APCTT
Asian and Pacific Centre for Transfer of Technology
ESCAP

Consolidated Reply

Query 4 -

Innovative Financing Mechanisms for Energy Transition

Community of Practice (CoP) on Climate Technologies

APCTT
COMMUNITY OF PRACTICE ON CLIMATE TECHNOLOGIES

Community of Practice (CoP) on Climate Technologies

Shared Experiences, Smarter Solutions for Climate Action and Resilience

The Community of Practice (CoP) on Climate Technologies launched by the Asian and Pacific Centre for Transfer of Technology (APCTT) is dedicated to addressing the multifaceted challenges posed by climate change in the Asia-Pacific region through technology solutions. By leveraging the region's rich innovation capacities and good practices, the CoP aims to enhance access to critical knowledge on climate technologies. The Community connects professionals engaged in delivering technological solutions to climate change.

The objective of this Community of Practice is to:

- Promote collaborative problem-solving and policy-relevant dialogue
- Support the localization and transfer of innovations suited to national priorities
- Enhance institutional capacities for climate technology governance
- Enable matchmaking between solution providers and implementers

The Community is driven by a participatory and adaptive model that combines knowledge generation, engagement, and access to resources through the following mechanisms: monthly Query-Response Consolidated Reply (CR) cycle, webinars and interactive discussions, knowledge repository and much more.

Original Query by: Md Selim Reza, Ministry of Finance, Bangladesh

Posted: 14th October 2025

The global energy transition is progressing rapidly, with renewable power additions reaching approximately 585 GW in 2024, raising total installed capacity to 4,448 gigawatt (GW) worldwide[1]. Yet, renewables still account for only 13 percent of total final energy consumption, highlighting the scale of the challenge[2]. Achieving the COP28 goal of tripling capacity by 2030 will require annual grid investments of United States Dollar (USD) 600 - 800 billion, nearly double today's levels[3]. Persistent barriers include high fossil fuel subsidies of USD

7 trillion (7.1 percent of global gross domestic product (GDP)) in 2022, financing gaps in emerging economies, supply-chain volatility, and slow permitting[4].

Recognizing these challenges and building on the diverse experiences of our members, we invite your contributions to the following questions:

1. From your own experience, what proven innovative solutions - such as green banks, blended digital finance mechanisms, green bonds, or community-based initiatives - have been effective in supporting both utility and distributed renewable energy projects?

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[1] IRENA. (2025). Renewable Capacity Statistics 2025 . International Renewable Energy Agency.
[2] IRENA. (2024). *World Energy Transitions Outlook 2024*. International Renewable Energy Agency.
[3] IEA. (2023). World Energy Outlook 2 0 2 3 . International Energy Agency.
[4] IMF. (2023). IMF Fossil Fuel Subsidies Database 2023 . International Monetary Fund.

2. What has been your direct experience in designing or implementing successful policy models, digital technologies (including artificial intelligence (AI), blockchain, or internet of things (IoT)), or regulatory frameworks that have improved renewable energy deployment, reliability, and inclusivity?

Your experiences and insights will contribute to regional knowledge sharing and inform inclusive strategies for advancing renewable energy transition in the Asia-Pacific region and would be greatly appreciated.

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1. Summary of Responses

There is major shift in financing of renewable energy initiatives in Asia–Pacific due to the urgent need to match national development goals with climate commitments. Countries in the region have a common priority for mobilizing capital at a large scale, reduce investment risk and facilitate distribution of energy transition to all sections of their societies. A common learning that has emerged is that the success of energy transition will depend on mechanisms of design, delivery and meeting social needs more than the amount of actual capital invested.

Bangladesh has used concessional capital, domestic funds and Green Transformation Fund as examples of policy direction and blended public–private finance. Additionally, the IDCOL model and the Bangladesh Climate Change Trust Fund has helped the country expand clean-energy access. Other examples include Islamic green sukuk, Article 6 carbon-credit instruments and digital green-investment platforms to strengthen future financing systems.

In Mauritius and other Small Island Developing States, energy-transition strategies must factor in the challenges of small markets, high financing costs and extreme climate vulnerability. Mauritius adopted green and blue bonds, blended finance facilities and performance-linked structures to manage these constraints and support low-carbon infrastructure. The Sustainable Smart Port Assessment for Port Louis attracted capital through transparent monitoring and targeted innovation and demonstrates a model for other coastal economies to adapt.

The Pacific Island countries show other approaches. Fiji supports sovereign green bonds; Vanuatu has developed a National Green Energy Fund. Tonga has put in place blended GCF- supported initiatives for small states to attract international capital in line with their policy frameworks. Digital

technologies such as smart metering, IoT-linked billing and data-driven regulatory systems demonstrate cases where financial and technological innovation can concurrently improve reliability and inclusivity of renewable energy systems.

Waste-to-compost models and methane-reduction projects in Pakistan through decentralized and community-led approaches demonstrate local financially viable climate solutions. These examples emphasize the role of NGOs, cooperatives and public–private partnerships in scaling low-carbon interventions for broader environmental reforms. In Iran, regulated crowdfunding through platforms under the Iran Fara Bourse is financing early-stage renewable technologies. These offer investor protection and also open clean-energy entrepreneurship to a wider participant base.

Simultaneously, in Southeast and East Asia, large renewable-energy investments revolve around blended finance, green bonds, sustainability-linked loans and Just Energy Transition Partnerships. Indonesia and Viet Nam use guarantees and concessional finance to enhance policy certainty, reduce costs of financing and facilitate phasing of a shift away from coal. Central banks in Japan, China and Malaysia provide subsidised green credit lines, targeted refinancing facilities and regulatory measures thus expanding access of capital for SMEs and new and emerging climate technologies.

On the other hand, in India and Africa, consumer-driven models have increased access to solar home systems and solar irrigation (e.g. pay-as-you-go and pay-as-you-save systems) with support from mobile payments and digital credit scoring. These models demonstrate how private finance can be attracted by digital innovation while also improving affordability. Sikkim has implemented digital energy-monitoring tools, green building norms and youth-led programs in a blended finance method to support community adoption. India has also built a national level green financing system using sovereign green bonds, viability gap funding, credit-

enhancement facilities, national carbon-credit trading system under growing portfolios of REC, PFC, IREDA and NIIF. Government Schemes (e.g. PM Surya Ghar) provide subsidy-credit structures and digital verification to encourage access to rooftop solar.

Central to a just energy transition are the priorities of equity and inclusion. SELCO Foundation's community-centered models for credit-linked distributed energy systems and Barefoot College's community-owned solar initiatives demonstrate how clean energy can be taken to last-mile communities using microcredit and cooperative structures, including the supporting of livelihoods and gender inclusion. Renewable-energy finances must therefore advance social priorities and cultural practices as well as much as economic goals as these models show.

Across national examples, cross-cutting themes that are shaping the region's financing outlook include high capital costs limiting progress, because utility-scale renewable projects still face borrowing rates well above those in OECD economies in many markets. Partial risk guarantees, foreign-exchange hedging tools and standardized power-purchase agreements can reduce tariffs and build investor confidence, as shown by recent procurements. A heavy reliance on foreign-currency finance is another factor exposing projects to volatility, underlining the need to expand local-currency green-bond markets and blended refinancing windows, drawing on domestic pension and insurance funds. Digital innovation has emerged as a critical enabler, with examples such as IoT-based metering, blockchain verification and digital aggregation platforms. These improve transparency, cut system losses and help distributed-energy assets become investment-ready. Early-stage project development is another obstacle as many projects lack funding for land approvals, interconnection studies and feasibility assessments. Without this foundation, blended-finance facilities will struggle to move capital. Systemic issues (e.g. transmission congestion, grid-integration gaps, limited storage capacity) demonstrate the need for including grid upgrades and flexibility resources from the start in the financing strategies.

All the above experiences have shown that the clean-energy transition in the Asia–Pacific will depend on resilient, transparent and socially inclusive financing structures. The region meeting its renewable-energy targets is based on strengthening taxonomies, monitoring systems and pooled de-risking platforms as much as on mobilizing capital. Aligning national policies with long-term regional climate and development goals is crucial. For a just and sustainable energy future, stronger cooperation across the above areas seems to be an essential prerequisite to attract the investments required for transition to renewables across Asia Pacific.

2. Relevant Experiences

Australia

Australia's Clean Energy Finance Corporation (CEFC), one of the world's largest green banks has catalyzed over USD 50 billion in renewable and energy-efficiency investments. As of mid- 2025, CEFC's own commitments of A$18.3 billion have mobilized a total of A$85.3 billion through co-investments. By blending public and private capital, CEFC drives large-scale solar, wind, EV, and energy-efficient infrastructure, a model showcasing how sovereign green banks can accelerate decarbonization and net-zero transitions.

Bangladesh

Bangladesh's Infrastructure Development Company Limited (IDCOL) pioneered concessional and blended financing for off-grid renewable energy. Backed by the World Bank, KfW[5], and GCF, IDCOL has installed over 6 million solar home systems, biogas plants, and solar irrigation pumps. The model integrates microfinance institutions that tie repayment to productive-use activities such as solar-powered sewing and agro-processing ensuring both social and financial sustainability. IDCOL's success led to the issuance of green sukuk bonds in 2023 and informed the country's "Sustainable Smart Bangladesh 2041" strategy.

[5] KfW is Kreditanstalt für Wiederaufbau, (German for Credit Institute for Reconstruction)

Bhutan

Bhutan's Green Bond Framework directs funds to small hydropower, solar, and efficiency projects, maintaining the country's carbon-negative status. Revenue-sharing and community participation ensure equitable benefits, while results-based financing results-based financing (RBF) from ADB and GCF enhances accountability. The government's partnership with India for sustainable hydropower includes environmental-safeguard financing and biodiversity offsets, linking fiscal innovation with ecological stewardship.

Cambodia

Through the ASEAN Catalytic Green Finance Facility (ACGF), Cambodia has developed innovative PPP and concessional finance structures for solar parks, waste-to-energy plants, and micro-grids in Koh Kong and Kampot. The 2023 National Green Taxonomy provides Environmental, Social and Governance (ESG) alignment for banks and corporates, enabling access to blended capital. By combining donor guarantees with domestic-currency lending, Cambodia is advancing rural electrification and coastal resilience.

China

China's Green Finance Pilot Zones and Green Bond Endorsed Project Catalogue have channelled more than USD 300 billion into renewable-energy innovation, grid modernization, and battery storage. The national Sponge City Program, partially financed through green municipal bonds, uses hybrid blue-green and grey infrastructure to manage stormwater and enhance resilience. Digital Monitrong, Reporting and Verification (MRV) systems and green taxonomies ensure transparency, while fintech-enabled loan platforms expand small and mdium-sized enterprises (SME) participation in clean-energy markets.

Fiji

Fiji has positioned itself as a pioneer in blue and sustainable finance. The Blue Bond Initiative raises capital for low-carbon maritime transport and coastal resilience. The Sustainable Energy Finance Project, supported by United Nations Development Programme (UNDP) and the Reserve Bank

of Fiji, provides risk-sharing guarantees to commercial banks for renewable-energy lending. This mechanism has mobilized private investment in off-grid solar and biofuel projects in outer islands, while ensuring inclusion of women-led enterprises in the energy transition.

India

India's financing ecosystem spans community to institutional levels. The Sovereign Green Bonds (2023–24) mobilized over USD 2 billion for solar, wind, and e-mobility projects. IREDA, REC, and power finance corporation limited (PFC) provide concessional loans supported by multilateral partners, while Solar Energy Corporation of India Limited (SECI's) reverse auctions attract private players through transparent tariff discovery. NGO-led models like SELCO Foundation and Barefoot College integrate microcredit, blended finance, and livelihood linkages training women as "Solar Mamas." Early-stage investors like CIIE.CO[6] and the India Climate Collaborative have created catalytic funding pathways for clean-tech start-ups. Together, these innovations form a multi-tiered, inclusive model for energy transition.

Indonesia

Indonesia's Green Sukuk, the world's first sovereign Islamic green bond has raised over USD 5 billion for renewables, energy efficiency, and sustainable transport. The Energy Transition Mechanism (ETM) with ADB blends concessional and commercial capital to accelerate coal retirement and finance renewables. National ESG disclosure regulations and digital project registries foster investor confidence. The approach demonstrates how faith-based and market instruments can jointly support decarbonization.

Iran

Iran is piloting green financial mechanisms within urban and industrial sectors, focusing on solar, biogas, and waste-to-energy initiatives. UN-Habitat's urban-resilience partnership introduces low-interest credit lines and ESG-aligned disclosure for municipalities, linking green financing with improved governance and risk reduction. These programs strengthen domestic investment in decentralized renewable systems.

Japan

Japan's Joint Crediting Mechanism (JCM) facilitates bilateral carbon-finance projects with Asia- Pacific partners, allowing emission credits to be shared. Domestic banks offer sustainability- linked loans and transition bonds aligned with Japan's Green Transformation (GX) Strategy. By linking financial innovation with overseas cooperation, Japan promotes technology transfer and regional decarbonization.

Kazakhstan

Kazakhstan's Green Finance Centre (GFC) within the Astana International Financial Centre oversees the national taxonomy and manages a dedicated Green Bond Segment. UNDP's Green Cities Program promotes energy-efficient buildings and Energy Service Company (ESCO) models financed through blended capital. Tax incentives and sovereign guarantees reduce investment risk in renewable infrastructure.

Kenya

Kenya's Pay-As-You-Go (PAYG) solar sector-led by firms like M-KOPA[7] and d.light[8] has brought clean energy to over 3 million households. Through mobile-money micro-payments, users access solar home systems without upfront cost. These models, supported by United States Agengy for International Development (USAID) and Development Finance Institution (DFIs), have mobilized USD 1.5 billion in private capital while improving rural livelihoods.

Lao PDR

Lao People's Democratic Republic (DPR's) Green Growth Strategy integrates public green funds, concessional loans, and Public-Private Partnership (PPPs) for hydropower modernization and solar mini-grids.

[7] M-KOPA: Pay-as-you-go solar financing company. https://www.mkopa.com/

[8] d.light: Affordable off-grid solar solutions provider. https://www.dlight.com/about?

Transparent reporting under the Carbon Disclosure Project-International Council for Local Environmental Initiatives (CDP-ICLEI) Track ensures accountability and facilitates climate-finance inflows. This open-governance model enhances donor alignment and long-term resilience financing.

Malaysia

Malaysia's Green Technology Financing Scheme (GTFS) provides government-backed guarantees covering up to 60% of loan risks for renewables and efficiency projects. The ASEAN Catalytic Green Finance Facility co-finances large solar parks and low-carbon transport. Together, they have leveraged USD 1.5 billion and established Malaysia as a regional green- finance hub.

Maldives

The Climate Resilient Islands Program and Green Fund finance solar rooftops, desalination powered by renewables, and electric mobility for tourism. Through Green Climate Fund (GCF) and Asian Development Bank (ADB) partnerships, Maldives blends grants and concessional loans, ensuring island communities access clean, affordable energy and climate-resilient infrastructure.

Mongolia

The Mongolia Green Finance Corporation provides low-interest credit for clean heating and green buildings through partnerships with local banks. ADB's Upscaling Renewable Energy Program blends grants and loans to support wind and solar development. These mechanisms contribute to reduced air pollution and improved energy security in urban areas.

Myanmar

Myanmar's National Electrification Plan employs output-based aid and community micro-loans for solar mini-grids in remote villages. Supported by the World Bank and GEF, the model prioritizes affordability and resilience amid fragile contexts, promoting decentralized renewable access.

Nepal

Nepal's Alternative Energy Promotion Centre (AEPC) combines revolving funds, grants, and cooperative finance to implement micro-hydro, solar, and biogas systems. Performance-based disbursement ensures sustainability and accountability. The approach has electrified thousands of mountain villages while fostering local entrepreneurship.

New Zealand

New Zealand Green Investment Finance (GIF) mobilizes private investment for electric vehicle (EV) fleets, renewable projects, and industrial efficiency. The government co-invests in projects with measurable emission-reduction outcomes. GIF's transparent impact metrics and flexible equity-loan structures position it as a best-practice model for small advanced economies.

Pakistan

Pakistan's State Bank Green Refinance Scheme provides concessional loans to SMEs for renewable and efficiency upgrades. The forthcoming Green Bond Framework will fund solar, wind, and hybrid projects. By combining central-bank credit with sustainable-finance regulations, Pakistan is institutionalizing climate finance in its monetary system.

Papua New Guinea

Papua New Guinea blends community trust funds and ADB concessional finance to expand solar mini-grids in rural areas. Women's cooperatives manage repayment, linking financial inclusion with energy access. This decentralized model improves livelihoods while ensuring long- term maintenance.

Philippines

The Green Energy Auction Program employs digital platforms for transparent renewable-power procurement. Backed by the Development Bank of the Philippines (DBP) and ADB, the program uses partial-risk guarantees and performance-based contracts to attract institutional investors. Community cooperatives receive micro-finance for rooftop solar, ensuring inclusive participation.

Republic of Korea

Korea's Green New Deal (2020) allocates USD 60 billion for clean energy, green transport, and digital infrastructure. The Korea Development Bank and Export-Import Bank of Korea issue green bonds and sustainability-linked loans for hydrogen and battery technologies. ESG disclosure standards and carbon-pricing integration strengthen investor confidence.

Samoa

Samoa's Renewable Energy Development Project, supported by GCF and ADB, finances hydropower rehabilitation and solar mini-grids using concessional and grant blending. Community ownership and gender mainstreaming ensure equitable benefit-sharing. The project strengthens island energy security and climate resilience.

Singapore

Singapore's Green Finance Hub under the Monetary Authority of Singapore (MAS) advances sustainability-linked loans and green bonds for infrastructure developers. The Green Taxonomy defines eligible assets, while the Grant Scheme for Green Bonds covers verification costs, catalyzing rapid market growth. Singapore's City in a Garden vision links policy, finance, and innovation for a low-carbon economy.

Solomon Islands

In Solomon, the Rural Electrification Program employs blended climate finance from GEF and World Bank to expand solar mini-grids in outer islands. Community financing and gender- responsive design ensure equitable access. These interventions improve resilience and reduce reliance on imported diesel.

Sri Lanka

Sri Lanka's Energy Sector Development Program (ADB) applies results-based financing to improve efficiency and expand renewable capacity. Rural microfinance initiatives support household-level solar rooftops and biogas units. The integration of local banks and cooperatives promotes affordability and sustainability.

Thailand

Thailand's Energy Transition Mechanism Partnership (ETM-P) blends concessional capital to retire coal plants early. The Thai Bond Market Association promotes green bond issuance, while ESCO models finance rooftop solar and energy retrofits. The Chulalongkorn University Innovation Park demonstrates successful integration of public-space design with green financing.

Tonga

Tonga employs community co-financing and CDP-guided transparency to attract blended finance for solar micro-grids and coastal energy systems. Municipal-level tracking and participatory budgeting strengthen trust among donors and local stakeholders.

Viet Nam

Viet Nam's Green Credit Program by the State Bank and International Finance Corporation (IFC) incentivizes private banks to lend for renewables and efficiency. Feed-in tariffs, corporate power purchase agreement (PPAs), and green bonds drive large-scale solar and wind deployment. Viet Nam's Just Energy Transition Partnership (JETP) mobilizes USD 15.5 billion in public-private capital to phase down coal and scale clean power equitably.

3. Related Resources

Relevant Documentation

ADB - Innovative Financing for Clean Energy Transition in Asia and the Pacific: Explores policy frameworks and blended-finance instruments for accelerating renewable energy investment in developing Asia. Covers de-risking tools, sovereign green bonds, and concessional funds that bridge private and public capital.
(https://www.adb.org/publications/financing-clean-energy-developing-asia)

ADB - Energy Transition Mechanism (ETM) in Southeast Asia: Scaling **Up Finance for Coal Retirement**: Details the ETM framework that combines concessional and commercial finance to retire coal power plants early and reinvest in renewables. Highlights Indonesia and Philippines pilot models.
(https://www.adb.org/what-we-do/energy-transition-mechanism-etm)

ADB - Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Clean Energy: Provides methodologies for blending grants, guarantees, and equity to mobilize private investment in clean-energy projects, with examples from India, Thailand, and Viet Nam.
(https://www.adb.org/sites/default/files/publication/357156/catalyzing-green-finance.pdf)

ADB - Scaling Green Finance in Asia: Emerging Models: Assesses trends in sustainable finance markets across Asia. Discusses sovereign green bonds, ESG reporting, and climate- aligned investment pipelines.
(https://www.adb.org/publications/fostering-green-finance-sustainable-development-asia)

Asian Infrastructure Investment Bank (AIIB) – Energy Sector Strategy: Financing Sustainability: Describes AIIB's framework for mobilizing private and public capital for renewables, emphasizing results-based lending and carbon-pricing integration.
(https://www.aiib.org/en/policies-strategies/strategies/sustainable-energy-for-tomorrow.html)

BloombergNEF - Emerging Markets Outlook for Clean Energy Finance 2024: Analyzes evolving investor trends and risk barriers in emerging economies. Features innovative green finance instruments in India, Indonesia, and Viet Nam.
(https://about.bnef.com/insights/clean-energy/new-energy-outlook/)

Carbon Trust - Green Finance and De-Risking Instruments for Developing Countries: Summarizes mechanisms such as partial-risk guarantees, insurance pools, and performance- based financing that can reduce investment risk in clean energy.
(https://www.sciencedirect.com/science/article/pii/S2542435120305006)

Climate Policy Initiative (CPI) - Global Landscape of Climate Finance 2023: Comprehensive mapping of USD 1.4 trillion in annual global climate finance flows. Highlights the growing role of blended and concessional finance in energy transition.
(https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2023/)

Climate Bonds Initiative - Green Bond Market Summary 2024: Provides global and regional insights into green bond issuance, certification standards, and taxonomy alignment relevant to renewable-energy financing.
(https://www.climatebonds.net/files/documents/publications/Sustainable-Debt-Market- Summary-H1-2024.pdf)

European Investment Bank - Green Financing Instruments for Energy Transition: Examines lessons from the EU's Green Deal financing and Just Transition Mechanism for application in Asia-Pacific contexts.
(https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op367~16f0cba571.en.pdf)

Global Energy Alliance for People and Planet (GEAPP) - Financing Distributed Renewables: Documents innovative financing tools such as demand aggregation, credit guarantees, and PAYG mechanisms for last-mile electrification.
(https://energyalliance.org)

Green Climate Fund (GCF) - Readiness and Preparatory Support for Energy Transition: Provides operational guidance for accessing GCF readiness funds and concessional loans for clean energy projects and policy support.
(https://www.greenclimate.fund/readiness)

IEA - Financing Clean Energy Transitions in Emerging and Developing Economies: Defines the investment requirements to achieve net zero in EMDEs, focusing on risk-reduction, blended finance, and national enabling policies.
(https://www.iea.org/reports/financing-clean-energy-transitions-in-emerging-and-developing- economies)

IEA - World Energy Investment Report 2024: Annual review of investment flows in renewables, grids, and clean technology. Analyzes cost of capital, regional disparities, and financing barriers. (https://www.iea.org/reports/world-energy-investment-2024/overview-and-key-findings)

IFC - Green Banking Toolkit for Emerging Markets: Guides financial institutions in developing green products, risk frameworks, and ESG-aligned lending for renewable energy and energy efficiency.
(https://www.ifc.org/en/what-we-do/sector-expertise/sustainability)

IDCOL (Bangladesh) - Financing Solar Home Systems and Mini-Grids: Case study on IDCOL's PPP model combining concessional loans, microcredit, and output-based aid for off- grid solar deployment, now replicated in several countries.
(https://ppp.worldbank.org/sites/default/files/2024-07/Output-Based_Aid_Bangladesh_Solar_Home_Systems_Rural_Households_2012_EN.pdf)

IRENA - Renewable Energy Finance: Institutional and Policy Perspectives: Evaluates global investment trends, identifies policy levers for crowding in private capital, and provides guidance on risk-sharing frameworks.
(https://www.irena.org//media/Files/IRENA/Agency/Publication/2020/Nov/IRENA_Mobilising_Institutional_Capital_2020.pdf)

IRENA - Innovation Landscape for Smart Electrification and Finance: Explores digital technologies AI, IoT, and blockchain in financing distributed renewable energy systems and performance-based credit scoring. (https://www.irena.org//media/Files/IRENA/Agency/Publication/2023/Jun/IRENA_Innovation_landscape_for_smart_elect rification_2023.pdf)

Japan International Cooperation Agency (JICA) – Green Investment Framework for Asia: Outlines concessional loan schemes, credit guarantees, and regional partnerships enabling low- carbon investments, focusing on Southeast Asia.
(https://www.jica.go.jp/Resource/english/ir/financial/c8h0vm0000az4vl9-att/investorpresentation.pdf)

OECD - Clean Energy Finance and Investment Policy Review: Indonesia: Provides policy roadmap for mobilizing private investment through fiscal incentives, risk-mitigation facilities, and green sukuk markets. (https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/06/clean-energy-finance-and-investment-policy-review-of-indonesia_966c6193/0007dd9d-en.pdf)

OECD - Sustainable Finance Taxonomies in Asia: Building Regional Alignment: Compares taxonomy development across 10 Asian countries, recommending harmonization for regional green capital markets.
(https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/10/developing-sustainable-finance-definitions-and-taxonomies_e2b5148f/134a2dbe-en.pdf)

UN ESCAP - Asia-Pacific Green Deal for Business: Mobilizing Private Finance for Renewables: Policy guidance for enabling private-sector investment in renewable energy, with case studies on green bonds, carbon markets, and digital finance platforms.
(https://www.unescap.org/projects/gd)

UNDP - Financing the 2030 Agenda: Outlines regulatory reforms and fiscal incentives for leveraging concessional and blended finance. Includes examples from India, Nepal, and Fiji.
(https://www.undp.org/sites/g/files/zskgke326/files/publications/Financing_the_2030_Agenda_C O_Guidebook.pdf)

UNEP - Guiding Principles for development of credible, comparable, sustainable finance frameworks to help mobilize capital: Presents financial-sector guidance for structuring climate-aligned lending portfolios and green investment taxonomies in emerging markets.
(https://www.unepfi.org/news/taxonomy-roadmap-initiative-releases-principles-for-taxonomy-Interoperability)

World Bank - Sustainable Development Bonds & Green Bonds 2023: Documents the Bank's green bond portfolio with focus on renewable-energy, efficiency, and transport sectors. Includes case results from India, China, and Viet Nam.
(https://thedocs.worldbank.org/en/doc/667f95939700497452d00a1544ba2d01-0340022024/original/World-Bank-IBRD-FY23-IMPACT-REPORT.pdf)

World Bank - Scaling Up to Phase Down: Financing Energy Transitions in Developing Countries: Major 2023 report outlining global best practices for financing the early retirement of fossil-fuel assets and mobilizing investment for renewables, grids, and storage.
(https://www.worldbank.org/en/news/press-release/2023/04/20/scaling-up-to-phase-down-financing-energy-transition-in-developing-countries)

Relevant Organizations

Asian Development Bank (ADB): A leading multilateral bank financing renewable energy, clean technology, and low-carbon infrastructure through mechanisms like the Energy Transition Mechanism (ETM) and ASEAN Catalytic Green Finance Facility (ACGF).
(https://www.adb.org)

Asian Infrastructure Investment Bank (AIIB): Provides debt and equity investments for renewable-energy, energy-efficiency, and sustainable transport projects, emphasizing blended finance and private-sector mobilization in Asia.
(https://www.aiib.org)

Climate Policy Initiative (CPI): Global think tank tracking climate-finance flows and designing innovative financial instruments to de-risk renewable-energy and adaptation investments.
(https://www.climatepolicyinitiative.org)

Green Climate Fund (GCF): The world's largest climate-finance mechanism supporting developing countries through grants, concessional loans, guarantees, and equity for clean- energy transitions and resilience.
(https://www.greenclimate.fund)

Global Environment Facility (GEF): Provides co-financing and catalytic support for renewable- energy, biodiversity, and sustainable-land initiatives through blended-finance partnerships.
(https://www.thegef.org)

International Renewable Energy Agency (IRENA): Promotes global renewable-energy adoption and finance, offering data, policy guidance, and the Energy Transition Accelerator Financing Platform (ETAF) for emerging economies. (https://www.irena.org)

International Energy Agency (IEA): Produces analytical research on clean-energy investments, cost-of-capital barriers, and energy-transition pathways for emerging and advanced economies. (https://www.iea.org)

International Finance Corporation (IFC - World Bank Group): Supports private-sector renewable-energy projects via green bonds, blended finance, and ESG-aligned banking products under its Green Banking Toolkit.(https://www.ifc.org)

World Bank Group - Energy Global Practice: Mobilizes concessional and commercial finance for clean-energy and grid-modernization projects. Publishes flagship studies like Scaling Up to Phase Down on coal retirement. (https://www.worldbank.org/en/topic/energy)

UN ESCAP - Asia-Pacific Centre for Technology Transfer (APCTT): Facilitates regional cooperation and knowledge exchange on innovative financing, technology transfer, and policy frameworks for renewable-energy transition. (https://apctt.org)

United Nations Development Programme (UNDP): Implements renewable-energy and clean- cooking programs through grants, de-risking tools, and blended finance, including the Sustainable Energy Hub.
(https://www.undp.org)

UNEP Finance Initiative (UNEP FI): Partnership between UNEP and global financial institutions promoting sustainable-finance principles, green bonds, and transition-finance frameworks for banks and investors.
(https://www.unepfi.org)

UN Energy Compact Secretariat: Coordinates commitments from governments and companies toward SDG 7 by tracking renewable-energy financing pledges and public-private partnerships.
(https://www.un.org/en/energycompacts)

Global Energy Alliance for People and Planet (GEAPP): Philanthropy-industry partnership funding distributed renewable-energy systems through catalytic grants, concessional finance, and demand-aggregation models.
(https://www.energyalliance.org)

Sustainable Energy for All (SEforALL): UN-backed initiative supporting governments to develop investment roadmaps, finance facilities, and risk-mitigation mechanisms for universal clean-energy access.
(https://www.seforall.org)

Clean Energy Ministerial (CEM): A global forum of 30+ countries accelerating energy-transition cooperation on clean-power finance, hydrogen, and energy-efficiency policy frameworks.
(https://www.cleanenergyministerial.org)

OECD Centre on Green Finance and Investment: Provides policy analysis and convenes dialogues on green-finance taxonomies, sustainable-investment frameworks, and capital-market reforms for clean energy.
(https://www.oecd.org/en/networks/forum-on-green-finance-and-investment.html)

Climate Investors Program (Climate Fund Managers): Blended-finance fund deploying equity and debt to renewable-energy and water-infrastructure projects in developing markets through public-private partnerships.
(https://www.climatefundmanagers.com)

Global Infrastructure Facility (GIF): A G20-endorsed global partnership that provides transaction-advisory and blended-finance solutions for sustainable and climate-aligned infrastructure.
(https://www.globalinfrafacility.org)

Green Finance Centre (Kazakhstan): Regional hub for developing green-bond standards, taxonomies, and financial instruments within the Astana International Financial Centre (AIFC). (https://gfc.aifc.kz)

International Solar Alliance (ISA): Intergovernmental organization of 120 countries promoting solar deployment through concessional credit lines, risk-guarantee mechanisms, and solar finance catalyst funds.(https://isa.int)

International Hydropower Association (IHA): Supports sustainable hydropower financing and ESG standards through the Hydropower Sustainability Standard and partnerships with multilateral banks.
(https://www.hydropower.org)

REN21 - Renewable Energy Policy Network for the 21st Century: Global multi-stakeholder network providing renewable-energy policy tracking, market analysis, and investment data across 180 countries.
(https://www.ren21.net)

SEB Green Bonds Platform: Nordic-based banking initiative structuring sustainability-linked and green bonds for clean-energy and grid-modernization projects in emerging economies.
(https://sebgroup.com/investor-relations/debt-investors/green-bonds)

Global Off-Grid Lighting Association (GOGLA): Industry body representing decentralized solar enterprises, advancing PAYG financing, consumer protection, and results-based financing for off-grid markets.
(https://www.gogla.org)

Energy Sector Management Assistance Program (ESMAP – World Bank): Technical and financial partnership supporting countries to design enabling policies and investment frameworks for renewable energy and energy efficiency.
(https://www.esmap.org)

International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE): Promotes policy, finance, and technology cooperation for hydrogen projects, helping countries develop bankable investment pipelines.
(https://www.iphe.net)

Rockefeller Foundation: Catalytic philanthropic investor supporting distributed-renewable programs, risk-sharing instruments, and energy-access enterprises under the Global Energy Alliance.
(https://www.rockefellerfoundation.org)

Relevant Websites

Clean Energy Ministerial (CEM): The CEM brings together 29 member countries and the EU to promote policies and programs advancing clean energy technologies. Its Policy Data Resources section provides access to global databases on renewable energy, energy efficiency, and net-zero initiatives.
(https://www.cleanenergyministerial.org/resources-cesc/policy-data-resources)

Center for Climate and Energy Solutions (C2ES): A leading U.S.-based think tank that produces in-depth analyses and policy briefs on clean energy, carbon markets, and climate resilience strategies for governments and businesses.
(https://www.c2es.org)

Energy Institute (EI): The Energy Institute publishes the Statistical Review of World Energy, offering comprehensive global data on energy production, consumption, and emissions—used widely by governments and researchers.
(https://www.energyinst.org/statistical-review)

Energy Transitions Commission (ETC): A coalition of global leaders working to accelerate energy transition through sectoral roadmaps, particularly in steel, cement, and heavy industries, aiming for net-zero emissions by 2050.
(https://www.energy-transitions.org)

European Commission - Energy Transition Portal (EU Energy): Provides EU-level strategies, directives, and success stories on renewable energy, hydrogen, and smart grids under the European Green Deal.
(https://energy.ec.europa.eu)

Global Energy Alliance for People and Planet (GEAPP): An international initiative supporting developing nations in expanding clean energy access and reducing carbon emissions through blended finance and scalable models.
(https://www.energyalliance.org)

Global Platform for Sustainable Cities - World Bank: A knowledge hub supporting cities in building sustainable, resilient, and low-carbon energy systems through technical assistance and financing instruments. (https://www.worldbank.org/en/topic/urbandevelopment)

ICLEI - Local Governments for Sustainability: A global network of over 2,500 local governments committed to sustainable urban energy planning and climate adaptation through technical and policy guidance. (https://iclei.org)

International Energy Agency (IEA): Provides global energy statistics, policy analysis, and technology roadmaps through its Clean Energy Transitions Programme, focusing on energy efficiency and innovation. (https://www.iea.org)

International Institute for Sustainable Development (IISD): Offers evidence-based policy insights on transitioning to low-carbon economies, fossil fuel subsidy reform, and sustainable energy systems. (https://www.iisd.org)

International Renewable Energy Agency (IRENA): A UN-affiliated intergovernmental organization promoting renewable energy adoption, policy frameworks, and capacity building across 160+ countries. (https://www.irena.org)

Linköping University - Energy Resilient Cities Project: An academic research initiative exploring decentralized energy systems and resilience at community and urban levels, integrating renewable technologies and governance models. (https://liu.se/en/research/graduate-school-in-energy-systems/energy-resilient-cities)

MIT Energy Initiative - Future Energy Systems Center: Conducts advanced research on energy resilience, AI in energy optimization, and decarbonization pathways across power, transport, and industry sectors. (https://energy.mit.edu/futureenergysystemscenter)

National Renewable Energy Laboratory (NREL): A leading U.S. federal research center focusing on renewable technologies, energy modeling, and integration of distributed energy systems.
(https://www.nrel.gov)

NITI Aayog - India Energy Dashboard: Provides open-access data and analytical tools to support India's clean energy transition, with insights on renewables, storage, and policy targets. (https://www.ndma.gov.in)

Renewables Grid Initiative (RGI): A Europe-based initiative promoting collaborative grid development compatible with nature and local communities, vital for renewable energy expansion.
(https://renewables-grid.eu)

Resilient Cities Network (RCN): Global alliance of city leaders advancing resilience-based energy and infrastructure systems through city-to-city knowledge exchange and practical frameworks.
(https://resilientcitiesnetwork.org)

Sustainable Energy for All (SEforALL): A UN-backed platform promoting universal energy access, energy efficiency, and renewable adoption to meet SDG 7 targets, with key regional programs in Asia-Pacific.
(https://www.seforall.org)

State of Green - Denmark: Showcases real-world examples of sustainable city energy systems and green technologies applied globally, including district heating and offshore wind.
(https://stateofgreen.com/en)

TERI (The Energy and Resources Institute): India's leading think tank advancing sustainable energy through research on renewables, clean cooking, and urban energy planning.
(https://www.teriin.org)

UNDP Sustainable Energy Hub: Supports developing countries in integrating renewable energy and resilience measures into their national development strategies.
(https://www.undp.org/energy)

UN-Habitat - Sustainable Urban Energy Planning: Provides practical tools for city officials to design sustainable and inclusive urban energy systems that address both access and efficiency. (https://unhabitat.org/sustainable-urban-energy-planning)

United Nations Environment Programme (UNEP) - Energy & Climate: Leads global initiatives on clean energy, low-carbon transitions, and circular economy innovations through technical assistance and partnerships.
(https://www.unep.org/explore-topics/energy)

World Bank Energy Sector Management Assistance Program (ESMAP): Funds energy transition projects in over 100 countries, supporting renewable deployment, policy reform, and energy efficiency.
(https://www.esmap.org)

World Energy Council (WEC): Publishes the World Energy Trilemma Index, analyzing energy security, equity, and sustainability in more than 120 countries.
(https://www.worldenergy.org)

World Resources Institute (WRI): Conducts extensive work on energy transitions, electrification of transport, and renewable integration with strong focus on Asia and Africa. (https://www.wri.org/energy)

4. Responses in full

1. Md Selim Reza, System Analyst, Ministry of Finance, Bangladesh
2. Rushaa Badaloo, Analyst (Advocacy Economy Department) at the Mauritius Chamber of Commerce and Industry (MCCI), Research Scholar in Applied Statistics, Mauritius
3. Alex Tsakiridis, Disaster Risk Specialist, UNDRR, France
4. Irum Tariq, Member Standing Committee (SC) for Smog and Climate Lahore Chamber of Commerce and Industry (LCCI), CEO at Exodus Green Pvt. Ltd., Pakistan
5. Saeed Eshraghi, Head of Technology, Valuation and Documentation, Iranian Research Organization for Science and Technology, Tehran, Islamic Republic of Iran
6. Ankur Pandey, Research Scholar, University of Leeds, Leeds, England, United Kingdom
7. Dr. Sunder, CBRN Expert & Former Scientist, Bhabha Atomic Research Centre (BARC), India
8. Mangal Jakhar, Deputy Director, MY Bharat Sikkim, Ministry of Youth Affairs & Sports, India
9. Ms. Akanksha Pandey, DRR Specialist & Assistant Professor (Disaster Management), Rashtriya Raksha University, Lucknow Campus, MHA, Government of India (GoI), India
10. Ashish Sharma, Research Associate, India Water Foundation, India
11. Rajat Singh, Independent Consultant, India
12. Akansha Singh, Social Entrepreneur & Director at Swayambhu Innovative Solutions Pvt. Ltd., India
13. Himanshu Sharma, DRR and Climate Change Consultant, India
14. Sumit Mamgain, DRR Consultant, India
15. Nikita Sharma, Sociologist & Development Scholar, India

16. Bilal Saleem, Independent Consultant, India

17. Kuldeep Ghildiyal, Independent Consultant, India
18. Imran Ul Haq, Research Analyst, Wood Mackenzie, India
19. Inputs from APCTT, India
20. Inputs from APCTT, India
21. Inputs from APCTT, India

Responses:

1. Md Selim Reza, System Analyst, Ministry of Finance, Bangladesh

Bangladesh has been implementing several innovative financing mechanisms to accelerate its energy transition and promote renewable energy adoption, aligned with SDG 7 and the Paris Agreement. Some key approaches include:

i. Green Transformation Fund (GTF):
Managed by Bangladesh Bank, this fund provides low-interest financing for renewable energy and energy-efficient technologies in the export-oriented industries.

ii. Infrastructure Development Company Limited (IDCOL):
A pioneering model combining public–private partnership and blended finance, IDCOL has successfully mobilized concessional loans and grants from development partners to support over 6 million solar home systems and mini-grids in rural areas.

iii. Bangladesh Climate Change Trust Fund (BCCTF):
A government-led domestic fund that finances adaptation and mitigation projects, showcasing how national revenue can complement international climate finance.

iv. Results-Based Financing (RBF):
Emerging models are linking payments to verified emission reductions and energy savings, especially for solar irrigation, waste-to-energy, and industrial retrofitting.

v. Potential Innovations:
- Introduction of Islamic Green Sukuk (Shariah-compliant bonds) to mobilize ethical investment for renewable projects.
- Carbon credit trading mechanisms under Article 6 of the Paris Agreement for South–South collaboration.

Digital financing platforms integrating blockchain for transparent tracking of green investments are helping improve accountability, build investor confidence, and ensure that funds are directed toward verified climate outcomes. Bangladesh's experience demonstrates that blending public policy, concessional finance, and private innovation can create a scalable and inclusive pathway toward a sustainable energy future.

2. Rushaa Badaloo, Analyst (Advocacy Economy Department) at the Mauritius Chamber of Commerce and Industry (MCCI), Research Scholar in Applied Statistics, Mauritius

Energy transition is no longer a question of ambition but of access. The challenge today is not just about producing renewable energy, it is about financing and sustaining it in contexts where fiscal space is tight and exposure to climate risk is high. Many developing economies, particularly island and coastal states, face the twin constraints of fuel dependency and limited concessional funding. In such settings, financial innovation becomes as critical as technological innovation.

Green banks, blended finance, and climate-linked bonds are changing how renewable energy projects are financed. When structured well, these instruments reduce risk, attract private investment, and ensure continuity of funding through measurable performance. The goal is to build systems that are both energy-secure and climate-resilient.

Small Island Developing States illustrate this interdependence clearly. Mauritius provides a current example through its work on the Sustainable Smart Port Assessment Report developed by the United Nations Conference on Trade and Development and the Mauritius Ports Authority. The assessment moves beyond technical review, it positions Port Louis as a pilot for low-carbon maritime infrastructure and innovative green finance.

Port Louis contributes about 2% to national GDP and manages most of Mauritius' trade flows. Yet its reliance on imported fuel and exposure to cyclones create vulnerabilities that affect both economic and environmental performance. The new report identifies solar photovoltaic generation, onshore power supply, and electrification of port operations as practical first steps to reduce emissions and operational costs.

From experience, the financial challenge lies in structuring investments that work within small markets. Conventional borrowing often fails because of high interest rates and limited collateral. Mauritius has instead begun exploring blended-finance approaches, where public and private investment share both risk and return.

At the national level, Mauritius is also experimenting with green and blue bonds to channel capital into renewable and coastal infrastructure. These instruments link interest rates or tax credits to verified outcomes such as reduced emissions or lower fuel consumption. Transparent monitoring has become essential, as investors, regulators, and citizens increasingly demand evidence that sustainability targets are being met. Performance-based disbursement has improved accountability and strengthened investor confidence.

The broader lesson from the Port Louis initiative is that small island economies can achieve energy transition not through scale, but through structure. When finance, governance, and technology are aligned, even limited renewable projects can yield long-term resilience dividends. A sustainable port also supports a cleaner blue economy, protecting fisheries, sustaining tourism, and improving logistics efficiency.

The experience suggests a practical model for replication across the Asia-Pacific region. Blended finance, linked to measurable adaptation and energy outcomes, offers a way for other SIDS and coastal cities to attract climate funding without heightening debt risks. If accompanied by clear governance, transparent reporting, and community participation, such mechanisms can help turn adaptation from a financial burden into a growth opportunity.

3. Alex Tsakiridis, Disaster Risk Specialist, United Nations Office for Disaster Risk Reduction (UNDRR), France

As far as innovative financing solutions for renewable energy are concerned, Pacific countries are pioneering several such mechanisms to advance their energy transitions despite small markets and high capital costs. Fiji's 2017 sovereign green bond, one of the first in a developing economy, mobilized about US $50 million for low-carbon and climate-resilient projects and set the foundation for its 2022 Sustainable Bond Framework, which guides future thematic issuances. Vanuatu's National Green Energy Fund blends public, donor, and private finance to expand off-grid solar and mini-grid access, while Tonga's GCF-supported Renewable Energy Project combines grants and concessional loans from the Green Climate Fund and ADB to de-risk investments in grid-scale storage and outer-island electrification. These blended and community-based approaches show that small island states can attract private capital and expand distributed renewables by pairing concessional financing with clear governance and reporting frameworks.

With regards to policy models, digital technologies, and regulatory frameworks, Pacific governments are increasingly integrating digital tools and policy innovations to improve renewable energy deployment and inclusivity. Fiji's Sustainable Bond Framework and Vanuatu's National Energy Roadmap link national policy targets to financing mechanisms, improving investor confidence. Samoa's smart-metering initiative, supported by the ADB, uses IoT technology to enhance billing efficiency and grid reliability, while the solar-battery microgrid on Ta‘ū in American Samoa demonstrates how performance-based private contracts can deliver 100 percent renewable supply for remote islands. These examples highlight how enabling regulatory environments, data-driven technologies, and capacity-building programs can make energy systems in the Pacific more reliable, inclusive, and resilient to climate and supply disruptions.

4. Irum Tariq, Member Standing Committee (SC) for Smog and Climate Lahore Chamber of Commerce and Industry (LCCI), CEO at Exodus Green Pvt. Ltd., Pakistan

a. Hands-on experience of recovering and converting organic matter from municipal solid waste into compost and getting the project registered with UNFCCC has been a success story. Many countries are following this model, and methane reduction from untreated biodegradable waste through this aerobic composting process is not only a value addition but also a source of income generation for communities as a decentralized circular-economy model. Green bonds and other climate-finance tools should support community-based initiatives in developing countries to meet SDG-13 targets. NGOs can play a pivotal role, creating a win-win situation.

b. As team leader for a World Bank project, we have recommended that Single-Use Plastic be banned as it is severely impacting water bodies, marine life, human health, and is a major driver of urban flooding. Alternatives and environmentally friendly packaging technologies must be promoted. This is possible if industry and academia join hands and learn from success stories around the world, ably supported by different financial instruments such as green bonds, CSR financing, PPP models, climate funds, and results-based financing (RBF). ARR (Alternate Resource Recovery) models at community and state level offer another effective pathway that many team members are already following.

5. Saeed Eshraghi, Head of Technology, Valuation and Documentation, Iranian Research Organization for Science and Technology, Tehran, Islamic Republic of Iran

Iran's innovative financing mechanism is focused on crowdfunding. Crowdfunding is the practice of funding a project or venture by raising small amounts of money from a large number of people, typically via the internet. It has become a vital tool for financing innovative projects, startups, and creative ideas that might struggle to get funding from traditional sources like banks or venture capitalists.

The key player to know is the Iran Fara Bourse (IFB), which is the over-the-counter stock market operating under the main Securities and Exchange Organization (SEO). They are the ones who regulate this entire process. The innovator (the startup or small business) submits its detailed business plan, financial projections, and funding goals to one of these licensed platforms. The platform's team then performs due diligence to verify the business, its founders, and the feasibility of its plan. They filter out low-quality or fraudulent projects. Once approved, the project is listed on the platform. This is where the "crowd" comes in. The project page shows the amount needed, the business plan, and (crucially) what the investors get in return. The campaign runs for a limited time. If the project reaches its minimum funding goal, the platform transfers the collected money to the startup. If it fails to reach the goal, the money is typically returned to the investors. The platform takes a small percentage as its fee for a successful campaign.

This innovative mechanism allows regular people to invest in high-risk, high-reward private startups, something that was previously only available to wealthy "angel investors" or Venture Capital (VC) firms and also Startups are toxic to traditional banks; they have no collateral and no profit history. This mechanism provides a vital alternative route for "seed capital" (early-stage funding). Also, it is regulated because the Fara Bourse (SEO) is involved, and there are rules. There are limits on how much a single person can invest in a project and how much a project can raise. This (in theory) provides a level of investor protection and legitimacy that's missing from unregulated systems.

6. Ankur Pandey, Research Scholar, University of Leeds, Leeds

Innovative financing mechanisms are proving critical for advancing energy transition across the Asia-Pacific, with real-world examples including blended finance partnerships, green banks, green bonds, and Just Energy Transition Partnerships (JETPs). Several countries and organisations such as Indonesia and Vietnam under JETP, India’s Clean Energy Finance Corporation aligned green bank model, and Bangladesh’s IDCOL blended-finance approach have already implemented these mechanisms to mobilise private capital, enable early coal retirement, and finance large-scale renewable energy projects.

Blended Finance Partnerships:

- Blended finance combines public and private capital to reduce risks for investors in renewable projects.
- Examples: The Just Energy Transition Partnerships in Indonesia (USD 10 billion) and Viet Nam (USD 7.75 billion) use grants, concessional capital, and guarantees to support the early retirement of coal power plants and replacement with renewables.
- Multilateral institutions such as the Asian Development Bank (ADB) have blended finance programs that have catalysed billions in green infrastructure investment, including landmark projects like the Monsoon cross-border wind power project in Laos.

Green Bonds and Loans:

- Proceeds from green bonds and loans are used to fund renewable energy, low-carbon projects, and energy-efficient infrastructure.
- Singapore has fostered an ecosystem where green bonds and loans are prominent, and Asia's first sustainability-linked club loan (USD 500 million) was completed by Olam International, involving 15 banks.
- Sustainability-linked bonds (SLBs) and transition bonds are increasingly used to finance projects with pre-defined sustainability targets.

Green Banks and Guarantee Facilities:

- Green banks focus on financing climate-friendly initiatives by leveraging limited public funds to mobilize much larger private sector investment.
- Credit guarantee funds and grant-based technical assistance are also among the innovative tools supporting transitions in emerging Asian markets.

Just Energy Transition Partnerships (JETPs):

- JETPs, notably in Indonesia and Viet Nam, channel public and private finance to accelerate decarbonization, facilitate early retirement of high-emission coal plants, and ensure social protections for affected communities.

Emerging Policy and Regulatory Models:

- Central banks in Japan, China, and Malaysia offer subsidised green loans, preferential refinancing, and targeted facilities to ensure access to affordable capital for sustainability and low-carbon innovation by firms, including SMEs.
- Regulatory engagement and policy-based lending have proven effective in boosting renewable deployment and de-risking investments.

7. Dr. Sunder, CBRN Expert & Former Scientist, Bhabha Atomic Research Centre (BARC), India

The global energy transition from fossil fuels to renewables like solar, wind, and storage requires trillions in investment annually, far exceeding traditional funding sources. Innovative financing mechanisms bridge this gap by de-risking projects, mobilizing private capital, and aligning

incentives with climate goals. These tools often blend public and private funds, leverage technology for accessibility, and tie repayments to performance outcomes. Drawing from recent trends in the Global South and emerging markets, they have enabled millions to access clean energy while reducing emissions. Below, outlined key mechanism supported by real-world example and experience.

Pay-As-You-Go (PAYG) Models: PAYG allows consumers to access renewable energy systems (e.g., solar home kits) through small, incremental payments, often via mobile money, rather than large upfront costs. This democratizes energy access in off-grid areas, with repayments funding scaling.

Example include M-KOPA in Africa: Serving over 3 million households across Kenya, Uganda, and Nigeria, M-KOPA's solar systems have displaced diesel generators, saving users up to 50% on energy costs and reducing CO2 emissions by millions of tons annually.3e2df0 In India, pay-as-you-save pilots for solar irrigation have enabled farmers to repay via diesel savings, boosting crop yields by 20-30%.4f44e9

Experience: These models have mobilized $1.5 billion in private investment but face challenges like default risks, addressed through credit scoring via mobile data.

8. Mangal Jakhar, Deputy Director, Ministry of Youth Affairs & Sports, Sikkim, India

MY Bharat Sikkim under Ministry of Youth Affairs and Sports, Govt of India has integrated sustainability goals within youth empowerment, sports infrastructure, and rural development initiatives. Our approach combines innovative financing models, green partnerships, and digital inclusion to promote low-carbon growth and community participation.

a. Community-Linked and Green Financing Mechanisms

Through the State Green Mission Fund and Chief Minister's Youth Empowerment Programme, the state encourages youth cooperatives and rural sports clubs to adopt renewable energy systems particularly solar lighting and micro-hydro solutions for playgrounds, training centers, and hostels. These initiatives leverage blended finance, combining state grants, Corporate Social Responsibility (CSR) contributions, and soft loans from Sikkim State Cooperative Bank. Partnerships with institutions like National Bank for Agriculture and Rural Development (NABARD) and Rural Electrification Corporation (REC) have enabled installation of solar-powered cold- storage and drinking-water facilities in sports complexes and youth hostels.

b. Digital Technologies and Capacity Building

MY Bharat Sikkim promotes Digital Green Clubs where young entrepreneurs use IoT-based energy meters to monitor consumption and optimize renewable power usage in local facilities. These digital tools enhance energy literacy and transparency, ensuring efficient operation and reduced carbon footprints.

c. Policy Innovation and Inclusion

Aligned with the State Action Plan on Climate Change (SAPCC-II), the Ministry collaborates with the Department of Power and Energy to ensure all future sports and youth infrastructure projects integrate green building

codes and energy-efficient design standards. Youth volunteers are also trained under Eco-Volunteer Programs to champion renewable practices in schools and rural communities.

Thus, Sikkim's experience demonstrates how youth-driven community models, supported by blended financing and digital tools, can accelerate renewable energy adoption at the grassroots level. The Ministry remains committed to scaling these initiatives through stronger partnerships with national green finance programs and international climate funds.

9. Ms. Akanksha Pandey, DRR Specialist & Assistant Professor (Disaster Management), Rashtriya Raksha University, Lucknow Campus, MHA, GoI

If I talk from the Indian perspective, India's transition towards clean and renewable energy is supported by a dynamic and expanding landscape of innovative financing mechanisms that blend domestic and international capital, de-risk investments, and align finance with just transition principles. India has issued over $18 billion in green bonds by 2022, with both public and private issuers. These bonds mobilize funds for renewable energy projects, including large- scale solar and wind, and have been instrumental in reducing the cost of capital and signaling a strong commitment to sustainability. Also, mechanisms that combine concessional donor funds with commercial capital are unlocking investments in harder-to-finance segments, such as off- grid solar and rural electrification. Instruments like viability gap funding (VGF), credit enhancement, and dedicated "Green and Transition Finance" windows help attract private and international capital by de-risking projects. Additionally, development finance institutions and environmental, social & governance (ESG)-driven funds have scaled up investments to support companies that align with net zero and renewable energy goals. The Government of India issued its first sovereign green bonds to finance public sector climate projects, a step echoed by thematic funds and sub-sovereign green bond programs at state and municipal levels.

I will conclude by mentioning some examples here :

Ayana Renewable Power: Structured as a platform investment by British International Investment and India's National Infrastructure Investment Fund, Ayana demonstrates how development and institutional capital can create large-scale, socially responsible renewable energy assets, while mainstreaming just transition programs and community engagement.
Simpa Energy and Rural Solar Home Systems: Supported by Asian Development Bank concessional loans, off-grid solar enterprises like Simpa have demonstrated the viability of pay- as-you-go solar models, making clean energy affordable for rural populations.

REC Limited's Green Finance Initiatives: REC has pioneered in syndicated loans, green bonds, and structured finance to support wind and solar park development, collaborating with domestic and foreign banks for co-financing.

10. Ashish Sharma, Research Associate, India Water Foundation, India

India's Energy Transition at a Crossroads:
India stands at a defining point in its energy transition, balancing ambitious climate goals with the developmental needs of 1.4 billion citizens. The nation aims to achieve 500 GW of non-fossil capacity by 2030, cut emissions intensity by 45 percent from 2005 levels, and reach net-zero by 2070. With 201.45 GW of renewables installed in 2024, accounting for 46.3 percent of total capacity, India ranks fourth globally. However, meeting these targets demands between USD 1.5 trillion and USD 10.1 trillion by 2070, while annual climate finance flows of USD 44 billion meet only a fraction of the USD 170 billion required.

Green Bonds Driving Sustainable Finance:
India's sovereign green bond program, launched in 2023, has emerged as a cornerstone of its sustainable finance strategy. By December 2024, USD 55.9 billion worth of green, social, and sustainability-linked debt had been issued, with green bonds comprising 83 percent. Proceeds fund renewable energy, clean transport, and energy efficiency projects. Yet, muted investor demand and narrow greenium premiums highlight the need for stronger incentives and market depth.

Blended Finance and Institutional Leadership:
Blended finance models combining concessional public funds with private capital are helping de-risk projects in clean energy, transport, and waste management. The Green Growth Equity Fund and National Investment and Infrastructure Fund (NIIF's) initiatives have attracted global private equity into renewable sectors. Specialized institutions such as Indian Renewable Energy Development Agency (IREDA), Power Finance Corporation (PFC), and Rural Electrification Corporation (REC) have expanded their green portfolios through innovative instruments and large-scale bond issuances, channeling capital into renewables, EVs, and urban infrastructure.

Inclusive and Targeted Financing Models:
Schemes like PM Surya Ghar: Muft Bijli Yojana exemplify how subsidies and credit linkages can democratize access to clean energy. With an outlay of INR 75,021 crore, the program aims to empower one crore households with rooftop solar systems. Complementary loans from public banks integrate government support with affordable credit, fostering an inclusive financing ecosystem.

Carbon Markets and Next-Generation Technologies:
The Carbon Credit Trading Scheme launched in 2024 establishes a compliance-based carbon market across nine industrial sectors. It creates tradable credits for verified emission reductions, paving the way for a mature carbon pricing system. Simultaneously, the National Green Hydrogen Mission, with an allocation of INR 19,744 crore, is advancing green hydrogen production and electrolyzer manufacturing, supported by World Bank financing and state-level incentives.

Structural and Institutional Challenges:
Financing constraints persist due to limited credit flexibility, underdeveloped capital markets, and India's lower investment-grade ratings. DISCOM financial distress further impedes grid modernization, requiring INR 31 trillion in investment by 2032. Addressing these issues through reforms in cross-subsidies, direct transfers, and tariff rationalization is vital to ensure a resilient and sustainable power ecosystem.

Investment Trends and Policy Imperatives:
India attracted USD 11.8 billion in renewable energy investment in the first half of 2025, with strong growth in solar capacity. FDI inflows and record capacity additions signal investor confidence, though volatility in wind investments reflects market uncertainty. Strengthening the green finance taxonomy, expanding sustainability-linked instruments, and ensuring clear policy signals are essential to sustain momentum.

Path Forward for a Just and Resilient Transition:
India's energy transition financing landscape reflects an evolving ecosystem driven by innovation, collaboration, and policy reform. From green bonds and blended finance to carbon markets and subsidy-linked inclusion, the framework is expanding rapidly. Achieving long-term success will require systemic mainstreaming of climate finance, capacity building, and risk mitigation across institutions. As India's energy demand quadruples in coming decades, the ability to mobilize and channel innovative finance will define its success in achieving a low-carbon, inclusive, and resilient growth trajectory.

11. Rajat Singh, Independent Consultant, India

Achieving an equitable energy transition requires not only financial capital but also innovative delivery mechanisms that reach marginalized communities. Across South Asia, NGOs and social enterprises have demonstrated how blended finance, microcredit, and community ownership can accelerate renewable energy adoption while advancing livelihoods and gender equality. One of the most successful NGO-led examples is the SELCO Foundation in India, which integrates financing with last-mile energy access. By partnering with rural banks, cooperatives, and microfinance institutions, SELCO provides low-interest loans and credit guarantees to poor households and small enterprises. The model ties loan repayment to income generation activities such as solar-powered sewing machines and irrigation pumps ensuring both social and financial sustainability.

Similarly, the Barefoot College in Rajasthan employs an innovative community financing model. It trains rural women, known as Solar Mamas, to install and maintain solar lighting systems in their villages. Funding combines philanthropic capital, CSR contributions, and local co-financing, creating a circular model that empowers women while expanding rural electrification. The India Climate Collaborative (ICC) and CIIE.CO CleanTech Fund have further strengthened the ecosystem by channelling blended capital into early-stage clean technology start-ups, promoting innovations in decentralized renewables and energy efficiency.

Across the region, similar models are evident such as Grameen Shakti in Bangladesh, which financed over 1.8 million solar home systems through microcredit, and Nepal's AEPC revolving funds supporting micro-hydro schemes in remote areas. These experiences show that NGOs and social enterprises play a critical role in de-risking investments, fostering behavioural change, and building local ownership. Embedding such approaches into national and regional financing frameworks can help ensure that the energy transition remains inclusive, equitable, and community-led across the Asia-Pacific region.

12. Akansha Singh, Social Entrepreneur & Director at Swayambhu Innovative Solutions Pvt. Ltd., India

Working with rural communities revealed how centralized energy distribution creates massive inefficiencies. India's aging transformers alone waste enormous power. The solution lies in decentralized systems where villages and communities generate 20% of their energy through solar panels and biogas plants. Food and fecal waste can produce substantial electricity while creating biomanure that replaces industrial fertilizers, eliminating another layer of energy waste.

This organic matter also helps soil sequester carbon. We have abundant waste, wind, and solar resources that can help us achieve energy independence without relying heavily on government infrastructure. Technology aids loss calculation, but collective action toward localized energy systems offers the most sustainable path forward. Funding and other investments should be imposed in local decentralised ideas.

13. Himanshu Sharma, DRR and Climate Change Consultant, India

The global push toward net-zero has made it clear that the real barrier to energy transition is not technology, but finance. From my engagement with climate policy dialogues and multilateral programmes, several priorities have emerged for structuring truly innovative financing mechanisms in the region.

- Risk De-risking and Credit Enhancement:

Traditional investors remain cautious about renewable energy in developing economies due to currency volatility, off-taker risks, and weak guarantees. Instruments such as green insurance pools, currency hedging facilities, and partial-risk guarantees can lower capital costs and unlock private flows for large-scale renewables.

- Transition-aligned Taxonomies and Measurement Frameworks:

The absence of clear definitions of "green" continues to deter mainstream capital. Regional cooperation on sustainable finance taxonomies and common MRV (Monitoring, Reporting, Verification) standards can improve market transparency and investor trust, paving the way for cross-border green bond issuance.

- Aggregation and Digital Marketplaces:

Small projects often remain unbankable. Digital energy marketplaces that aggregate distributed assets such as rooftop solar or e-mobility can pool investment demand and attract institutional finance, while blockchain verification ensures accountability.

- Capacity Building and Governance:

Innovative finance also depends on institutional readiness. Strengthening local financial intermediaries and integrating climate risk into fiscal planning can mainstream green finance into national systems. Ultimately, innovation in energy financing lies not in creating new instruments alone, but in redesigning systems that align finance, technology, and policy for long-term resilience and inclusivity.

14. Sumit Mamgain, DRR Consultant, India

Innovative financing mechanisms are reshaping India's clean energy journey by blending financial creativity with technology, policy reform, and community engagement. Through tools such as blended finance, green bonds, and digital platforms, India is overcoming long-standing challenges of affordability, accessibility, and equity ensuring that the clean energy transition is both sustainable and inclusive.

A defining step came in 2023 with the launch of India's Sovereign Green Bonds, which embedded climate considerations directly into the national budgeting process. Raising over USD 2 billion, these bonds have funded solar, wind, and electric mobility projects while setting a benchmark for transparency through robust post-issuance monitoring. This model has strengthened investor trust and inspired other developing economies to explore similar climate- finance pathways. Parallelly, institutions like the Indian Renewable Energy Development Agency (IREDA) and state-level Green Energy Funds have utilized concessional loans from global partners such as the World Bank and KfW to scale decentralized renewable energy initiatives and support MSMEs in the sector.

At the community level, innovative financing is driving tangible social impact. Husk Power Systems, for instance, operates over 500 solar-biomass mini-grids across Bihar and Uttar Pradesh through a pay-as-you-go model that merges digital metering with social impact investment providing stable electricity to rural households and small businesses. Similarly, the Solar Sister initiative, active in parts of South Asia and Africa, combines microfinance with entrepreneurship training to empower women as clean energy entrepreneurs, linking gender empowerment directly to energy access.

Digitalization has further strengthened transparency and efficiency within the clean energy ecosystem. The Power Ledger project, for example, pilots blockchain-based peer-to-peer solar trading, while Solar Energy Corporation of India Limited (SECI's) online reverse auctions have simplified renewable procurement, reduced costs, and expanded international investor participation.

India's evolving experience shows that a blend of policy innovation, financial risk-sharing, and technological transparency can serve as a powerful catalyst for achieving a just, inclusive, and climate-resilient energy future not only within India but across the broader Asia-Pacific region.

15. Nikita Sharma, Sociologist & Development Scholar, India

In India, living in harmony with nature was never a choice, it was our way of existence. The concept of sustainability was embedded in our spiritual and cultural fabric long before it became a global necessity. Our ancestral understanding of energy, environment, and the five elements viz., Air, Water, Fire, Earth, and Space, created a holistic framework for balance and well-being. Our spiritual beliefs offer a timeless perspective on interconnectedness standing as a bridge between modern consumerism and ecological consciousness. Before we talk about innovation in renewable energy and technology, it is essential to rekindle the individual transformation that nurtures respect for nature and mindful consumption.

As Swami Vivekananda rightly said, "The world will change if we change; if we are pure, the world will become pure." This purity of thought and action is the foundation of India's energy transition journey, a shift not just in systems but in consciousness. The measures include combining ancient wisdom with modern energy solutions, such as:

i. Acknowledging Nature's Sacredness

Rivers, trees, and the celestial bodies have long been revered as divine. Worship of sacred groves like peepal, banyan, and neem ensured their preservation, echoing today's push for green cover and carbon sinks as vital components of sustainable urban design.

ii. Sustainable Living and Resource Efficiency

Traditional practices such as using natural materials, reducing waste, and recycling echo the principles of circular economy and energy efficiency. For instance, biodegradable materials once used in daily life reflect a zero-waste mindset crucial for today's green transitions.

iii. Minimalism and Conscious Consumption

The Hindu philosophy of detachment from materialism promotes energy conservation through minimalism, reducing overconsumption, lowering energy demand, and encouraging lifestyle choices aligned with planetary limits.

iv. Traditional Water and Solar Wisdom

Ancient water tanks near temples functioned as rainwater harvesting systems, while structures were aligned with solar movement for natural cooling and daylighting, the same principles guiding passive solar architecture and climate-resilient urban design today.

v. Festivals in Sync with Ecological Rhythms

Festivals like Sankranti and Van Mahotsav align agricultural, solar, and ecological cycles, reflecting seasonal energy balance and gratitude for nature's resources, lessons vital for designing community-led renewable energy programs.

vi. Plant-Based Diet and Low-Carbon Choices

A plant-based lifestyle, already central to Indian tradition, supports low-emission, sustainable food systems that complement renewable energy transitions and reduce environmental footprints.

vii. Sustainable Architecture and Energy Efficiency

Ancient temples and homes were designed for thermal regulation, natural ventilation, and light optimization principles now revived in green building codes and net-zero architecture.

viii. Religion as a Medium for Sustainability Education

Faith-based communication can play a transformative role in energy literacy and behavior change, inspiring collective action to protect our panch tattva (five elements), the natural foundations of all energy.

Thus, India's path toward a sustainable energy future is not merely technological, it is philosophical and cultural. By integrating traditional wisdom with modern science, we can lead an energy transition rooted in compassion, equity, and reverence for the planet. The shift to renewables,

green infrastructure, and clean technologies is, in essence, a return to our ancient dharmic principles, where energy is sacred, not merely consumed. Our ancestors viewed energy as life itself, to be harnessed wisely, shared equitably, and preserved for generations to come.

16. Bilal Saleem, Independent Consultant, India

The GIZ-MNRE project "Solar in Rural Areas in India" introduces an innovative, gender- responsive financing mechanism to accelerate the energy transition in rural India. The initiative focuses on enabling financial service providers such as banks, cooperatives, and microfinance institutions to design and offer credit products tailored to women's needs for decentralized solar systems. These financing models emphasize reduced collateral requirements, simplified loan access, flexible repayment schedules, and lower interest rates, allowing rural women to invest in technologies like solar pumps, dryers, and home systems that enhance their livelihoods. By combining technical assistance with targeted capacity building, the project addresses the structural barriers that limit women's access to formal finance.

Grants to partners such as Council on Energy, Environment and Water (CEEW), SELCO Foundation, and International Water Management Institute (IWMI) further support research and pilot implementation of inclusive financing models. This approach not only bridges gender and energy gaps but also strengthens local economies by positioning women as active participants in the renewable energy market. Embedded within the broader Indo-German energy cooperation framework, the mechanism complements KfW's large-scale renewable financing by preparing a pipeline of decentralized, gender-inclusive investments, creating a replicable model for socially just and sustainable energy financing in developing contexts.

17. Kuldeep Ghildiyal, Independent Consultant, India

Innovative financing mechanisms are playing a transformative role in advancing India's clean energy transition by integrating blended finance, green bonds, digital technologies, and community-driven solutions. These instruments are addressing challenges of affordability, accessibility, and equity, while ensuring sustainable and inclusive development.

India's pioneering issuance of Sovereign Green Bonds in 2023 marked a milestone in embedding climate finance into public budgeting. The initiative mobilized over USD 2 billion to support projects in solar, wind, and electric mobility. The transparent framework, coupled with rigorous post-issuance reporting, has enhanced investor confidence and established a replicable model for other developing economies. Similarly, the Indian Renewable Energy Development Agency (IREDA) and state-level Green Energy Funds have leveraged concessional loans from international partners such as the World Bank and KfW to expand financing for decentralized renewable energy projects and MSMEs.

At the grassroots level, community-based financing models are fostering inclusion and impact. Husk Power Systems, operating across Bihar and Uttar Pradesh, has combined social impact investment and digital metering to operate over 500 solar-biomass mini-grids using a pay-as- you-go model. This approach ensures reliable electricity access for rural households and enterprises. Likewise, the Solar Sister initiative—implemented across Africa and South Asia— uses microfinance and entrepreneurship training to empower women in distributing solar lanterns and clean cookstoves, linking gender equity with energy access.

Digital innovation is also driving transparency and efficiency. The Power Ledger pilot enables blockchain-based peer-to-peer solar trading, while SECI's digital reverse auctions have streamlined procurement and attracted international investors. India's experience demonstrates that combining policy innovation, financial de-risking, and technological transparency can accelerate a just, inclusive, and climate-resilient energy transition across the Asia-Pacific region.

18. Imran Ul Haq, Research Analyst, Wood Mackenzie, India

a. Innovative Financial Solutions:

Proven financial solutions successfully de-risk private capital and leverage public funds to mobilize commercial investment for both utility and distributed projects. One highly effective mechanism is Blended Finance, particularly using Green Bonds supported by sovereign guarantees or partial

credit guarantees from Multilateral Development Banks (MDBs). This approach has been instrumental in countries like India to mitigate currency and political risk, crowding in commercial banks for large utility-scale solar and wind farms. Supported by green- labelled instruments, India's sustainable debt market stood at $55.9 billion at the close of 2024, as documented by the latest Mitsubishi UFG Financial Group-Climate Bonds Initiative (MUFG- CBI) report. Green bonds and loans are the primary drivers of this growth, making up 83% of the total aligned volume. Within that green segment, loans are responsible for 39%, with 2024 proving to be a record year, featuring $5.5 billion in labeled green-loan deals spread across 19 corporate entities. For small and decentralized projects, the establishment of National Green Investment Banks (GIBs) is key, as these entities take on the initial, higher development risks to prove commercial viability before transitioning projects to private investors.

b. Policy and Technology Models

The successful deployment of renewables requires foundational regulatory certainty and modern digital infrastructure. On the policy front, implementation of standardized Power Purchase Agreement (PPA) is crucial, which drastically reduces the transaction costs, legal uncertainty, and project timelines for international investors. From a technology standpoint, the adoption of AI-driven grid optimization systems (e.g., used to enhance grid stability and forecasting in the Republic of South Korea is essential for improving the reliability and bankability of intermittent renewable sources. These digital models also underpin inclusivity by enabling sophisticated, low-cost metering and peer-to-peer energy trading, which are vital for integrating small, distributed generation projects into the regional energy market.

Inputs from APCTT, India:

19. We would like to thank all the contributors for the depth and diversity of insights shared on innovative financing for renewable energy. The discussion has brought together useful experiences from across the Asia-Pacific region, covering green bonds, blended finance, community-led models, and digital transparency.

Building from these contributions, a few areas that could be further explored in order to strengthen the regional knowledge base could be as follows:

a. Digital and Fintech-Enabled Climate Finance: An assessment of pathways improve financial inclusion, transparency, and accountability in renewable energy financing could be done through digital public infrastructure, AI, IoT, and blockchain applications.

b. Risk Mitigation and Insurance Instruments: The role of green insurance pools, guarantee facilities, and parametric insurance in de-risking investments, particularly in small and climate- vulnerable economies, is another area meriting greater attention.

c. Regional Green Finance Cooperation: Practical examples of regional mechanisms, such as green finance facilities under ASEAN or SAARC, harmonized taxonomies, and cross-border power investments, would add to the understanding of cooperative models for scaling finance.

d. Carbon Markets and Results-Based Financing: Expanding the discussion on carbon credit trading systems, MRV-linked disbursement mechanisms, and performance-based finance could help connect financing flows to measurable emission outcomes.

e. Just Transition and Social Inclusion: Gender-responsive models highlighted by members are good. Further exploration of labour reskilling, social protection frameworks, and community co- ownership models could strengthen equity dimensions of the transition.

f. Adaptation-Linked Renewable Finance: Integrating adaptation considerations such as renewable-powered irrigation, cooling, or coastal resilience would help develop a more holistic understanding of climate-resilient energy finance.

Inclusion of the above areas would add value in advancing integrated, inclusive, and digitally enabled financing pathways toward a just energy transition across the Asia-Pacific region.

20. The Asia-Pacific region is witnessing a significant shift toward clean-energy adoption through innovative financing, digital technologies, and community-driven systems. Mechanisms such as green bonds, blended-finance models, and digital investment platforms have been instrumental in mobilizing large-scale public and private investments for renewable-energy projects. The ASEAN Green Bond Standards and similar regional frameworks have enabled countries to issue over USD 20 billion in green bonds since 2017, supporting solar, wind, and energy-efficiency projects.

Community-based energy systems are also reshaping rural electrification. The Mlinda Foundation's solar mini-grids in Jharkhand and Odisha provide reliable electricity to households and small enterprises, creating local employment and enhancing income opportunities. Likewise, Hamara Grid has developed micro-grids in Nagaland and Meghalaya to power remote villages, improve productivity, and reduce dependence on diesel generators.

Digital transformation is playing a critical role in optimizing operations. Tools leveraging Artificial Intelligence (AI) and the Internet of Things (IoT) support advanced forecasting, real-time monitoring, and efficient energy-supply management. Smart-metering initiatives in India and Thailand, for example, demonstrate how predictive analytics can enhance demand-side management and reduce system losses. To sustain momentum, enabling policy frameworks that simplify regulatory approvals, promote technology transfer, and attract private participation remain essential. Integrating financial innovation, digital intelligence, and local empowerment offers a holistic pathway toward affordable, reliable, and inclusive renewable-energy systems, advancing the region's progress toward SDG 7: Affordable and Clean Energy for All.

21. Thank you for the regional summary. I would like to offer three short reflections that may help clarify what works in renewable-energy finance.

First, real capital only flows when risks are reduced. Partial risk guarantees and FX-hedging tools lower financing costs and give lenders confidence. In several countries they reduced the cost of capital for solar projects by more than a percentage point. Parametric insurance has also helped projects in

cyclone-prone areas reach financial closure faster. On the other hand, some ideas have not worked. Early crowdfunding pilots stalled because investor protections were weak and project checks were unreliable. It is important to learn from these missteps.

Second, too many projects are being delayed because the grid is not ready. Transmission gaps, unclear curtailment rules, and slow permitting hold back large volumes of renewable capacity. Standard PPAs and simpler land-approval steps could cut delays sharply. Better MRV systems are also needed. Investors want clear, comparable data on capacity additions, emissions reductions, and financing structures. Local-currency financing remains limited as well. Stronger domestic green-bond markets and credit-enhancement tools would reduce exposure to currency swings.

Third, the transition needs to move beyond generation alone. Industrial decarbonization, green hydrogen, storage, and digitalized distribution networks need targeted finance. Social inclusion does matter, too: community-owned energy systems tend to do better because people have a direct stake in their outcomes. Gender-responsive loans show higher repayment rates and stronger economic benefits.

On the whole, the region needs to accelerate its movement, focusing first on four priorities: effective de-risking, rules that are more clearly defined and reporting, deeper local-currency markets, and people-centred financing models. These elements will help build a transition that is practical, fair, and financially sound.

Many thanks to all who contributed to this query!

The Community of Practice on Climate Technologies aims to foster technology cooperation and transfer through enhanced knowledge exchange and cross-border collaboration in Asia Pacific.

If you have further information to share on this topic, please send it at apctt@un.org.

This Consolidated Reply is a systematic compilation of all responses received and additional desk research. It has been compiled by the CoP Moderator Vinita Kumari, Consultant to APCTT.

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