippines, funded the construction of towers to be leased to local mobile network operators. In addition to providing long-term financing, the World Bank Group aims to provide policy support, share knowledge and good practices, and promote strong environmental and social standards in these companies and the telecom sector in their countries.

5.2.4. Fiber-optic cables

Fiber-optic cables are the backbone of high-speed internet and communication networks. They transmit data as light signals, offering significantly higher bandwidth, longer transmission distances, and stronger data security than traditional copper cables. Fiber optics support emerging technologies such as 5G and the Internet of Things, enabling reliable and scalable network performance.

The newly approved Philippines Digital Infrastructure Project,[69] financed by a $287.24 million loan from the International Bank for Reconstruction and Development, the World Bank's lending arm for middle-income and creditworthy low-income countries, comprises five components: backbone network, middle-mile network, access network (last mile), network security, and project management support. The first three components will invest in the government fiber-optic backbone and middle mile at the national level and in last-mile connectivity in Mindanao. The network security component will strengthen digital resilience by ensuring the secure and efficient functioning of fiber-optic cables and increasing public confidence in digital adoption by the government, businesses, and citizens. The project management component will build the project management, technical, and coordination capacity of the Department of Information and Communications Technology.

The project aligns with the government's National Broadband Plan. The plan seeks to (i) accelerate broadband access in remote and disadvantaged areas, (ii) augment the country's digital infrastructure to reduce the digital divide and catalyze private sector investments, and (iii) build capacity for cybersecurity and the protection of critical information infrastructure.

[69] "Development Projects: Philippines Digital Infrastructure Project - P176317," World Bank, accessed March 19, 2025. The project was approved in October 2024.

World Bank–financed projects have supported a broad array of government interventions in the broadband sector globally. In the Philippines, the World Bank maintains an extensive program promoting digital government transformation, the growth of the digital economy, financial inclusion through digital finance, and the rollout of digital ID. It supports pro-competition telecom regulatory reforms, including on market entry, foreign ownership rules, licensing and permits, infrastructure sharing, and open access to digital infrastructure markets. The Digital Infrastructure Project complements these efforts by expanding broadband access in unserved areas, building trust in digital transactions, and bolstering the foundations for digital service delivery.

5.2.5. Integration of ICT with transport and energy sectors

One area where IFIs are promoting the integration of ICT with the transport and energy sectors is in infrastructure sharing. This involves encouraging the systematic use of surplus capacity in fiber-optic cable installed along long-distance electric lines, roads, and railways. In many regions, regulatory gaps and the absence of appropriate business models have created weak incentives for public utilities to monetize their unused fiber-optic capacity for the benefit of the telecom sector. To resolve this, the World Bank is actively supporting infrastructure-sharing initiatives in the Philippines, as well as in Cambodia and Lao PDR.

Another area of integration involves the energy needs of data centers. AIIB is investing in energy-efficient data centers that rely on renewable energy. The World Bank, meanwhile, seeks to ensure that national energy planning accounts for the growing demands of data centers, which are already affecting energy markets and will continue to expand, driven by AI.

5.3. IFI soft infrastructure interventions to enhance connectivity

As the ICT sector is primarily led by the private sector, IFIs play a key role in building soft infrastructure. This includes fostering an enabling environment for private ICT investment, designing national ICT development plans and strategies, identifying and structuring bankable projects, and providing technical assistance and advisory services.

ADB-funded regional technical assistance, approved in 2022 and still under implementation, supports soft interventions to improve digital connectivity. Expanding Connectivity and Affordability to Address the Digital Divide provides strategic assistance to select developing Asian economies — including several in Southeast Asia — to do the following:[70]

- Identify and adopt innovative, cost-effective, and sustainable digital connectivity solutions and business models
- Strengthen investment strategies related to digital connectivity infrastructure
- Enhance policy frameworks to expand broadband coverage, quality, and affordability

The technical assistance focuses on satellite broadband, particularly low Earth orbit communication, to leverage the recent technological and market breakthroughs that could improve broadband affordability, coverage, and quality in areas lacking fiber-optic or robust mobile networks. It will develop and expand a pipeline of digital infrastructure investment opportunities, starting with subregional initiatives such as the Central Asia Regional Economic Cooperation Digital Strategy 2030 and the GMS Strategic Framework 2030.

The IFC-financed Philippine National Broadband Program, approved in 2021 and still underway, sought to ease bottlenecks in broadband investment. The program included a diagnostic and scoping study to advise the Philippines' Department of Information and Communications Technology on the following:

[70] ADB, *Technical Assistance to Expanding Connectivity and Affordability to Address the Digital Divide* (2022).

- Assessing five investment projects under the current National Broadband Program
- Recommending optimal procurement and prioritization strategies for each project
- Accelerating implementation, improving cost-efficiency, and meeting government development targets for the sector[71]

Approved in 2014, the World Bank–financed Myanmar: Telecommunications Sector Reform supported rapid expansion of telecom access. It aimed to improve the sector's enabling environment, extend coverage to remote pilot locations, and establish priority e-government foundations for public sector reform. The World Bank's independent evaluation indicates that the project achieved significant results:

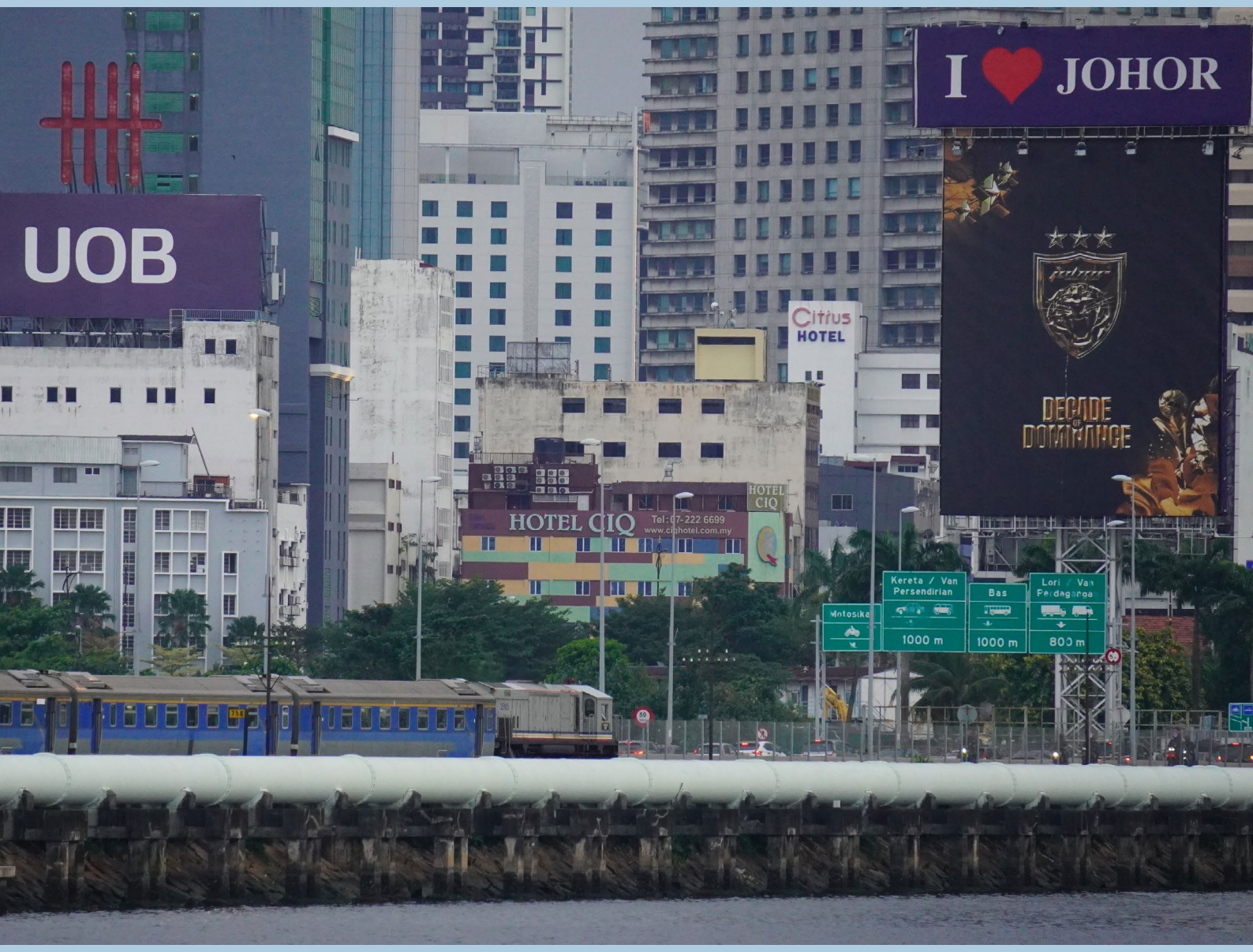
- Licensed telecom operators increased from 1 to 191 (far exceeding the target of 10)
- Spectrum management and monitoring systems were implemented
- The Universal Service Strategy was adopted
- Network coverage expanded by 96% across more than 300 townships
- Radio planning tools, digitized maps, and drive-test equipment ensured operator compliance
- The project supported the government with public procurement for rural pilots and helped Myanmar transition to faster and more reliable networks
- 4G mobile subscribers increased from 10% in 2016 to 61% in 2022

5.4. Future priorities

IFIs are scaling up support for digital connectivity infrastructure in response to client countries' needs. A survey of IFI ICT sector leads and reviews of strategies and operational plans confirm IFIs' commitment to narrowing the digital divide through investments in both hard and soft infrastructure, along with promoting digital technology applications for development challenges. IFIs will provide an extensive range of services and solutions encompassing ICT infrastructure development, policy and regulatory frameworks, and capacity and skills building. These efforts aim to help countries harness digital technologies while mobilizing financing, developing partnerships, managing risks, strengthening understanding of financing mechanisms for digital infrastructure, and fostering the adoption of new technologies. IFIs will continue to support policies that promote market competition and nurture the business environment for private investment. Their investments will target the entire digital ecosystem, including shared infrastructure models (open-access networks, carrier-neutral broadband, independent towers, and data centers) and mobile network operators. Given substantial funding available in most countries' digital infrastructure sectors, IFIs must demonstrate clear value-added beyond financing.

[71] "Disclosure - Philippine National Broadband Program," IFC, accessed March 19, 2025.

6 Project Development and Financing Approaches



6. Project Development and Financing Approaches

6.1. IFI project support

In developing cross-border connectivity infrastructure, IFIs often serve as both project developers and financiers. They help client countries design investment programs and project pipelines to tackle development challenges and constraints. They then source funding from international capital markets (benefiting from strong, often triple-A, credit ratings), past loan repayments, donor contributions (mostly from high-income countries), and profits from lending and investment operations. This funding is deployed through various modalities and instruments to finance development projects.

6.2. Project development approaches

A key aspect of IFIs' investment approaches in cross-border connectivity infrastructure in Southeast Asia is support for developing multiyear investment programs and project pipelines for ASEAN and the three subregional cooperation initiatives. ADB has played a particularly prominent role. Since the launch of the GMS Program, for example, ADB has helped design and update the GMS RIFs, which outline priority projects and investment needs across various sectors such as transport, energy, ICT, environment, trade facilitation, agriculture, health, human resource development, urban development, and tourism. The GMS RIF 2022, the program's medium-term pipeline, includes 143 investment projects totaling $65.7 billion and 84 technical assistance projects requiring $295 million. Among the investment projects are 85 in transport ($55.8 billion), 11 in energy ($2.2 billion), 3 in ICT ($28 million), 3 in transport and trade facilitation ($91.3 million), and 6 in border zone development ($2.1 billion). Of the total investment in transport, 62% ($35 billion) is allocated to railways; 36% ($20 billion) to roads and bridges; 1% ($741 million) to ports and waterways; and about 1% ($741 million) to border crossings, logistics, and other facilities.[72]

ADB has also supported BIMP-EAGA and IMT-GT in developing project pipelines. Since 2003, ADB has served as BIMP-EAGA's regional development advisor, helping build a pipeline of 69 priority infrastructure projects valued at more than $22 billion as of 2019.[73] ADB supported the preparation of the IMT-GT Implementation Blueprint 2017–2021, the first five-year implementation blueprint to achieve IMT-GT's 2036 vision. The blueprint identified 41 priority projects requiring total financing of $46.9 billion, including 17 for roads, railways, and bridges; 2 for inland transport (such as container depots and distribution centers); 4 for airports; 6 for seaports; 5 for customs, immigration, and quarantine facilities; and 7 projects in other sectors.[74]

AIIB is supporting the development of the Initial Rolling Priority Pipeline of ASEAN Infrastructure Projects through a joint three-year program with the ASEAN Secretariat, backed by MCDF. The program aims to strengthen ASEAN members' capacity to prepare bankable cross-border connectivity infrastructure projects. AIIB's support includes technical advisory and training, broad-based and project-specific capacity building, early-stage project preparation, and pipeline updates.[75] The program aligns with the update of the Initial Rolling Priority Pipeline under the Master Plan on ASEAN Connectivity 2025, which includes 19 projects across transport, energy, and ICT, with a total investment value exceeding $15 billion.[76]

[72] ADB, *Greater Mekong Subregion Economic Cooperation Program: Overview of the Regional Investment Framework 2022* (2018).
[73] ADB, "BIMP-EAGA: Turning Remote, Isolated Areas into Economic Engines" (June 24, 2019).
[74] ADB, *IMT-GT Implementation Blueprint 2017–2021* (2017).
[75] "Multicountry: Joint Three-Year Program Supporting Infrastructure Connectivity in the ASEAN Region," AIIB, accessed March 19, 2025.
[76] ASEAN, "Regional Efforts Related to ASEAN Connectivity" (2019).

At the country level, IFIs prepare country partnership strategies (CPSs) or frameworks to guide their operations, including identifying project and program pipelines. The World Bank prepares a country partnership framework (CPF) and ADB develops a CPS to define strategic priorities and objectives for engagement over a typical period of four to six years. These documents align with national development goals and focus on areas where the institutions can provide the most effective assistance. They are based on IFI-led analytical work — such as country diagnostics and economic and sector studies — and extensive consultations with client countries, development partners, civil society, and other stakeholders. Each CPF or CPS includes a pipeline of investment projects and policy interventions for the upcoming four to six years. For example, the World Bank's Lao PDR CPF FY2023–FY2026 outlines nine objectives and a lending pipeline of nine projects totaling $231.5 million (IDA), including one for power distribution improvement.[77] ADB's Philippines CPS 2024–2029 identifies four strategic objectives and a sovereign lending program projected to total $24 billion.[78]

IFIs have helped client countries develop and design individual investment projects through project preparatory facilities. Infrastructure projects are typically complex, requiring long-term public and private resources; sophisticated engineering; and careful consideration of economic, environmental, and social impacts. Many client countries face challenges in identifying and structuring bankable projects partly because of capacity and resource constraints. Inadequate preparation has led to delays and cost overruns in many cases. Well-prepared projects are more likely to deliver intended development outcomes and more easily attract additional funding, including private sector investment, which is crucial for large-scale infrastructure projects (Box 5 and Box 6).

Box 5: International Financial Institutions' Dedicated Project Preparatory Facilities

The Asian Development Bank's $78 million Asia Pacific Project Preparation Facility (AP3F) is a multi-donor trust fund that helps developing member country governments and public sector agencies prepare and structure infrastructure projects with private sector participation, including privatization through public–private partnership modalities. AP3F provides grants for technical, financial, and legal advisory services during project preparation and structuring. It supports (i) capacity building, including reforms to policy, legislative, regulatory, and institutional frameworks; and (ii) ongoing project performance, such as monitoring and restructuring. Launched in January 2016, AP3F targets energy, transport, urban development, and social infrastructure.

The $128 million Project Preparation Special Fund of the Asian Infrastructure Investment Bank (AIIB) is a multi-donor facility that supports the preparation of high-quality, bankable projects for AIIB members, especially those with substantial development needs and capacity constraints. Established in June 2016, the fund provides grants for preparatory activities such as feasibility studies, environmental and social assessments, and detailed engineering designs. Grants are available to AIIB members eligible for IDA financing and those facing substantial development challenges. The fund supports projects in AIIB's investment pipeline, covering sovereign and nonsovereign operations.

[77] World Bank, "Lao PDR Partnership Framework FY23–26," PowerPoint presentation, March 2, 2023.
[78] ADB, *Country Partnership Strategy: Philippines, 2024–2029 — Building Strong Foundations for a Prosperous, Inclusive, and Climate-Resilient Future* (2024).

The European Investment Bank (EIB) has established several project preparation facilities (PPFs) to support the development of high-quality, bankable projects. The African, Caribbean, and Pacific Water PPF supports sustainable water and sanitation projects in African, Caribbean, and Pacific countries by providing technical assistance for feasibility studies, environmental and social assessments, and project designs. EIB's Public–Private Partnership (PPP) PPF supports PPP infrastructure projects in Southern and Eastern Mediterranean countries, offering funding for legal, technical, and financial advisory services to help public authorities prepare, procure, and implement projects. Its Financing Energy for Low-Carbon Investment-Cities Advisory Facility, a joint initiative of the German Agency for International Cooperation (GIZ) and EIB, supports low-carbon urban infrastructure projects that have significant development impact.

The World Bank's PPF is a funding mechanism designed to support the preparation and structuring of investment operations and development policy programs to improve implementation outcomes. Established in 2002, the PPF provides project and program preparation advances to prospective borrowers to finance preparatory activities, including preliminary and detailed designs, limited initial implementation, and the preparation of programs to be supported by development policy lending. The World Bank hosts the Global Infrastructure Facility, a platform funded by various development partners that supports PPP project preparation with the goal of mobilizing private sector and institutional investor capital.

Sources: "Asia Pacific Project Preparation Facility," ADB, accessed March 19, 2025; "Project Preparation Special Fund (PPSF)," AIIB, accessed March 19, 2025; "EIB Water Project Preparation Facility," EIB, accessed March 19, 2025; "FELICITY: Sustainable solutions for cities," EIB, accessed March 19, 2025; "European PPP Expertise Centre (EPEC)," EIB, accessed March 19, 2025; "Project Preparation Facility: Increase in Commitment Authority and Enhanced Scope," World Bank, accessed March 19, 2025; and "Global Infrastructure Facility," World Bank, accessed March 19, 2025.

Box 6: Multilateral Cooperation Center for Development Finance's Finance Facility for Project Preparation and Capacity Building on Connectivity Infrastructure

The $181 million Finance Facility of the Multilateral Cooperation Center for Development Finance (MCDF) is a multi-donor platform that promotes high-quality connectivity infrastructure in developing countries that follow IFI standards. Established in 2020, the facility provides grants for project preparation activities for sovereign and nonsovereign projects, including feasibility studies, environmental and social assessments, and climate assessments. It funds capacity building to help resolve soft infrastructure constraints. Although hosted at the AIIB, the facility is open to any accredited IFI and supports the African Development Bank, Africa Finance Corporation, AIIB, the Latin American and Caribbean Development Bank, the International Fund for Agricultural Development, and the Islamic Development Bank. Low- and middle-income members of these institutions with active programs are eligible for support.

The MCDF Finance Facility has several unique features:

- **Cross-border connectivity focus.** It is the only project preparation facility globally dedicated exclusively to cross-border connectivity infrastructure, covering transport, energy, information and communication technology, and water.
- **Pre-concept note support.** Like the IFI project preparation facilities (Box 5), the facility supports the detailed preparation of projects with approved concept notes. It also offers a window for IFIs to access support for developing concept notes in the first place.
- **Promotion of cofinancing.** While IFIs may use the facility for stand-alone projects, it also supports the preparation of cofinanced projects involving IFIs and developing-country financiers, helping the latter become familiar with IFI standards and systems.

The facility has supported AIIB and partner governments in developing six connectivity projects in Southeast Asia:

- **Batam-Bitan Bridge Project (Indonesia).** Supports project preparation activities related to environmental and social safeguards and helps improve the performance of AIIB's underlying investment
- **Trans-Sumatra Toll Road Project (Indonesia).** Supports project preparation for AIIB's proposed investment in the Trans-Sumatra Toll Road from Cinto Kenang to Sentjalan, with a focus on environmental and social safeguards, road safety, and secondary impacts related to environmental and social sustainability and land use
- **Road Development Program (Lao People's Democratic Republic).** Supports project preparation for the National Road 13 South Extension Project and promotes partnership with the Abu Dhabi Fund for Development as a cofinancier
- **Development Support for Sihanoukville Special Economic Zone (SEZ) (Cambodia).** Facilitates the development and implementation of a comprehensive master plan for the multipurpose SEZ in Sihanoukville and strengthens the institutional capacity of the Ministry of Economy and Finance to undertake multisector infrastructure development aligned with IFI standards
- **Early-stage concept development projects under the AIIB–ASEAN Connectivity Facility:**
  - **Project to Optimize Regional Transport (Indonesia).** Supports a diagnostic study of the maritime sector to identify potential investment projects aimed at improving port infrastructure and maritime equipment supply chains, thereby strengthening Indonesia–ASEAN regional maritime connectivity
  - **Project to Improve Transport Connectivity (Cambodia).** Lays the groundwork for investment proposals to sustainably upgrade direct road links among four northeastern provinces — Kratie, Mondul Kiri, Ratanak Kiri, and Steung Treng and improve connections with the rest of the country and neighboring ASEAN countries

Source: MCDF staff.

The funding from project preparatory facilities and other grant sources has supported feasibility studies for many cross-border connectivity infrastructure projects in Southeast Asia. The studies often involve the following:

- **Engineering studies.** Geological, topographical, and hydrological surveys; preliminary pavement design; detailed cost estimates; and implementation plans
- **Economic studies.** Traffic surveys (for transport projects) and assessments of economic feasibility

- **Financial analysis.** Financial management assessments and project financial analyses
- **Social and environmental studies.** Environmental assessments, poverty and social assessments, gender analysis and gender action plans, resettlement plans, stakeholder communication strategies, consultation plans, and community engagement plans
- **Project documentation.** Preparation of all documents required for management approval of ensuing projects

For instance, an ADB-funded regional transaction technical assistance, approved in 2018 and still under implementation, has supported project preparation and capacity building for a series of transport projects in several Southeast Asian countries: (i) the Road Network Improvement Project, Phase 2 (Cambodia); (ii) the Bataan–Cavite Bridge Project (Philippines); (iii) the Laguna Lakeside Road Project (Philippines); (iv) the Manila Mass Rapid Transit Line 4 (Philippines); (v) the Metro Manila Bridges Project (Philippines); and (vi) the National Railway Improvement Project (Thailand).[79] The technical assistance and all ensuing projects are included in the draft country operations business plans, 2019–2021 for Cambodia, the Philippines, and Thailand.

IFC has provided transaction advisory services to support client countries in Southeast Asia in promoting PPPs for cross-border transport infrastructure projects. These services often involve developing a sound business case or structuring a project to attract international financing, including designing risk mitigation strategies for key legal, regulatory, technical, and financial issues. Once a government approves the approach, IFC helps design the transaction structure and tender process to competitively select a qualified private sector investor to implement the project. In 2010–2024, IFC's PPP transaction advisory services included the Sihanoukville Logistics Hub Project and Cambodia Logistics (Cambodia); the Iloilo Airport PPP, Laguindingan Airport, Bohol Airport, Davao Sasa Port, Clark Airport, and Philippines Agribusiness Trade Logistics (Philippines); and the Vientiane Integrated Logistics Park (Lao PDR).

Most cross-border connectivity hard infrastructure projects reviewed in this report were designed as single-investment projects. Investment operations by IFIs may take the form of a single investment or an investment program. A single-investment project is a stand-alone investment intervention in one sector or across related sectors (such as integrated urban development). An investment program typically involves multiple investment projects in one or more sectors over time, or may comprise large stand-alone projects with substantial and related components or contract packages, as in the case of ADB's multitranche financing facility. Of the 63 IFI-financed cross-border connectivity hard infrastructure projects reviewed, only 4 were multitranche investments (or framework loans); the rest were single-investment projects. While IFIs have increasingly adopted multiphase programmatic approaches (Box 7), this trend does not appear to extend to cross-border connectivity infrastructure projects in Southeast Asia.

Box 7: IFI's Multiphase Programmatic Approach in Operations

International financial institutions (IFIs) have traditionally focused on stand-alone projects to meet development goals. While effective in certain contexts, this approach often failed to address comprehensive, long-term development needs. In response to growing recognition of structural challenges and cumulative demands, multilateral development banks (MDBs) have increasingly adopted programmatic approaches.

Compared with single or stand-alone project financing, MDB instruments offer several advantages:

- Provide flexibility by allowing financing in multiple tranches or phases, which can be adjusted based on project needs, progress, and changing circumstances

[79] ADB, *Technical Assistance for Southeast Asia Transport Project Preparatory Facility* (2018).

- Streamline the approval process, avoid the repetitive bureaucratic hurdles associated with stand-alone projects by bundling multiple projects or phases within a single facility, reducing administrative costs and improving efficiency
- Enable continuous support for long-term development programs, ensuring sustained funding and consistent attention
- Help manage risks by spreading investments across phases or components, allowing adjustments based on lessons learned from earlier implementation
- Support the mobilization of additional resources from governments, the private sector, and other IFIs, enhancing overall impact
- Lead to more effective implementation, resulting in stronger development impact and greater sustainability

MDB modalities offer an integrated and flexible way to finance development projects:

Asian Development Bank (ADB) multitranche financing facility (MFF), introduced in 2005. After three years of pilot implementation, ADB mainstreamed the MFF in 2008. An MFF establishes a long-term partnership between ADB and a client in one or more sectors under sovereign operations and enables ADB to provide a series of tranches (loans or guarantees) as sector investments become ready and the client requests financing. It offers multiple entry points for policy dialogue, as lessons from earlier tranches can be applied to later ones. In 2022, following an independent evaluation, ADB revised the MFF's governing policy to incorporate recommended changes.

World Bank, multiphase programmatic approach (MPA), introduced in 2017. The instrument allows clients to structure a long-term, large-scale, or complex engagement as a series of smaller, linked operations (or phases) under a single program. Under the MPA, the board approves the overall program framework and financing envelope, and authorizes management to commit financing for each phase. The MPA enables more efficient use of financial resources for both the World Bank and its clients.

Asian Infrastructure Investment Bank (AIIB). The bank has also introduced a multiphase program (MPP) approach to support large-scale, long-term development projects. This approach allows for flexibility, risk management, and continuous improvement through different project phases. Under an MPP, projects are divided into multiple phases, each with specific goals, milestones, and financing arrangements. The structure enables adjustments based on project progress, changing circumstances, and lessons learned from earlier phases. By distributing investments across phases, AIIB can manage risks more effectively and ensure sustainable project outcomes. Improvements and adjustments can be made in subsequent phases based on performance and feedback from earlier phases.

European Investment Bank (EIB), framework loan, introduced in 2005. EIB provides various framework loans to cities and regions, typically exceeding €100 million per investment program. The loans often have multiple components, including roads, public transport, water, solid waste, urban revitalization, social housing, culture, health, education, sports facilities, energy efficiency, public parks, and green space. Loans for the public sector are available to sovereign states, national agencies, departments, institutions, and ministries, as well as regional or local authorities, and public sector companies (such as utilities). Depending on the loan, projects may span multiple themes.

Source: ADB, "Enhancing the Asian Development Bank's Multitranche Financing Facility" (2022); and AIIB staff.

6.3. Financing and cofinancing approaches

IFIs use a variety of instruments to finance development projects, including loans, grants, equity investments, guarantees, or combinations thereof. IFI loans may be sovereign or nonsovereign. Sovereign loans are extended to client country governments with sovereign guarantees and can be either market based (such as the World Bank's International Bank for Reconstruction and Development and ADB's regular OCR) or concessional (such as the World Bank's IDA and ADB's concessional OCR). Market-based loans are typically provided to creditworthy middle-income countries, while concessional loans target low- and lower-middle-income countries with limited creditworthiness.

Nonsovereign loans, by contrast, are extended without sovereign guarantees to privately held, state-owned, or sub-sovereign entities and are generally priced at commercial terms. IFIs offer this type of financing to support projects and programs considered too risky without their involvement, with the aim of promoting private sector development. IFIs also promote cofinancing as part of their strategy to increase the impact and efficiency of development projects.

6.3.1. IFIs' own financing

Of the total cost of cross-border connectivity hard infrastructure projects approved by IFIs during 2010–2024, IFIs financed half, with the rest sourced from various cofinancing partners. The total project cost of hard infrastructure projects across the three sectors reached $19,482.1 million (Table 12). IFIs contributed $9,943.1 million (51%), while cofinancing sources provided $9,539.0 million (49%). Among IFIs' own financing sources, market-based sovereign loans accounted for the largest share at 28.1% of the total project cost, followed by concessional sovereign loans (12.6%), nonsovereign loans (8%), grants (1.5%), and equity investments (0.8%).

Significant differences emerged in the composition of IFIs' financing across the three sectors. Transport projects relied more heavily on sovereign financing, while energy and ICT projects drew more on nonsovereign financing. For transport projects, with a total cost of $7,870.7 million, IFIs' own financing covered 52.6%, comprising 34.3 percentage points from market-based sovereign loans, 16.3 from concessional sovereign loans, 1.3 from grants, and 0.7 from nonsovereign loans. The greater reliance on sovereign financing reflects the nature of most transport projects, which do not generate revenue and require government funding for capital and O&M. This is evident from the large share of government counterpart funding for transport projects, which stood at 19.2%.

IFI nonsovereign financing played a larger role in energy and ICT projects, reflecting their revenue-generating nature and minimal need for government funding support. For energy projects, with a total cost of $1,960.9 million, IFIs' own financing accounted for 21.7%: 14.5 percentage points from nonsovereign loans, 4.7 from grants, and 2.5 from market-based sovereign loans. For ICT projects, totaling $2,556.4 million, IFIs' own financing accounted for 64.4%: 45.5 percentage points from nonsovereign loans, 11.2 from market-based sovereign loans, 6.3 from equity investment, 0.9 from concessional loans, and 0.6 from grants. Government counterpart funding made up just 0.5% of total costs in energy projects and 0.1% in ICT projects.

6.3.2. Cofinancing

Cofinancing offers several benefits:

- Enables IFIs to pool resources; share risks; and mobilize additional funding from other IFIs, bilateral donors, and private sector investors
- Reduces the administrative burden on borrowing countries by streamlining processes, lowering transaction costs, and improving efficiency
- Allows IFIs to align operational strategies, avoid duplication, reduce aid fragmentation, leverage each partner's comparative advantages, and exchange knowledge, leading to more effective implementation
- Helps crowd in private sector investment, which is crucial for sustainable development and economic growth

IFIs are mandated to promote cofinancing and private capital mobilization as part of their strategies to increase the impact and efficiency of development projects. ADB's Strategy 2030 sets a cofinancing target ratio of $2.50 for every $1.00 of OCR deployed for private sector operations. The World Bank has signed cofinancing framework agreements with several key partners to generate efficiencies and maximize development impact.

In April 2024, a coalition of 10 MDBs launched the Global Collaborative Co-Financing Platform to channel additional capital for greater development scale and impact. The platform consists of the digital Co-Financing Portal and the Co-Financing Forum. The portal, hosted by the World Bank, provides a secure space for registered cofinanciers to share project pipelines, with the goal of improving efficiency, transparency, and coordination. The forum offers a venue for participants to discuss cofinancing opportunities, share best practices, address common challenges, and coordinate policies to reduce the burden on partner countries.

AIIB has signed cofinancing framework agreements with the World Bank, ADB, and the European Bank for Reconstruction and Development. It has also entered into MOUs on cooperation with various development partners.

The World Bank and ADB have recently set up a new cofinancing arrangement: the Full Mutual Reliance Framework. Building on a long history of collaboration, the framework will allow borrowers to apply a single set of operational policy requirements and engage with one lead lender responsible for all aspects of project preparation and implementation under the framework. The initiative aims to reduce project-processing complexity, shorten timelines, and lower transaction costs for borrowers. By strengthening collaboration and coordination, the framework is expected to improve the efficiency and effectiveness of both institutions' support to their shared client countries.

MCDF has a mandate to promote cofinancing, specifically between IFIs and developing-country financiers. While cofinancing between IFIs remains important, MCDF emphasizes the value of partnerships between IFIs and institutions such as national development banks and commercial banks. These arrangements combine the local knowledge of local banks with the concessional financing and expertise of IFIs. MCDF's Finance Facility has a dedicated window for preparing projects cofinanced by IFIs and developing country financiers.

Cofinancing plays an important role in funding IFI-supported cross-border connectivity infrastructure projects in Southeast Asia. Of the 63 hard infrastructure projects reviewed in this report, 43 involved cofinancing, comprising 34 transport projects, 4 energy projects, and 5 ICT projects. Cofinancing accounted for 49% of the total cost of these projects. This included 18.3 percentage points from official bilateral sources (such as loans and grants from JICA, EXIM Bank Korea, the Australian Agency for International Development, the Nordic Development Fund, and

Agence Française de Développement); 14.8 from government counterpart funding; 11.5 from commercial cofinancing (including loans syndicated by IFIs and private equity investment from project sponsors); 2.5 from IFI cofinancing; and 1.8 from other official cofinancing (including climate funds and the ASEAN Infrastructure Fund) (Table 12).

As with IFIs' own financing, cofinancing varies significantly across sectors. Official bilateral cofinancing plays a larger role in transport projects, while commercial cofinancing is more prominent in energy and ICT projects. Cofinancing covered 47.4% of the total cost of transport projects: 21.3 percentage points from bilateral official sources, 19.2 from government counterpart funding, 3.3 from commercial cofinancing, 2.2 from other official sources, and 1.2 from IFIs. Cofinancing accounted for 78.3% of the total cost of energy projects: 50.3 percentage points from commercial cofinancing, 19.8 from official bilateral sources, 7.6 from IFIs, and 0.5 from government counterpart funding. Cofinancing accounted for 35.6% of the total cost of ICT projects: 29.6 percentage points from commercial sources, 5.9 from IFIs, and 0.1 from government counterpart funding. The larger share of commercial cofinancing in energy and ICT reflects the revenue-generating nature of these projects.

IFI-supported cofinanced cross-border connectivity infrastructure projects in Southeast Asia have more frequently used parallel cofinancing than joint cofinancing. Cofinancing is generally of two types: joint or parallel. In joint cofinancing, multiple financiers pool resources to fund a common set of goods, works, and services under a unified procurement and management framework, governed by a single set of policies and procedures. In parallel cofinancing, the project is divided into distinct components or contract packages, each financed and managed separately by different financiers according to their own guidelines and policies.

Of the 27 cross-border connectivity hard infrastructure projects for which the type of cofinancing is known, 17 followed a parallel cofinancing model, while 10 used joint cofinancing. IFIs mostly follow the parallel approach.

Many cross-border connectivity hard infrastructure projects received cofinancing from developing-country financiers. Of the 40 cofinanced projects reviewed, 10 involved developing-country financiers, mostly in the energy and ICT sectors. These financiers included commercial banks and project sponsors providing equity investments in project companies.

For example, the ADB-funded Mactan Cebu International Passenger Terminal Project in the Philippines was cofinanced by two project sponsors. These were GMR Infrastructure Ltd. (GIL), an India-based holding company and a leading global private airport operator, and Megawide Construction Corporation, a publicly listed company in the Philippines, along with several commercial banks. The Monsoon Wind Power Project in Lao PDR, cofinanced by ADB and AIIB, also received funding from two Thai commercial banks: Siam Commercial Bank and Kasikorn Bank. The ADB-funded Nam Ngiep 1 Hydropower Project in Lao PDR was cofinanced by two regional project sponsors — Electricity Generating Authority of Thailand (EGAT) and Lao Holding State Enterprise, which together held a 25% equity stake — and Thai banks, including Bangkok Bank, Kasikornthai Bank, Siam Commercial Bank, and the Export–Import Bank of Thailand.

Table 12: Financing Sources of IFI-Supported Cross-Border Connectivity Hard Infrastructure Projects by Sector, Approved in 2010–2024

	Transport	Energy	ICT	Total	Transport	Energy	ICT	Total
	$ million				%			
IFI's own financing								
Sovereign loan, market based	5,132.9	49.0	287.2	5,469.1	34.3	2.5	11.2	28.1
Sovereign loan, concessional	2,439.0	0.0	21.9	2,460.9	16.3	0.0	0.9	12.6
Grant	191.9	92.0	15.0	298.9	1.3	4.7	0.6	1.5
Nonsovereign loan	107.0	284.0	1,163.2	1,554.2	0.7	14.5	45.5	8.0
Equity investment	0.0	0.0	160.0	160.0	0.0	0.0	6.3	0.8
Guarantees	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal	**7,870.7**	**425.0**	**1,647.4**	**9,943.1**	**52.6**	**21.7**	**64.4**	**51.0**
Cofinancing								
IFIs	181.7	150.0	150.0	481.7	1.2	7.6	5.9	2.5
Official bilateral	3,182.2	388.9	0.0	3,571.1	21.3	19.8	0.0	18.3
Official others	357.9	0.0	0.0	357.9	2.4	0.0	0.0	1.8
Commercial	496.4	986.8	757.4	2,240.6	3.3	50.3	29.6	11.5
Government counterpart funding	2,875.8	10.2	1.6	2,887.6	19.2	0.5	0.1	14.8
Subtotal	**7,094.0**	**1,535.9**	**909.1**	**9,539.0**	**47.4**	**78.3**	**35.6**	**49.0**
Total	**14,964.7**	**1,960.9**	**2,556.4**	**19,482.1**	**100.0**	**100**	**100**	**100**

ICT = information and communication technology, IFI = international financial institution.

Source: Authors' estimates from data on IFI websites.

6.4. Private capital mobilization

Given fiscal constraints on governments to finance connectivity infrastructure through taxation or sovereign debt, mobilizing private capital is essential. In addition to cofinancing with commercial banks, IFIs have developed several instruments to support capital mobilization. The main one we will cover in this section is public–private partnerships (PPPs).

Of the 63 cross-border connectivity hard infrastructure projects reviewed in this report, 12 were structured as PPPs. These included 4 energy generation projects, 4 ICT projects, 2 airport projects, 1 road project, and 1 dry port project. PPPs involve collaboration between the public and private sectors to finance infrastructure projects or deliver services and are most common in revenue-generating sectors such as ports, airports, power generation, telecoms, and ICT. In this arrangement, the government provides oversight, regulation, and sometimes funding or in-kind support such as land, while the private sector contributes investment, technical expertise, efficiency, and project management.

Most of the PPP projects reviewed in this report were implemented under concession agreements awarded by the government to the special purpose vehicles set up by project sponsors to implement and manage the projects. The Nam Ngiep 1 Hydropower Project in Lao PDR, financed by ADB, followed a build–operate–transfer model under a concession lasting up to 27 years from the start of commercial operations. The project sponsors formed the Nam Ngiep 1 Power Company to serve as the borrower and to implement and manage the project. The Monsoon Wind Power Project in Lao PDR, jointly financed by ADB and AIIB, was carried out under a 25-year build–own–operate–transfer concession agreement with the government. Project sponsors set up Monsoon Wind Power Company Limited to act as the borrower and to implement and manage the project.

The VLP Dry Port, financed by IFC, was implemented under a 50-year concession agreement with the government. The project sponsor set up VLP to develop an integrated logistics park in Vientiane, which includes the redevelopment of a brownfield dry port and the construction of a multiservice logistics park. IFC's financing supported the dry port component through Thanaleng Dry Port Sole Co. Ltd, a subsidiary of VLP. The Mactan–Cebu International Passenger Terminal Project in the Philippines, financed by ADB, was implemented under a 25-year build–own–transfer concession agreement with the government. The project sponsors set up GMR Megawide Cebu Airport Corporation, a special purpose company incorporated in the Philippines, to implement and manage the project.

The PPP projects were financed through diverse funding sources, including sovereign and nonsovereign loans from IFIs, syndicated commercial loans, and equity investment by project sponsors. The Nam Ngiep 1 Hydropower Project in Lao PDR, with a total cost of $982 million, was financed through a package that included an ADB nonsovereign OCR loan, syndicated loans from commercial banks, and additional funds from the government and project sponsors. The Monsoon Wind Power Project, with a total cost of $752.55 million, was financed through a package arranged by ADB, which included its nonsovereign OCR loans, a syndicated loan funded by international commercial banks, an AIIB nonsovereign loan, an ADB grant from the Asian Development Fund Private Sector Window, and loans from the Leading Asia's Private Infrastructure Fund (LEAP, supported by JICA and administered by ADB) and the Canadian Climate Fund for the Private Sector in Asia (Box 8). The Mactan–Cebu International Passenger Terminal Project in the Philippines, with a total cost of $762 million, was cofinanced through an ADB OCR sovereign loan, commercial bank loans, equity from the project sponsors, and government counterpart funding. The Multifunctional Satellite PPP Project in Indonesia, with a total cost of $540 million, was cofinanced by loans from AIIB and other financial institutions along with equity investment from the project sponsors.

Some PPP projects have a single project sponsor, while others involve multiple sponsors, including local, regional, and international companies. The Nam Ngiep 1 Hydropower Project in Lao PDR was sponsored by the Kansai Electric Power Company, Inc. — Japan's second-largest power utility — through KPIC Netherlands B.V. (holding 45% of Nam Ngiep 1 Power Company); EGAT, Thailand's largest electricity generator, through EGAT International (30%); and the government, through its Lao Holding State Enterprise (25%), which owns and manages equity investments in power projects.

Sponsors of the Monsoon Wind Power Project in Lao PDR include ACEN Renewables International Private Limited, wholly owned by ACEN Corporation, which manages a diversified energy portfolio. Other sponsors are BCPG Public Company Limited, a leading Thailand-based renewable energy company; Impact Electrons Siam Company Limited, a pioneering renewable energy developer in Thailand; Mitsubishi Corporation, Japan's largest trading company with 9,450 MW of equity-based generating capacity; and SMP Consultation Sole Company Limited, a Lao PDR–based company operating in several sectors, including energy, automotive distribution, education, ICT, finance, food and beverage, hospitality, and real estate.

The sponsor of the VLP Dry Port is Sitthi Logistic Lao Co. Ltd., part of the Phongsavanh Group, a diversified Lao PDR business conglomerate. Sponsors of the Mactan–Cebu International Passenger Terminal Project in the Philippines include GMR Infrastructure Ltd, an India-based holding company with investments across airports, energy, roads, and urban infrastructure, and recognized as the world's fourth-largest private airport operator. The other sponsor, Megawide Construction Corporation, is a publicly listed company in the Philippines engaged in general construction.

The PPP modality is often seen as a way to leverage the strengths of the public and private sectors, promote risk-sharing, and improve the efficiency and effectiveness of infrastructure projects. However, the PPP projects reviewed in this report are either still under construction or only recently completed, making it too early to evaluate their performance.

Box 8: How the Monsoon Wind Power Project Mobilized Private Investment

The Monsoon Wind Power Project successfully mobilized private financing as a public–private partnership, despite the perceived high risks often associated with energy generation projects for export. The risks are multidimensional, including market and revenue uncertainty, regulatory and policy challenges, cross-border political and economic complexities, technological and construction risks, operational and curtailment issues, financing hurdles, and environmental and social concerns. The project incurred additional first-mover costs and risks, as it is the first wind power project in Lao PDR, the largest in Southeast Asia, and the first cross-border wind project in Asia.

Several factors and measures helped mitigate these risks:

- **Political and institutional support.** The project aligned closely with the ASEAN Power Grid, received strong political backing from the governments of Lao PDR and Viet Nam, secured a multiyear power purchase agreement with state-owned Vietnam Electricity, and is expected to offer significant benefits to both countries.
- **IFI financial support.** Blended finance provided by ADB played a critical role in mitigating key commercial risks, including a $10 million grant used to establish a curtailment debt service reserve account. This account allowed the borrower to partially mitigate repayment risk to senior lenders in the event of extreme curtailment.
- **Environmental and social risk management.** Due diligence undertaken by ADB and AIIB during project preparation, along with the implementation of environmental and social safeguard measures — such as biodiversity action plans, resettlement strategies, a gender mainstreaming plan, and grievance mechanisms — helped minimize potential environmental and social risks.

Source: "Lao People's Democratic Republic: Monsoon Wind Power Project," ADB, accessed March 19, 2025; and "PSI P000515 Monsoon 600 MW Cross-Border Wind Power Project_20230501," AIIB, accessed March 19, 2025.

7 Physical Cross-Border Connectivity Infrastructure: Challenges and Practices

7. Physically Cross-Border Connectivity Infrastructure: Challenges and Practices

7.1. Definition and scope

Physically cross-border connectivity infrastructure projects, as defined in this report, are those with a physical footprint and development impacts that traverse the territories of two or more countries.[80] These projects may involve the construction, upgrading, or rehabilitation of roads or railways and border crossings in multiple countries; the development of generation capacity and transmission lines to enable cross-border power trading; or the installation of ICT infrastructure connecting multiple countries.

Compared with national connectivity projects, physically cross-border infrastructure projects are often more complex and challenging to design and deliver. To support better understanding and identify solutions, the G20 Infrastructure Working Group commissioned the 2024 report, "Delivering Cross-Border Infrastructure: Conceptual Framework and Illustrative Case Studies." The 2024 report outlines challenges and recommends a set of good practices to overcome them. Using the conceptual framework from that report, this chapter examines how these challenges have been managed and the extent to which IFIs have applied recommended practices in preparing physically cross-border infrastructure projects in Southeast Asia.

Of the 63 cross-border connectivity hard infrastructure projects reviewed in this report, only 5 meet the definition of physically cross-border projects used here:

- **Second Northern GMS Transport Network Improvement Project in Lao PDR and Viet Nam, financed by ADB (Northern GMS Transport Network).** Upgraded road sections along the GMS Northeastern Economic Corridor that traverse the border between Lao PDR and Viet Nam
- **Nam Ngiep 1 Hydropower Project in Lao PDR, financed by ADB.** Involved the construction and operation of a 290 MW hydropower facility on the Nam Ngiep River in Bolikhamxay and Xaysomboun provinces, along with a transmission line to enable power export to Thailand
- **Monsoon Wind Power Project in Lao PDR, financed by ADB with cofinancing by AIIB.** Involved the construction and operation of a 600 MW wind power plant in Attapeu and Sekong provinces, along with transmission infrastructure to facilitate power export to Viet Nam
- **GMS Northern Power Transmission Project in Lao PDR, financed by ADB.** Involved the construction of transmission and distribution lines to expand grid electricity access in the western provinces and establish interconnection with Thailand's power grid to support cross-border power trading
- **Xekaman Cross-Border Hydropower Project in Lao PDR, financed by AIIB.** Designed to refinance a portion of the existing debt under a sovereign guarantee from the Viet Nam government, enabling the release of the sovereign guarantee and its replacement with competitive private sector financing

[80] AIIB, EBRD, and IDB, "Delivering Cross-Border Infrastructure."

Several factors may explain the limited number of physically cross-border hard infrastructure projects, stemming from both demand and supply considerations. On the demand side, countries in Southeast Asia focused more heavily on road investments during the review period. Of the 63 IFI-supported cross-border hard infrastructure projects, 39 were road projects, mostly in Cambodia, Lao PDR, Myanmar, and Viet Nam. Technically, cross-border road projects are easier to implement as single-country operations than railways or power transmission lines, reducing the need for joint projects involving two or more countries. Among the 85 transport investment projects listed in the GMS RIF 2022, 46 were road projects, and 12 were stand-alone projects for constructing border-crossing facilities. These patterns help explain the small number of physically cross-border projects financed by IFIs in the region. In addition, Indonesia and the Philippines are island countries, and Malaysia did not borrow during the review period, further limiting opportunities for cross-border connectivity transport infrastructure involving multiple countries.

On the supply side, several constraints may have limited the number of physically cross-border projects. IFI funding is typically allocated to individual countries, making it more difficult to structure projects that span multiple countries, especially when national development priorities diverge. Although the World Bank sets aside a portion of its IDA resources for regional projects, the allocation is small. ADB earmarks a portion of its Asian Development Fund resources for regional cooperation and integration, but eligible projects may still be single-country operations.

The political, economic, financial, and institutional complexity involved in structuring multicountry infrastructure projects may reduce the willingness of client countries and IFI staff to pursue such initiatives. ADB's independent evaluation of the GMS Program observed that while many GMS investment projects are classified as regional, they are often designed and implemented as single-country operations. As a result, although completed projects generally achieved high success rates and delivered national benefits, transboundary impacts were less evident.[81]

7.2. Challenges

Challenges to investing in physically cross-border hard infrastructure are often multidimensional. Countries involved may lack mutual political trust; pursue different development priorities; or operate under divergent policy, legal, regulatory, and technical frameworks. They may face capacity constraints in project planning, implementation, and operations, or fiscal and financing limitations because of the size and risk of such projects. In some cases, the distribution of benefits and costs may be uneven across countries, making it harder to build consensus. These factors can limit government support, complicate design and implementation for IFIs, and increase risks and costs for private sector investors.

IFI sector leads and project team leaders were surveyed to gather their views on key barriers to developing and investing in physically cross-border projects in Southeast Asia. Respondents were asked to rate each potential barrier as high (score of 3), medium (2), or low (1). Each barrier's overall score reflects the weighted average of these ratings, with weights based on the number of responses per score. Of the 10 individuals surveyed, 7 responded (Table 13).

[81] IED, *ADB Support for the Greater Mekong Subregion Program, 2012–2020: Performance and Results* (ADB, 2021).

Table 13: Barriers to Investing in Physical Cross-Border Projects in Southeast Asia

	High	Medium	Low	Overall Score
1. Fiscal and financing constraints due to project size and risk	4	2	1	2. 4
2. Different policy, legal, and regulatory frameworks	3	2	2	2. 14
3. Different national development priorities	2	3	2	2. 0
4. Lack of political mutual trust between the countries	2	3	2	2. 0
5. Unbalanced distribution of benefits and costs	2	3	2	2. 0
6. Inadequate capacity for project planning, implementation, and operation across countries	2	3	2	2. 0
7. Different technical standards and protocols	2	2	3	1. 86

Note: Seven responses were received: two for energy, four for transport, and one for ICT. Overall score = (number of high ratings x 3 + number of medium ratings x 2 + number of low ratings x 1)/7, with scores ranging from 1 (low) to 3 (high).

Source: Authors' estimates from data on IFI websites.

Fiscal and financing constraints related to project size and risk emerged as the top barrier to investment in cross-border infrastructure projects, with an overall score of 2.43. Energy sector leads consistently rated this barrier high, transport leads gave a mix of high and medium ratings, while the ICT sector lead rated it low.

- **Differences in policy, legal, and regulatory frameworks ranked as the second most critical barrier, with an overall score of 2.14.** The barrier received three high and two medium ratings — all from energy and transport leads — and two low ratings from a transport lead and the ICT lead.
- **Different development priorities; lack of mutual political trust; unbalanced distribution of benefits and costs; and inadequate institutional capacity for project planning, implementation, and operations across countries all ranked as the third most significant barriers, each with an overall score of 2.** Each received two high and three medium ratings — mostly from energy and transport leads — and two low ratings from a transport lead and the ICT lead.
- **Differences in technical standards and protocols were considered the least critical barrier, with an overall score of 1.86.** The barrier received three out of the seven low ratings.

Beyond the numerical scores, qualitative responses offered additional insights into the barriers to investing in physically cross-border infrastructure projects in Southeast Asia. Transport sector leads cited borrowing capacity and debt–equity ratio limitations when preparing large railway projects as public investments supported by IFIs. Differences in technical standards — such as track specifications, power sources, and signaling systems — were noted as key interoperability challenges that hinder seamless railway operations. Unbalanced distribution of benefits and costs was seen as a recurring feature of physically cross-border infrastructure operations. Low-income countries were generally viewed as having limited absorptive capacity for sovereign financing because of institutional weaknesses in project planning, implementation, and operations. Many sector leads emphasized that IFI operational priorities should be guided largely by client needs.

Overall, these findings broadly align with those of the Master Plan on ASEAN Connectivity 2025, which identified key barriers to implementing prioritized cross-border connectivity infrastructure projects in the areas of financing, decision-making, and implementation. Barriers such as differing development priorities, lack of political mutual trust, unbalanced distribution of benefits and costs, inadequate institutional capacity, and varying technical standards and protocols were ranked lower than fiscal and financial constraints and differences in policy, legal, and regulatory differences. This may reflect the strong political commitment across Southeast Asian countries to deepen regional cooperation and integration. Many cooperation mechanisms are now well established. The heightened awareness of these barriers among energy and transport leads, compared with the ICT lead, likely stems from the greater need for physical cooperation and coordination in cross-border energy and transport projects.

7.3. G20 Working Group recommended practices: Economic rationale and planning

Practice 1: Develop a regional infrastructure plan among participating countries to support long-term strategic planning through agreed project prioritization and coordination

All five projects are in GMS countries and align with the priorities of GMS and ASEAN economic cooperation and related regional plans. The Northern GMS Transport Network Project involved upgrading road sections along Lao PDR–Viet Nam border, forming part of the GMS Northeastern Economic Corridor. This corridor links Nanning in Guangxi Province (China), Ha Noi and Thanh Hoa (Viet Nam), Louangphrabang (Lao PDR), and Bangkok (Thailand), and its development is a key element of GMS economic cooperation. The project was a priority in the GMS RIF 2013–2022, and the GMS Northeastern Economic Corridor — partially covered by this project — was identified in ADB's transport sector strategy study and endorsed by GMS governments.

The four energy projects support power trading in the GMS. They are aligned with the APG initiative, which aims to strengthen regional energy connectivity, facilitate multilateral power trading among ASEAN members, and promote energy transition in Southeast Asia. The Nam Ngiep 1 Hydropower Project is among the priority projects in the GMS RIF 2022. While the GMS Northern Power Transmission Project is not included — because it was approved earlier — a follow-up project has been listed as a priority in the GMS RIF 2022.
The five projects all have a strong economic rationale:

The Northern GMS Transport Network Project addressed a crucial weak link in the economic corridor connecting Lao PDR and Viet Nam. The project's Lao PDR component upgraded 151.2 km of roads, including National Roads 6-1, 6A, and 6B, and the Viet Nam component upgraded 135.6 km of National Highway 217 to Class III–IV standard. While many sections of the GMS Northeastern Economic Corridor had already been improved or were in good condition, the stretch from the coast through Thanh Hoa in Viet Nam to Houaphanh in Lao PDR remained in poor condition and required significant improvements to meet all-weather international standards. Improving this section was essential for the corridor to realize its economic potential and to provide northern Lao PDR with reliable year-round access to seaports along the South China Sea.

The project aimed to strengthen the cross-border link between the two countries and was prioritized in the GMS transport sector strategy study. An estimated 37% of households in the project area in Viet Nam lived below the national poverty line, and five of the eight districts in Lao PDR project area were among the country's poorest. Both governments fully recognized the importance and urgency of the project for local and national economies.

The GMS Northern Power Transmission Project aimed to strengthen Lao PDR's power transmission and distribution infrastructure, expand electricity access in underserved provinces, and support cross-border electricity trade with neighboring countries. The project involved constructing 398 km of 115 kV transmission lines and associated 115/22 kV substations, along with about 1,100 km of new 22 kV medium- and low-voltage distribution lines. These upgrades were designed to extend grid electricity to consumers in western Vientiane and Xaignabouli and Phongsali provinces, and to establish interconnection with Thailand's power grid.

Before the project was implemented, only 58% of households in Lao PDR had electricity access, with even lower rates in provinces such as Phongsali and Xaignabouli. The government set a national target of a 90% electrification rate by 2020, which required significant investment in the transmission and distribution network system, especially in underserved areas. Increased connectivity would enable Lao PDR to export surplus hydropower during the rainy season and import electricity during times of shortage.

The Nam Ngiep 1 Hydropower Project is expected to generate significant mutual benefits to Lao PDR and Thailand. Developed on a build–operate–transfer basis, the project involved a 290 MW hydroelectric power facility on the Nam Ngiep River in Bolikhamxay and Xaysomboun provinces, along with a transmission line to enable electricity exports to Thailand. The project supports increased cross-border cooperation through clean energy trade.

Lao PDR, while limited in trade opportunities and economic growth, has substantial untapped hydropower potential that can be harnessed to generate foreign exchange revenues. Thailand, in contrast, has a strong and growing economy but faces increasing energy security risks because of dwindling natural gas reserves. The project thus provides significant benefits to both countries.

The project contributes to Lao PDR's goal of achieving a 92% electrification rate by 2024. It also promotes environmentally and socially responsible private sector investment in hydropower as it was structured as a PPP.

The Monsoon Wind Power Project is expected to deliver substantial mutual benefits to Lao PDR and Viet Nam. It involves the construction and operation of a 600 MW wind power plant in Attapeu and Sekong provinces of Lao PDR, along with transmission infrastructure to support electricity exports to Viet Nam. This cross-border initiative promotes economic growth and reduces the carbon footprints of both countries.

While hydropower exports have significantly boosted Lao PDR's foreign exchange earnings, fiscal revenues, and foreign direct investment inflows, the country's abundant wind power potential remains largely untapped. By harnessing wind resources, the project introduces a new source of economic growth and job creation while diversifying power exports and supporting climate mitigation efforts. For Viet Nam, importing wind power from the project will help meet rising energy demand and contribute to its nationally determined contribution to GHG reduction.

Practice 2: Conduct feasibility studies for specific cross-border projects that capture the benefits of regional connectivity and assess how benefits and costs are distributed across countries

All five projects were developed based on detailed feasibility studies, and their project documents highlighted benefits for the countries involved. However, while qualitative analyses were included, the distribution of benefits and costs was not quantified for any of the four energy projects.[82]

The Northern GMS Transport Network Project was prepared with support from a $1.3 million project preparatory technical assistance grant financed by the Japan Special Fund and administered by ADB.

The project's economic analysis included forecasting, estimation of economic costs and benefits, and calculation of the net present value and EIRR, comparing with- and without-project scenarios covering 23 years. The estimated EIRR was 13.9% for the entire project, 14.1% for Lao PDR component, and 19.3% for the Viet Nam component, all exceeding the minimum threshold of 12%, indicating strong economic viability.

The GMS Northern Power Transmission Project was prepared through an $800,000 technical assistance grant funded by the Japan Special Fund. The economic analysis indicated that the project would generate an economic net present value of $203.7 million over a 30-year operating period, using a 12% discount rate, and achieve an EIRR of 42.2% — well above ADB's minimum threshold — demonstrating strong economic viability. Based on the same demand forecasts and tariff study carried out by the project's executing agency, the financial analysis showed that the expected financial internal rate of return is also financially sustainable.

The preparation of the Nam Ngiep 1 Hydropower Project was also supported by Japan. The project was identified in the early 1990s.[83] In 1996, Lao PDR government requested JICA to conduct a full feasibility study covering social and environmental impacts, as well as technical and commercial aspects. Conducted in two phases — 1998–2000 and 2001–2002 — the JICA study confirmed the project's technical feasibility under a build–operate–transfer model and recommended an optimal development approach that considered physical, economic, and environmental and social safeguards.

Practice 3: Ensure that the planning process includes thorough consultations with all stakeholders, including the private sector, civil society, and affected communities

The planning process plays a critical role in the success of cross-border connectivity infrastructure projects. Regional and national planning helps establish the economic rationale for proposed projects and ensures alignment with the regional vision for economic cooperation and integration, as well as with the national economic development goals of all participating countries. Stakeholder planning and consultation are needed in areas such as project procurement, financing, environmental and social safeguards, implementation, and O&M. IFIs generally have excellent processes in place for these activities, as demonstrated in the projects reviewed.

For example, the Monsoon Wind Power Project was classified as category A — the highest risk rating — for environmental impact, involuntary resettlement, and impacts on Indigenous Peoples under ADB's Safeguard Policy Statement. To manage these risks, the borrower was required to prepare plans for biodiversity action, resettlement, and community and ethnic group development. These plans were developed through extensive engagement, including public consultations, focus group discussions, and key informant interviews with communities and local authorities in the project areas.

[82] One of these, the Xekaman Cross-border Hydropower Project, provided funding for two existing hydropower plants by refinancing a portion of the existing debt under a sovereign guarantee from the Government of Viet Nam, allowing the sovereign guarantee to be released and replaced with competitive private sector financing.

[83] "History," Nam Ngiep1 Power Company, accessed March 19, 2025.

The Northern GMS Transport Network Project was classified as category B for environmental impact. ADB prepared environmental management plans as part of the initial environmental examination. These plans detailed mitigation measures and monitored activities and were developed through public consultations with stakeholders, including local residents, road users, roadside business owners, elected representatives, and local government officials.

For the Nam Ngiep 1 Hydropower Project, consultations with people living in the project area were carried out alongside technical studies on topography and geology. These were followed by national consultations involving villagers, local officials, senior politicians, project developers, and financial backers, building on earlier village, district, and provincial meetings.[84]

7.4. G20 Working Group recommended practices: Political support and governance

Practice 4: Establish high-level political cooperation agreements to support regional plans or specific cross-border projects

ASEAN, GMS, BIMP-EAGA, and IMT-GT offer effective mechanisms for member states to build consensus and mobilize political support for regional economic cooperation and integration. These platforms have facilitated agreement on strategies, master plans, and investment frameworks — including those related to cross-border connectivity infrastructure — such as the Master Plan for ASEAN Connectivity 2025, the GMS RIF, the Initial Rolling Priority Pipeline of ASEAN Infrastructure Projects, BIMP-EAGA Vision 2025, the IMT-GT Implementation Blueprint, and the APG.

The Northern GMS Transport Network Project aligned with the GMS Cross-Border Transport Agreement, which was incorporated into the GMS Program in 1999 to facilitate trade and cross-border transport. The agreement covers various aspects of cross-border movement. All GMS countries have finalized and signed all annexes and protocols, and most have ratified them. By the time the project began, the agreement was already being implemented at three border crossings: Lao PDR–Viet Nam, Thailand–Lao PDR, and China–Viet Nam. This strong political commitment to regional economic cooperation provided a robust foundation for the project.

For the four energy export projects, Lao PDR government signed MOUs with Thailand and Viet Nam. Under the agreements, Lao PDR aims to export up to 7 GW of electricity to Thailand by 2025 and up to 5 GW to Viet Nam by 2030. The agreements are expected to play a crucial role in boosting Lao PDR's economy by generating significant revenue from electricity exports. They also support energy security for Thailand and Viet Nam by ensuring stable and reliable supply. Leveraging Lao PDR's hydropower potential for export promotes clean energy use and supports environmental goals. The agreements reflect strong political will for regional energy cooperation and a shared commitment to sustainable energy development, forming a strong foundation for the three reviewed energy projects and future initiatives that promote power trading.

Practice 5: Align policy, legal, and regulatory frameworks, as well as technical standards and protocols

Southeast Asian countries have made significant progress in harmonizing policy, legal, and regulatory frameworks, as well as technical standards and protocols. This progress has been achieved through various cooperation initiatives under ASEAN, GMS, BIMP-EAGA, and IMT-GT, with member states signing a wide range of agreements and action plans. Examples of ASEAN framework agreements are those on the facilitation of goods in transit (1998), interstate transport (2009), cross-border transport of passengers by road vehicles (2017); and multimodal transport (2005).

[84] "Welcome to Nam Ngiep1 Power Company," Nam Ngiep1 Power Company, accessed March 19, 2025.

Other important agreements include the GMS Cross-Border Transport Facilitation Agreement (1999), the Kunming Consensus on GMS Economic Corridors (2008), and the BIMP-EAGA MOUs on buses (2007) and trucks (2009). Digital and energy frameworks include the APG, the ASEAN Framework on Personal Data Protection (2016), the ASEAN International Mobile Roaming Framework (2018), the ASEAN Digital Data Governance Framework (2018), and the ASEAN Digital Economy Framework Agreement (2023). Collectively, these agreements provide a sound basis for developing cross-border connectivity infrastructure.

Practice 6: Establish effective intergovernmental institutional arrangements for complex cross-border projects to narrow capacity and coordination gaps and resolve conflicts through, for example, a cross-border commission or authority

Intergovernmental arrangements support regional and project energy export initiatives. The Inter-Governmental Agreement on Regional Power Trade in the GMS was signed during the first GMS Summit in 2002. That same year, the Regional Power Trade Coordination Committee was established, comprising senior government officials from the six GMS countries, ADB, and other development partners. The committee was tasked with coordinating, promoting, and implementing the development of regional power trading.

In 2005, an MOU on the Guidelines for the Implementation of the Regional Power Trade Agreement — Stage 1 was signed at the second GMS Summit of Leaders. This was followed in 2008 by an MOU on the Road Map for Implementing the GMS Cross-Border Power Trading (MOU-2), signed at the third GMS Summit in Lao PDR. MOU-2 outlined the key activities and timelines through 2012 to complete stage 1 and prepare for stage 2, which enable trading between any pair of GMS members, using the transmission facilities of a third member. These agreements and mechanisms provide a broad institutional framework for advancing power trading within the GMS.

For the GMS Northern Power Transmission Project, intergovernmental committees composed of energy authorities from both countries are in place. The governments of Lao PDR and Thailand, along with Electricité du Laos (EDL, the project's executing agency) and EGAT have shown strong support for the cross-border connection. In May 2009, the EGAT governor and the EDL managing director general signed an MOU in Bangkok to formalize the interconnection agreement.

Joint operation committees supervise power exchange between EGAT and EDL. The committees meet regularly, involving technical and senior staff, to discuss cooperation. The interconnection is part of the Nam Ngum 1 system, and arrangements for power trading are reviewed by the joint committees within the context of that system.

For PPPs, intergovernmental institutional arrangements may not need to be as detailed. The project documents for the two generation projects did not indicate the existence of project-specific intergovernmental arrangements to manage coordination or resolve conflicts. However, as these are PPPs, such arrangements are often unnecessary, since the primary relationship is between the importing government and the project company.

The Northern GMS Transport Network Project may serve as an example of a cross-border project that did not need an intergovernmental institutional arrangement. Although it involved two countries, the project was structured as two separate loans to Lao PDR and Viet Nam. The border crossing along the project road was not included in the scope of project implementation but was to be addressed through a separate ADB regional policy and advisory technical assistance focused on implementing the GMS transport and trade facilitation action plan.

Institutional platforms under the GMS Program — such as the annual Economic Corridors Forum — support cross-border coordination. This forum aims to elevate the visibility of economic corridor development and reinforce collaboration among GMS forums, working groups, and country representatives. Within it, the Governors' Forum provides a mechanism for stronger cooperation among provincial and local officials, as well as closer engagement with the private sector in resolving corridor-related issues.

Given these broader regional mechanisms, project-specific intergovernmental arrangements may not have been necessary, and none were reported in the project documents in this case. The project was executed by the Ministry of Transport in Viet Nam and by the Ministry of Public Works and Transport in Lao PDR. Both governments committed to maintaining the project roads to national standards.[85]

Additional practices to forge political support. Two additional lessons from the region highlight ways to support dialogue between countries and build political consensus around cross-border initiatives:

- **Multiple layers for discussion can be complementary.** When ASEAN integration initiatives such as GMS, BIMP-EAGA, and IMT-GT were developed, concerns arose about potential conflict or overlap among them and with ASEAN itself. However, ASEAN chose to view these subregional programs as complementary "building blocks of ASEAN integration." In practice, having multiple layers of policy agreements has provided a stronger foundation for project development and financing.
- **Usefulness of the "plus X, minus X" approach.** First applied in the GMS context — where the program includes five countries and two regions of one country — this principle allows project development to proceed even if not all members participate. As long as two or more countries agree to move forward ("plus x"), the others are not required to join or formally support the project ("6 minus x"). The principle was later adopted by the Central Asia Regional Economic Cooperation Program.

7.5. The role of IFIs

IFIs have distinct advantages in promoting the development of physically cross-border connectivity infrastructure. These advantages arise from their long-term engagement with client countries; development mandates; multicountry operations; commitment to quality, sound governance, and transparent implementation; and their neutrality and credibility. ADB's subregional cooperation programs — such as GMS, BIMP-EAGA, and IMT-GT — demonstrate how IFIs can forge long-term partnerships to strengthen cross-border connectivity infrastructure and deliver tangible results.

According to ADB's independent evaluation of the GMS Program (2012–2020), ADB-financed operations have significantly enhanced regional transport connectivity. They have done so through the development of physical infrastructure and economic corridors, and have also helped lay the groundwork for interconnecting GMS power systems (Box 9).

IFI sector leads shared their views on how IFIs can help overcome the challenges of investing in physically cross-border infrastructure. Their responses can be grouped into preparation and capacity building, finance, and facilitation.

[85] ADB, *Completion Report: Support for Implementing the Action Plan for Transport and Trade Facilitation in the Greater Mekong Subregion* (2020).

Preparation and capacity building

IFI sector leads emphasized the need to improve project readiness through sound planning, supervision of implementation, and coordination when investing in physically cross-border connectivity infrastructure. In this context, ADB's energy sector lead noted that ADB in coordination with ASEAN and other IFIs is planning to establish a dedicated APG financing facility, designed as a comprehensive end-to-end program. The facility will support all stages of the APG project life cycle — covering feasibility studies, project preparation, and investment activities — and promote a coordinated approach to realizing APG benefits holistically and progressively. A robust framework will be developed to assess the readiness of APG interconnections and prioritize projects, including those among Cambodia, Lao PDR, and Thailand, as well as potential subsea cable links among ASEAN countries.

Box 9: Major Achievements of Asian Development Bank–Financed Transport and Energy Connectivity Operations in the Greater Mekong Subregion, 2012–2020

- **Transport.** ADB supported the construction and rehabilitation of about 3,300 kilometers of roads, helping double the number of cross-border road passengers and the freight volume in 2010–2018. This support is expected to connect 19.2 million residents to the Greater Mekong Subregion (GMS) economic corridor network along project corridors and reduce vehicle operating and road maintenance costs. ADB initiated dialogue on the development of a GMS railway network, supported the establishment and operation of the GMS Railway Association, and fostered synergies in the regional transport system through continued cooperation and coordination among GMS transport agencies in developing the network.

- **Energy.** ADB support helped lay the groundwork for interconnecting the GMS power systems and developing a GMS power market through the establishment and operation of the Regional Power Trade Coordination Committee. This led to the development of performance standards and regulatory frameworks for multicountry power trade and the drafting of GMS regional grid codes. The number of cross-border transmission lines used for cross-border power trading increased from 14, with a total traded capacity of 4,030 megawatts (MW) in 2012, to 19, with 8,870 MW in 2020. ADB strengthened government capacity to develop an environmentally sustainable power sector, specifically in integrating resource planning with strategic environmental assessments, and in improving regulations, policies, and programs for renewable energy and efficiency.

Source: Independent Evaluation Department, *ADB Support for the Greater Mekong Subregion Program*, 2012–2020: Performance and Results (ADB, 2021).

ADB offers three ways to help developing member countries better design and implement development projects:[86]

- **Project-readiness financing.** A fast and flexible modality that supports activities expected to lead to at least one ADB-funded project. It can finance project preparation consulting services such as detailed engineering design, capacity building, limited project startup support, and pilot testing of project design. These activities help ensure high project readiness and minimize delays during the initial implementation phase.
- **Small-expenditure financing facility.** ADB's quick and flexible mechanism for meeting small

[86] "What are Project Readiness Financing, Small Expenditure Financing Facility, and Technical Assistance?" ADB, accessed March 19, 2025.

financing needs linked to ADB-financed projects. Once set up, the facility allows for processing individual loans or grants of up to $15 million each, within the approved facility ceiling. The facility typically supports low-risk activities across the project cycle, including preparation; implementation; pilot testing; and even post-completion activities such as O&M, rehabilitation, and post-disaster early recovery.

- **Technical assistance.** Primarily provided as grants to strengthen country capacity and improve the use of their development resources.

For IFIs such as IsDB, where all member countries fall within the low-development category, financing new projects in underserved subsectors can be considered once countries prepare the necessary documentation and submit formal financing requests. This requires capacity building to ensure effective project management throughout implementation. IFIs view building soft components as a way to increase impact, quality, and sustainability, particularly through policy formulation, asset management, and operational efficiency.

Finance

IFIs can help tackle fiscal and financing challenges. One approach is to enhance private sector participation. For example, ADB's support for APG development will include de-risking mechanisms to improve the bankability of private sector–led projects. For IsDB, joint and cofinancing arrangements for electricity interconnection projects are seen as a way to ease fiscal and financing constraints stemming from project size and risk. A transport sector lead recommended offering large projects — particularly in railways — through blended financing arrangements such as PPPs.

IFIs highlighted the importance of integrating climate-oriented infrastructure to help mitigate investment risks. They recommended offering concessional and/or grant financing for projects that support climate outcomes. One key suggestion was to review and provide inputs to taxonomy updates that assess the role of power grids in enabling the green energy transition, using current taxonomies and emerging principles as reference points.

Facilitation

IFIs emphasize that high-level political commitment and decision-making are critical for the planning, implementation, and mobilization of financial resources. A transport sector lead noted that cross-border connectivity projects are inherently limited in volume and require strong regional political will to overcome the challenges of unbalanced costs and benefits. Sector leads noted that political commitment is key. For instance, ADB facilitates dialogue and negotiation on framework agreements and infrastructure projects related to cross-border railway systems. It has supported, financed, and shared lessons learned from several cross-border power trade projects, including the Nam Thun 2 Hydropower Project and other Lao PDR hydropower projects exporting to Thailand, the Monsoon Wind Power Project exporting to Viet Nam, and the West Kalimantan–Sarawak interconnection.

However, IFIs face limits in what they can facilitate. While IFIs are well positioned to tackle financing and technical challenges, they are less equipped to overcome barriers related to political trust and different development priorities. Cross-border infrastructure projects often require strong political support and may involve tied procurement practices, which can be difficult for IFIs to support because of their reliance on international competitive bidding.

8 Key Findings and Recommendations

8. Key Findings and Recommendations

8.1. Key findings

This report provides a synthesis of Southeast Asian countries' efforts to improve cross-border connectivity infrastructure, with a focus on IFI-supported projects in 2010–2024. The key findings are summarized as follows.

Southeast Asia has made significant progress in improving cross-border connectivity infrastructure, particularly in transport, energy, and ICT. Progress has been driven largely by countries' concerted efforts to deepen cross-border economic cooperation and advance a seamlessly connected ASEAN Community, supported by strong political commitment at the highest levels. The region has tackled many coordination challenges related to cross-border connectivity investment through a range of initiatives under well-established regional cooperation frameworks, including ASEAN, GMS, BIMP-EAGA, and IMT-GT.

Strongly backed by development partners, particularly IFIs, these initiatives include the following:

- **Transport.** The ASEAN Highway Network, the SKRL, the adoption of the economic corridor approach, and various framework agreements on cross-border transport and trade facilitation
- **Energy.** The APG
- **ICT.** Successive ASEAN ICT master plans and various framework agreements to advance the digital economy

Despite strong political will and encouraging progress, Southeast Asia continues to face significant challenges in improving cross-border connectivity. The development of adopted economic corridors remains a work in progress. The APG has advanced primarily through bilateral cross-border trading, with limited progress toward subregional and multilateral power trade. A significant digital divide persists within and across countries.

The Master Plan on ASEAN Connectivity 2025 identified several common challenges affecting the implementation of prioritized connectivity projects. These include barriers related to financing, decision-making, and implementation.

IFIs have been long-standing partners of Southeast Asian countries and have played a critical role in supporting the development of cross-border connectivity infrastructure. Their contributions have included financing, policy advice, project development and transaction advisory services, and capacity building and technical assistance. From 2010 to 2024, seven IFIs approved a total of 98 projects valued at $16,196.1 million to support cross-border connectivity in Southeast Asia, spanning both hard and soft infrastructure. These included 76 transport projects totaling $13,825.7 million, 6 energy projects at $573 million, and 16 ICT projects at $1,797.4 million. In addition to these project investments and policy-based loans, IFIs approved about 60 technical assistance projects — mostly grants — amounting to $130 million to further support and promote cross-border connectivity.

IFI-financed projects have supported regional and national priorities in developing cross-border connectivity infrastructure. Most IFI-supported transport projects focused on roads, with fewer interventions in railways, airports, ports, waterways, and logistics. Most of the road projects helped develop economic corridors in GMS.

In energy, IFIs have increasingly shifted their support to clean energy sources such as hydropower and wind power. This aligns with commitments under the Paris Agreement and Southeast Asia's green transition goals. The energy projects financed were all designed to support cross-border power trading.

In ICT, IFI-supported projects included investments in satellite connectivity for remote and underserved areas. They also supported data centers, telecom towers, mobile networks, and fiber-optic cables.

All IFI-supported cross-border connectivity hard infrastructure projects were economically viable, with many generating broader development impacts. Among the 25 cross-border road projects that reported an estimated EIRR at either appraisal or completion, one-third had an EIRR of 9.2%–15.7% (average: 14.1%), another third 16.4%–22.1% (average: 15.5%), and the rest 23.0%–43.4% (average: 26.3%). The simple average EIRR across all 25 projects was 20.3%, far exceeding the threshold required by IFI policy.

The broader development impacts included job creation, poverty reduction, and improved business environments. They also expanded access to public services, stimulated local and regional economies, increased foreign exchange earnings, and boosted government fiscal revenues. Many transport projects and all energy projects contributed to climate change mitigation, with the energy projects, in particular, supporting the region's transition to green and clean energy sources.

IFIs have placed strong emphasis on supporting the development of soft infrastructure for cross-border connectivity. Many hard infrastructure projects included soft components such as road safety measures, capacity building for local contractors, asset maintenance, project management and implementation, and improvements in border-crossing management.

Beyond components of hard infrastructure projects, IFIs have supported the development of cross-border connectivity soft infrastructure through stand-alone and dedicated interventions, including the following:

- Strategic and master plan studies
- Promotion of cross-border transport agreements
- Harmonization of regulations and technical standards
- Customs and border-crossing modernization
- Sector-specific policy and institutional reforms
- Improvements in SPS for agricultural products
- Support for regional transport organizations
- Knowledge sharing and institutional development for power trading
- Creation of an enabling environment for ICT development

Most IFI-supported cross-border connectivity hard infrastructure projects approved and completed in 2010–2024 received satisfactory performance ratings, although many experienced significant implementation delays. In the road sector, for example, of the 33 hard infrastructure projects approved during this period, 12 were completed. Performance ratings are available for 8 of these completed projects, all of which were rated successful or satisfactory overall, based on PCRs prepared by the IFIs' project departments or independent evaluation departments.

However, all seven completed projects with available data on implementation schedules experienced delays of 3–60 months, with an average delay of 34 months. Reported causes included the following:

- Delays in consultant recruitment
- Lengthy procurement and approval processes
- Setbacks in implementing resettlement and land acquisition plans
- Changes in project scope and design
- Counterpart funding shortfalls and contractor cash flow issues
- Adverse weather conditions
- COVID-19–related restrictions

The delays often resulted in increased project costs, reduced economic returns, and additional financing requirements.

In supporting cross-border connectivity infrastructure projects, IFIs often serve as both project developers and project financiers. In Southeast Asia, IFIs have provided project development support at three levels:

- **Regional.** Multiyear investment programs and project pipelines for ASEAN, GMS, BIMP-EAGA, and IMT-GT
- **National.** Country partnership strategies or frameworks to guide operations, including identification of project and program pipelines
- **Project.** Individual investment projects through feasibility studies, often financed by dedicated project preparatory facilities

IFIs have used a variety of instruments to finance cross-border connectivity infrastructure projects and have actively promoted cofinancing to enhance the impact and efficiency of development efforts. Of the total cost of the 63 cross-border connectivity hard infrastructure projects approved in 2010–2024, IFIs' own financing accounted for about half, with the remainder drawn from various cofinancing sources.

Among IFIs' own financing sources, the largest share came from market-based sovereign loans, accounting for 28.1% of the total project costs. This was followed by concessional sovereign loans at 12.6%, nonsovereign loans at 8.0%, grants at 1.5%, and equity investments at 0.8%.

Among cofinancing sources, official bilateral cofinancing made up 18.3 percentage points. Government counterpart funding contributed 14.8, commercial cofinancing 11.5, IFI cofinancing 2.5, and other official cofinancing 1.9.

Differences across the sectors were significant. Transport projects relied more on IFI sovereign financing, government counterpart funding, and bilateral official cofinancing, while energy and ICT projects drew more heavily on IFI nonsovereign financing and commercial cofinancing.

IFIs have actively promoted PPPs in their support for cross-border connectivity infrastructure. Among the 63 cross-border connectivity hard infrastructure projects reviewed in this report, 12 were designed as PPPs: 4 in energy generation, 4 in ICT, 2 airports, 1 road, and 1 dry port.

Most of these PPPs were implemented under concession agreements awarded by the government to the special purpose vehicles set up by the project sponsors to implement and manage the projects. The PPPs were financed by diverse funding sources, including IFIs' sovereign and nonsovereign loans, syndicated commercial loans, and equity investment from the project sponsors. Some involved a single project sponsor, while others included multiple sponsors (local, regional, and international).

A review of the five physically cross-border connectivity projects confirms the importance of the recommended practices outlined the G20 working paper, although some contextual nuances were observed. These practices include the following:

- Developing a regional infrastructure plan among participating countries to support long-term strategic planning through agreements on project prioritization and coordination
- Undertaking feasibility studies that demonstrate how benefits and costs are distributed among countries
- Ensuring that the planning process includes thorough consultations with all stakeholders
- Forging cooperation agreements between high-level political decision-makers to support regional plans or specific cross-border projects
- Aligning policy, legal, and regulatory frameworks and technical standards across countries
- Establishing effective intergovernmental institutional arrangements that narrow capacity and coordination gaps

Looking ahead, IFI support remains vital given the significant gaps in and investment needs for cross-border connectivity infrastructure. The review of 158 IFI-financed initiatives — including project investments, policy-based lending, and technical assistance — highlights several priorities for continued engagement in the region:

- Developing a more balanced portfolio of cross-border connectivity projects
- Promoting PPPs and risk-sharing mechanisms while fostering an enabling business environment to attract greater private capital
- Strengthening soft infrastructure to complement hard infrastructure investments
- Implementing measures to enhance project readiness and minimize implementation delays
- Embracing innovative project designs
- Ensuring alignment of investments with both regional and national priorities

In conclusion, while Southeast Asia has made significant progress in strengthening cross-border connectivity infrastructure — driven by strong political will and robust regional cooperation — much more needs to be done. IFIs have played a pivotal role in financing and supporting these efforts, but challenges remain in project implementation, financing, and narrowing regional disparities.

A balanced approach that leverages public and private investment, prioritizes soft infrastructure, and adopts innovative solutions will be critical to achieving a seamlessly connected and integrated ASEAN Community. With their unique strengths in multicountry operations and adherence to high governance standards, IFIs will continue to be critical partners in this effort.

8.2. IFI recommendations

Drawing on the future priorities identified in each chapter, the consulted IFIs highlighted several key points. These were considered particularly important for governments, IFIs, and other development partners operating in the region.

Transport connectivity

1. **Transport modes.** While continuing to support road development to provide missing links in key economic corridors, expand efforts to explore new investment opportunities in cross-border railways, green ports and airports, and advanced logistics solutions
2. **Transport agreements.** Continue supporting institutional connectivity, with a focus on advancing the implementation of cross-border transport agreements

Energy connectivity

3. **APG.** Support the APG Financing Framework, which aims to deliver a coordinated solution to ASEAN's cross-border power requirements while advancing the transition to renewable energy. With an estimated $300 billion required for national power grid development — including $16 billion for the 18 interconnection projects to facilitate energy exchange among ASEAN members by 2040 — the framework emphasizes the need for close collaboration among MDBs and the mobilization of greater private sector investment through PPPs and dedicated transaction advisory services.
4. **Energy reforms.** Put in place standardized planning processes and policies across the region to support the APG

Digital connectivity

5. **Last-mile digital connectivity.** Assist governments in developing innovative financing models to incentivize private operators to provide rural connectivity, such as grants and concessional loans, PPPs, and satellite-based solutions
6. **Business environment.** Support efforts to improve the business environment to attract private sector investment in digital infrastructure through, for example, policy and regulatory reforms that promote competition, harmonization of cross-border policy and regulatory frameworks and technical standards, and the use of PPPs

Crosscutting support measures

7. **Regional coordination.** Continue and deepen collaboration with ASEAN, GMS, BIMP-EAGA, and IMT-GT, which play an invaluable role in forging and coordinating political support for cross-border infrastructure. For instance, deepening engagement with the ASEAN Transport Division and ASEAN transport sector technical working groups was highlighted as a priority to support the new ASEAN transport infrastructure connectivity pipeline.
8. **Technical assistance.** Leverage technical assistance from IFI project preparation facilities and stand-alone facilities such as MCDF to prepare high-quality, sustainable cross-border projects; build capacity to dismantle soft-infrastructure bottlenecks; and improve project readiness to reduce implementation delays
9. **Knowledge and analytics.** Although IFIs have supported extensive knowledge work — such as regularly updating regional investment frameworks that include pipelines for hard and soft infrastructure — additional transport analysis was suggested:
    - Post–COVID-19 trade dynamics and the growing role of intra-regional trade
    - Major railway investments recently implemented or planned, and how they may reshape transport demand and supply in Southeast Asia
    - New technological developments, such as electric mobility, and how countries can work together to benefit from regional economies of scale
    - Intensifying efforts to decarbonize the maritime and shipping sector
10. **Project case studies.** MCDF could consider following up on the report with in-depth case studies of IFI-supported connectivity projects, focusing on the challenges faced and lessons learned to maximize impact and value for money and minimize implementation delays. These case studies could capture insights on technical design, project readiness, procurement, contract management and financial structuring.

Appendix: Highlights of Example IFI Projects

The highlights below showcase the unique features of selected cross-border connectivity infrastructure projects in Southeast Asia financed by international financial institutions (IFIs) in 2010–2024.

Project 1: ADB
Lao People's Democratic Republic (Lao PDR) and Viet Nam: Second Northern GMS Transport Network Improvement Project[87]

- This road project creates a crucial link across the border of the Lao People's Democratic Republic (Lao PDR) and Viet Nam along the Northeastern Economic Corridor of the Greater Mekong Subregion (GMS) Economic Cooperation Program. It provides Lao PDR with year-round access to seaports along the South China Sea.
- The project, with an economic internal rate of return estimated at 14.1% for Lao PDR component and 19.3% for the Viet Nam component, has significantly boosted trade and tourism along the corridor. It has also improved access to health, education, and other social services for local communities, leading to substantial poverty reduction.
- An attached technical assistance project and capacity-building activities supported sound technical and operational design. Comprehensive environmental and social safeguards were implemented to adequately compensate affected communities.
- As part of the GMS regional cooperation business plan for 2010–2012, strong political support from both governments was crucial to the project's successful initiation and completion. Coordination issues related to the project road's border crossing were resolved through a separate ADB cluster regional policy and advisory technical assistance project, which supported the implementation of the GMS transport and trade facilitation action plan across multiple countries.
- The financing package included a mix of sovereign loans and grants, with cofinancing from ADB and the OPEC Fund.
- Adequate funding for road maintenance — backed by commitments from both governments — is essential to sustaining the project's benefits.

Project 2: World Bank
Lao PDR: Southeast Asia Regional Economic Corridor and Connectivity Project[88]

- The project, with parallel financing from Australia, the European Investment Bank (EIB), and the European Union, aims to improve the economic corridor along National Road 2 in Lao PDR, a section of ASEAN Highway 13, and a key part of the GMS East–West Corridor. It includes improvement of critical sections of National Road 2 to meet ASEAN Highway Class III standards and upgrades to local roads and cross-border facilities. The project is designed to improve climate resilience, augment safety measures, and raise the quality of transport corridor infrastructure.
- With an overall economic internal rate of return estimated at 20.5%, the project is expected to boost international and domestic trade along the corridor, improving land transport connectivity in northern Southeast Asia. It strengthens linkages among Lao PDR, Thailand, and Viet Nam, reinforcing Lao PDR's integration within the broader regional economy.

[87] ADB, *Completion Report: Lao People's Democratic Republic and Viet Nam: Second Northern Greater Mekong Subregion Transport Network Improvement Project* (2023).
[88] "Development Projects: Southeast Asia Regional Economic Corridor and Connectivity Project - P176088," World Bank, accessed March 19, 2025.

- The project combines hard infrastructure investment with soft components, including the development of logistics services and border-crossing management, improvement of institutional capacity in customs management and agricultural trade facilitation, and strengthened project management.
- Substantial environmental and social, climate-related, macroeconomic, and political risks identified during project preparation were addressed through environmental and social instruments, oversight by authorities, and creative engineering solutions.
- Revenue from the Road Fund — financed through a fuel levy — has been a key source of funding for road maintenance. Performance-based maintenance contracts have strengthened life-cycle road management by incorporating incentives for contractors to ensure construction quality and efficient maintenance. The contracts transfer certain risks to the contractors.

Project 3: AIIB
Thailand: U-Tapao International Airport Expansion Project (The Construction of the U-Tapao International Airport [UTIA] Second Runway and Taxiway)[89]

- The project will expand UTIA into a state-of-the-art commercial airport to ease congestion at Bangkok's existing airports. It involves constructing a new runway and taxiway connected to a new passenger terminal. With an estimated economic internal rate of return of 30.1%, the project will improve Thailand's international and regional connectivity and support the development of the Eastern Economic Corridor.
- Strong political support — through the Eastern Special Development Zone Act and the establishment of the Eastern Corridor Policy Support — has been crucial to the project's development and launch. Collaboration with experienced international partners is expected to help improve operational efficiency when the airport is completed.
- The public–private partnership (PPP) modality selected for project implementation, along with the concession agreement with the U-Tapao International Aviation Company, enables the government to leverage private sector expertise in developing and operating an internationally competitive airport. This approach supports long-term projected aviation growth in the Bangkok area and helps diversify and minimize financial risks.
- The project will help mobilize private capital for UTIA through a range of planned developments, including a high-speed rail link connecting the airport to Bangkok's two main airports (Suvarnabhumi and Don Mueang); a combined-cycle, cogeneration hybrid power plant using natural gas, a solar photovoltaic farm, and an energy storage system; a waste and wastewater treatment plant; and the development of the Eastern Airport City.
- Large-scale construction activities led to the identification of environmental and social risks — mostly related to noise — but mitigation measures were put in place to address them.

Project 4: ADB
Lao People's Democratic Republic: Greater Mekong Subregion Northern Power Transmission Project[90]

- The project aimed to strengthen Lao PDR's power transmission and distribution infrastructure, expand electricity access to underserved provinces, and facilitate cross-border power trade with neighboring countries. It involved the construction of transmission lines, associated substations, and distribution networks, along with the establishment of interconnection with Thailand's grid.
- The project supported the government's rural electrification program, raising the combined electrification rate in two of the three project provinces to 93%, surpassing the target of 79%. By offering no-interest credit to poor, mostly ethnic minority households, the project contributed to poverty reduction. It increased the two-way power trade between Lao PDR and Thailand. Its soft components — a strategic framework on energy efficiency and renewable energies and a national strategy for hydropower utilization — helped shape national policy.

[89] "Thailand: U-Tapao International Airport Expansion Project (The Construction of the U-Tapao International Airport Second Runway and Taxiway)," AIIB, accessed March 19, 2025.
[90] "Lao People's Democratic Republic: Greater Mekong Subregion Northern Power Transmission Project," ADB, accessed March 19, 2025.

- The cross-border interconnection received strong support from both governments, as well as from Electricité du Laos (EDL, the project's executing agency) and the Electricity Generating Authority of Thailand, building on significant groundwork by the GMS Program to promote cross-border power trade.
- However, the project faced multiyear implementation delays, underscoring the need for adequate project readiness, strong management capacity within the executing agency, thorough risk assessments, and sufficient in-country experience of contractors in delivering infrastructure projects.
- While the project has had significant development impacts, the sustainability of these benefits hinges on EDL improving its financial health, as noted in the project completion validation report by ADB's Independent Evaluation Department.
- The project involved cofinancing between ADB and the Export–Import Bank of Korea, a rare example of an export credit agency partnering with a multilateral development bank. This was made possible through parallel cofinancing, which allowed the Export–Import Bank of Korea to apply its own procurement policies.

Project 5: ADB and AIIB
Lao People's Democratic Republic: Monsoon Wind Power Project[91]

- The project involves the construction and operation of a wind power plant in Lao PDR to generate green energy for export to Viet Nam, supporting economic growth and reducing carbon footprints in both countries. It will help diversify Lao PDR's power exports and boost its foreign exchange earnings and fiscal revenues.
- As the first cross-border wind power project in Asia, it aims to develop the largest wind farm in Southeast Asia, contributing to the ASEAN Power Grid's vision for enhanced regional energy connectivity and energy transition, as well as the GMS's objective of deepening economic cooperation through power trading.
- The project employs an innovative PPP model — a build–own–operate–transfer scheme — involving public and private stakeholders. This approach combines public oversight and political support with private sector efficiency and risk sharing, while attracting a diverse array of funding sources, including public, private, and climate financing.
- Due diligence during project preparation, along with environmental and social safeguard measures — such as biodiversity action plans, resettlement strategies, a gender mainstreaming plan, and grievance mechanisms — helps minimize potential environmental and social risks.
- The project is being implemented under a 25-year power purchase agreement with state-owned Viet Nam Electricity. Its financial viability hinges on consistent electricity generation and the effective execution of the purchase agreement.

Project 6: World Bank
Viet Nam: Southern Waterway Corridors and Logistics Development Project[92]

- The project aims to improve the capacity, efficiency, and safety of transport infrastructure along key east–west and north–south waterway corridors. It involves rehabilitating and upgrading bottleneck sections to accommodate larger vessels and support increased trade logistics cargo flows.
- The project aligns with the government's national Inland Waterways Transport Master Plan, which aims to expand and strengthen IWT as a key transport mode. It enhances connectivity between the largest port in the Mekong Delta, the growing industrial cities of Dong Nai and Binh Duong, Viet Nam's largest port in Ho Chi Minh City, and the deep-sea port at Cai Mep–Thi Vai. It promotes containerization for multimodal transport and supports Viet Nam's export competitiveness.

[91] "Lao People's Democratic Republic: Monsoon Wind Power Project," ADB, accessed March 19, 2025.
[92] "Southern Waterway Corridors and Logistics Development Project," World Bank, accessed March 19, 2025.

- With an estimated economic internal rate of return of 18.6%, the project will cut the distance traveled by 92 kilometers (km) on the East–West Corridor, reducing travel time, transport costs, and vessel accidents. Beneficiaries include IWT operators; farmers; small and medium-sized enterprises; business owners and employees; and the population in southern Viet Nam, who are expected to benefit from lower consumer prices through more efficient waterways.
- The project has other special features:
  - Promotion of a greener transport mode that contributes to climate mitigation
  - Climate-resilient project design that adapts to risks, such as flooding and embankment erosion from rising sea levels
  - Comprehensive environmental and social safeguard measures
  - Detailed assessments of implementation risks and corresponding mitigation measures
  - Government commitment to ensure adequate funding for corridor maintenance

Project 7: IFAD
Cambodia: Agriculture Services Programme for an Inclusive Rural Economy and Agricultural Trade[93]

- The project aims to promote inclusive and sustainable agriculture growth, increasing incomes for rural producers and workers while reducing poverty. It seeks to raise the productivity and market access of smallholder farmers and producer organizations through three components: bolstering the productive assets of producer organizations, fostering partnerships and market access for small-scale producers, and integrating farmers into value chains.
- The project's cross-border connectivity impacts stem from its second component, which involves upgrading critical public services and associated infrastructure to support competitive export growth, particularly in export-oriented plant health and quarantine services.
- The project design includes a robust risk assessment framework. Risks related to market competition, financing instruments, public sector investments, financial management, and procurement were identified and addressed through appropriate mitigation measures.
- The project is funded by diverse sources, including domestic (public and private) and international financing. An innovative feature is the use of matching grants as blocked deposits for loans, significantly reducing risks for banks and lowering traditional collateral requirements for borrowers.
- Social safeguards have been set up to empower marginalized groups and mitigate risks they may face. A strong commitment to environmental protection — through a zero-deforestation policy and adherence to national and international standards — supports the project's social and environmental sustainability. The project promotes climate-smart agricultural practices, renewable energy technologies, climate resilience for farmers, and gender mainstreaming.

Project 8: ADB
Philippines: Malolos–Clark Railway Project [94]

- The project aims to provide an affordable and fast transport link between Clark International Airport and Metro Manila, helping decongest the country's busiest airport, Ninoy Aquino International Airport. It involves constructing a segment of a 163 km suburban railway network connecting Clark with Metro Manila and Calamba, Laguna.
- The investment is part of the government's flagship North–South Commuter Railway Project and features several unique aspects:
  - **Multimodal integration.** The railway line integrates with other transport modes.
  - **Technological advancements.** Cutting-edge railway technology ensures operational reliability and safety.
  - **Climate-resilient design.** The infrastructure is engineered to be flood-resistant, maintaining functionality during extreme weather conditions.

[93] "Agriculture Services Programme for an Inclusive Rural Economy and Agricultural Trade: Cambodia," IFAD, accessed March 19, 2025.
[94] "Philippines: Malolos–Clark Railway Project," ADB, accessed March 19, 2025.

- The project is expected to generate significant economic benefits and development impacts by improving logistics and transport efficiency in Metro Manila and surrounding areas, while enhancing regional and international connectivity. It will help stimulate business investment, create jobs, and promote tourism. It will cut travel time between Metro Manila and Clark from two or three hours to under one hour, and contribute to climate mitigation by providing a greener transport mode.
- To mitigate environmental and social risks associated with this large-scale infrastructure project, various safeguard measures were put in place. These included environmental management plans, a resettlement and Indigenous Peoples planning framework, stakeholder consultations, and training programs for women.
- Other project risks include delays in the release of counterpart funds, delays in completing related infrastructure, and inadequate operation and maintenance (O&M) funding. To mitigate these risks, the government has allocated budgets, approved critical related projects, and committed to fully finance O&M costs during the initial years of operation, when revenues are expected to be insufficient.

Project 9: ADB
Lao People's Democratic Republic: CAM/LAO: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion Trade Project[95]

- The project aimed to strengthen institutional, operational, and management capacities in Cambodia and Lao PDR to operate cost-effective sanitary and phytosanitary (SPS) systems that facilitate trade and protect public health. It involved establishing surveillance and inspection programs for plant health, animal health, and food safety; improving regional cooperation and harmonization for SPS measures and practices; and enhancing education and university-level training for SPS specialists.
- The project aligns with the targets of Cambodia's National Strategic Development Plan Update, 2009–2013, and Lao PDR's National Socio-Economic Development Plan VII, 2011–2015. Improving SPS management is a priority in various sector strategies and plans of both countries, as well as in the GMS Core Agriculture Support Program.
- The project completion report concluded that the project achieved its intended objectives, with increases in agriculture, forestry, and fisheries exports and tourist arrivals, and reductions in foodborne diseases — all exceeding their targets. The project strengthened the two countries' confidence in trade negotiations.
- The project was supported by technical assistance to review policies, develop institutional and operational frameworks, conduct due diligence, and prepare project documentation and implementation plans. A separate capacity-building technical assistance project helped strengthen SPS regional cooperation and monitoring through training workshops, cross-border coordination, and the development of an evaluation framework for SPS capacity building.
- To fully realize the benefits of SPS improvements, a higher level of technical capacity is required beyond what the project has already achieved. Additional funding sources are needed to increase regular budgetary allocations for O&M to sustain the project's benefits.

[95] "CAM/LAO: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion Trade Project," ADB, accessed March 19, 2025.

Project 10: AIIB
Indonesia Multifunctional Satellite PPP Project[96]

- The project supports the government's goal of providing connectivity to more than 149,000 public service points in Indonesia's least developed, frontier, and outermost regions. As the country's first satellite PPP project, it involves the construction, launch, and operation of a 150-gigabit-per-second-high throughput satellite with Ka-band frequency.
- The project is expected to generate substantial socioeconomic benefits by expanding and improving digital connectivity, reaching 93,900 schools, 47,900 villages, 3,700 health centers, 3,900 local governments, and 45 million individuals, including 23 million women.
- The project is strongly supported by the government, as it advances the goal of providing fast internet access to remote areas where satellite-based connectivity is the only feasible and cost-effective option. The innovative PPP modality brings together the government and the private sector, leveraging private sector expertise and efficiency, reducing public sector investment risks, and fostering innovation.
- Mitigation measures — including environmental assessments and grievance redress mechanisms — will address environmental and social risks associated with the project's construction, such as dust, noise, and potential community displacement.

Project 11: AIIB
Multicountry: Data Center Development in Emerging Asia[97]

- The project aims to promote greener digital infrastructure and cross-border connectivity, while helping bridge the digital divide in emerging Asia. It will finance the development of data centers primarily serving emerging Asia through the Keppel Data Centre Fund II, LP, a closed-end private equity vehicle managed by Alpha Investment Partners Ltd.
- With the acceleration of 5G technology, the need for investment in digital infrastructure has become pressing. The project aligns with AIIB's thematic priorities — connectivity and regional cooperation, green infrastructure, and private capital mobilization — as well as its strategy for geographical diversification. AIIB will participate in the fund as a limited partner.
- The project is guided by AIIB's Environmental and Social Policy, and carries a Category Financial Intermediary designation. It ensures compliance through the financial intermediary's environmental, social, and governance framework, with established mechanisms for environmental and social documentation, grievance redress, and the resolution of concerns raised by project-affected people.
- The project will leverage Alpha's expertise in data center operations, sustainable technology, and energy efficiency to develop better and greener data centers. It will support Alpha in creating climate finance monitoring indicators, applying the joint multilateral development bank methodology for tracking climate finance, and establishing an environmental and social management system for the fund.

[96] "Indonesia: Multifunctional Satellite PPP Project," AIIB, accessed March 19, 2025.
[97] "Multicountry: Data Center Development in Emerging Asia," AIIB, accessed March 19, 2025.

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