



CLIMATE FINANCE ASSESSMENT:

Opportunities
for Scaling Up
Financing for Clean
Energy, Sustainable
Landscapes, and
Adaptation

December 2019

Contract No.: AID-OAA-I-12-00038
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CLIMATE FINANCE ASSESSMENT: OPPORTUNITIES FOR SCALING UP FINANCING FOR CLEAN ENERGY, SUSTAINABLE LANDSCAPES, AND ADAPTATION

CLIMATE ECONOMIC ANALYSIS FOR DEVELOPMENT, INVESTMENT, AND RESILIENCE (CEADIR)

Contract No.: AID-OAA-I-12-00038
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ACRONYMS AND ABBREVIATIONS

AD	Adaptation
AFOLU	Agriculture, forestry, and other land uses
Asia EDGE	Asia Enhancing Development and Growth through Energy (USAID Initiative)
BloombergNEF	Bloomberg New Energy Finance
BTG	Beyond the Grid Program (USG Power Africa Initiative)
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CE	Clean energy (renewable energy and energy efficiency)
CEADIR	Climate Economic Analysis for Development, Investment, and Resilience Activity
CEFF-CCA	Clean Energy Financing Facility for the Caribbean and Central America
CF Ready	Climate Finance Readiness Program (GiZ)
DCA	Development Credit Authority (USAID)
DCED	Donor Committee for Enterprise Development
DFC	U.S. Development Finance Corporation
DIV	Development Innovation Ventures
EE	Energy efficiency
ESCO	Energy services company
FAO	Food and Agriculture Organization (United Nations)
FONDEN	Mexico's National Disaster Fund
GCF	Green Climate Fund
GDA	Global Development Alliance
GDP	Gross domestic product
GHG	Greenhouse gas
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation)
GW	Gigawatt
IFP	Investment Facility for the Pacific
IDB	Inter-American Development Bank
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
LEDS	Low Emission Development Strategies
LEDS GP	Low Emission Development Strategies Global Partnership
M&E	Monitoring and evaluation
MRV	Measurement, reporting, and verification
MW	Megawatt
MWh	Megawatt-hour
NAP	National Adaptation Plan
NDCs	Nationally determined contributions
NGO	Nongovernmental organization
NREL	National Renewable Energy Laboratory
ODI	Overseas Development Institute
OPIC	U.S. Overseas Private Investment Corporation
PATT	Power Africa Tracking Tool
PayGo	Pay-as-you-go
PES	Payments for ecosystem services
PFAN	Private Financing Advisory Network (Climate Technology Initiative)
PFES	Payments for forest environmental services
PPA	Power purchase agreement
PPF	Project preparation facility
PPP	Public-private partnership

PV	Photovoltaics
R&D	Research and development
RE	Renewable energy
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus conservation, sustainable management of forests, and enhancement of forest carbon stocks
REPIN	Renewable Energy Platform for Institutional Investors
SDG	Sustainable development goals
SEB	Sustainable energy bonds
SEIT	Solar energy investment trusts
SL	Sustainable landscapes
SME	Small- and medium-sized enterprises
TA	Technical assistance
tCO₂e	Metric tons of carbon dioxide equivalent
TFA	Tropical Forest Alliance
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USG	United States Government
USTDA	U.S. Trade and Development Agency
VAT	Value-added tax
VC	Venture capital

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I. INTRODUCTION

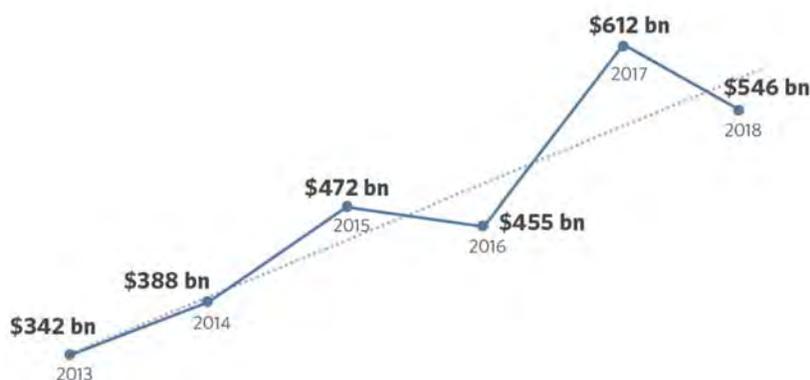
I.1 BACKGROUND

Climate finance includes international and domestic public financing and private investments to support climate change mitigation and adaptation. *Climate change mitigation* reduces greenhouse gas (GHG) emissions and includes clean energy (CE) and sustainable landscapes (SL). The United States Agency for International Development (USAID) defines clean energy as renewable energy (RE) and energy efficiency (EE). USAID defines sustainable landscapes as improved practices for agriculture, forestry, and other land uses (AFOLU) that slow, halt, or reverse GHG emissions while increasing long-term productivity. Climate adaptation increases the resilience of people and the built and natural environment to existing climate variability and climate change by reducing exposure, vulnerability, and/or negative impacts.

Global investments for climate change mitigation and adaptation have increased substantially since 2013 but fell sharply in 2018 (Figure I-1). Private investments in clean energy drove much of the growth. However, these investments are not enough for countries to meet their nationally determined contribution (NDC) commitments submitted to the United Nations Framework Convention on Climate Change (UNFCCC). The Intergovernmental Panel on Climate Change (IPCC) (2018) reported that an annual investment of \$1.6-3.8 trillion in CE would be needed between 2016 and 2050 to keep global warming in the 1.5° Celsius range and avoid the most harmful consequences. The IPCC did not estimate investment needed for adaptation. Achieving climate change mitigation and adaptation targets will require scaling up public and private investment.

Figure I-2 shows the sources, instruments, uses, and sectors of global climate finance flows in 2017/2018. The largest sources were corporations (31.6 percent of total climate financing), government development finance institutions (22.8 percent), commercial financial institutions (12.6 percent), multilateral financial institutions (9.8 percent), and households (9.5 percent). The most important instruments were market-rate debt (38.5 percent), corporate balance sheet equity and debt (37.8 percent), and concessional loans (11.1 percent). Over 92.7 percent of financing was for mitigation, only 5.2 percent was for adaptation, and 2.1 percent supported both mitigation and adaptation. 58.2 percent of total climate finance was for RE generation, 24.4 percent was for low-carbon transport, 5.9 percent was for EE, and 3.6 percent was for land use-based mitigation or adaptation. Figure I-3 shows the locations that received climate finance in 2017/2018.

FIGURE I-1. Global Climate Finance 2013-2018 (\$ Billion)



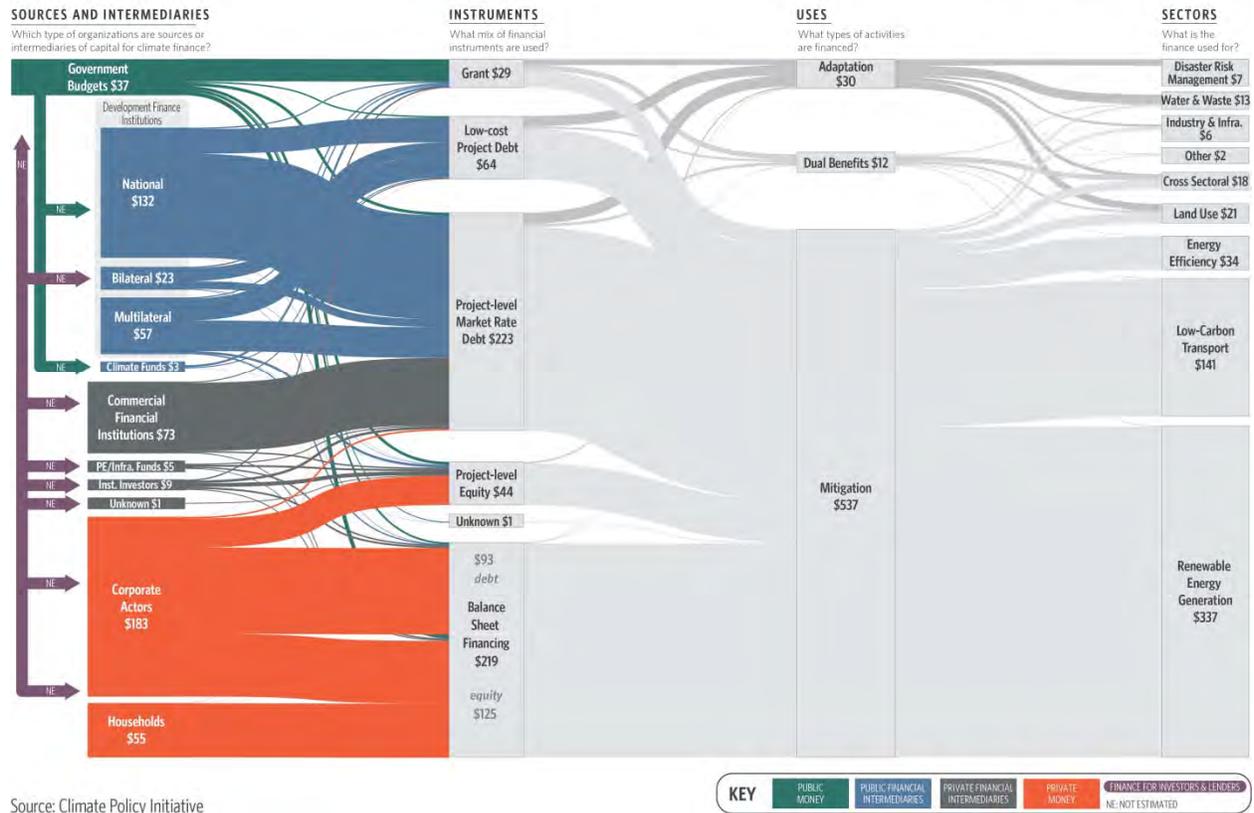
Source: Buchner et al. (2019)

FIGURE I-2. Sources, Instruments, Uses, and Sectors of Global Climate Finance Flows in 2017/2018

LANDSCAPE OF CLIMATE FINANCE IN 2017/2018

Global climate finance flows along their life cycle in 2017/2018. Values are average of two years' data, in USD billions.

579 BN USD ANNUAL AVERAGE 



Source: Climate Policy Initiative

Source: Buchner et al. (2019)

FIGURE I-3. Locations Receiving Global Climate Finance in 2017/2018



Source: Buchner et al. (2019)

Development assistance organizations include bilateral and multilateral donors, multilateral and government development banks, and nongovernmental organizations (NGOs). Funding from international development assistance organizations is critically important for mitigation and adaptation investments, but the available amount is small relative to private capital flows to developing countries and might not increase by a sufficiently large amount in the near future. Developing country governments can often improve their domestic revenue mobilization, but the current size of many countries' economies is small compared to the multiple, urgent competing needs for public expenditures.

To obtain large amounts of additional capital for climate-related investments, it will be important to increase private sector engagement and access international and domestic capital markets for debt and equity. It will also require accessing new sources of financing from institutional investors and impact investors. Development assistance organizations can play a major role in helping to leverage new sources of financing, but this will require changes in strategies and approaches.

This report discusses options for development assistance organizations to help national, subnational, and local governments; commercial banks; private companies; and communities scale up financing for clean energy, sustainable landscapes, and climate adaptation. These options can be applied across sectors, countries, and investment contexts under a variety of scenarios. They may need to be adjusted to fit the specific context. Thus, the options covered in this report are illustrative rather than comprehensive.

This report categorized these options for development assistance organization support under three building blocks for increasing investment:

1. *Establishing an enabling environment* (policy and regulatory conditions) to increase incentives for public and private sector investment and reduce barriers;
2. *Strengthening information and the capacity* (governments, public and private implementers, and investors to plan, design, implement, and finance climate investments); and
3. *Creating or strengthening financing mechanisms* for project preparation, financing co-financing, and risk mitigation.

In many developing countries, there has been much more commercial bank and development bank financing for CE than for agriculture, forestry, and other land use investments to reduce GHG emissions or support climate adaptation. There are some common challenges and opportunities for increasing investment in clean energy, sustainable landscapes, and adaptation, but there are also some key differences.

- **Clean energy:** Renewable energy is now more economically and financially viable than nonrenewable sources in many cases. However, barriers remain in the incentives and disincentives for suppliers and consumers, awareness of the benefits and costs of RE and EE, bank willingness to provide appropriate loan products, capacity and interests of government agencies and utilities, and use of public-private partnerships (PPPs) and innovative procurement approaches to increase competition.
- **Sustainable landscapes:** Many investments in forestry, agriculture, and other land uses can increase productivity and profitability while reducing GHG emissions. However, it can take many years to recoup the capital costs of planting and maintaining trees. Many developing countries lack the resources and capacity needed to reduce deforestation and forest resource degradation. Greater investment in sustainable landscapes is often hindered by lack of clear land tenure or resource use rights. Furthermore, the environmental benefits of sustainable landscapes are often unquantified or are not valued in monetary terms.
- **Adaptation:** It is generally more cost-effective to prevent or reduce the negative impacts from climate variability or change since the economic damages from the impacts of these stressors can be quite large. However, the willingness to make adaptation investments is often limited by uncertainty about the types, extent, and timing of climate impacts. There are also challenges in identifying appropriate adaptation measures for the public and private sectors and estimating their potential benefits against their relative costs. As a result, most developing countries are not sufficiently well-adapted to existing climate variability (such as a typical five-year flood), let alone the projected impacts from potential future with climate changes.

1.2 REPORT OBJECTIVES

This report analyzes the different ways that donors, development assistance agencies, governments, financial institutions, impact investors, and private companies can accelerate financing for investments in clean energy, sustainable landscapes, and climate adaptation. The report describes the key challenges to be addressed in catalyzing climate-related investment and presents options for expanding public and private sector financing. This report draws on USAID's substantial experience in supporting investments in clean energy, sustainable landscapes, and climate adaptation. It is also based on a review of literature documenting the experiences of donors, multilateral development banks, and the private sector, including case studies, tools, platforms and networks, and financial instruments.

This report uses the following key definitions.

- *Public finance:* Public money from taxes or other government revenue streams at the international, regional, national, subnational, or local levels;
- *Private finance:* Capital from nongovernmental sources, such as households, businesses, commercial banks, institutional investors, private equity, or venture capital funds;
- *Blended finance:* A combination of public and private capital to fund investments (one example is the IFC's Pilot Program for Climate Resilience for Agriculture in Nepal); and
- *Financial instruments:* Mechanisms or tools for the transfer or exchange of capital.

Table I-1 provides definitions of the most common types of financial instruments discussed in the report. The report provides a better understanding of the advantages and disadvantages of these financial instruments, ways to improve them to strengthen markets, and ways they can be used concurrently and sequentially to foster increased scale of impact and sustainability. Annex A contains additional definitions and explanations of the terms used in this report.

TABLE I-1. Common Types of Financial Instruments

Instrument	Definition	Examples
Debt	Capital provided by financial intermediaries in return for repayment on an established time schedule of the amount borrowed (<i>principal</i>) plus fees and interest (investment returns) based on a specified rate or formula. Loans are contractual agreements between a borrower and a single lender or group of lenders. Bonds, notes, and commercial paper are tradeable debt securities that allow money to be borrowed from public investors and resold on secondary markets.	Commercial and concessional loans; credit lines; asset-backed securities, bonds, notes, and commercial paper. Loans can be aggregated into portfolios that can be securitized and sold in private or public market transactions.
Equity	Capital provided by investors in return for an ownership share that entitles them to a portion of future operating profits and capital gains from sale of the ownership shares. In some cases, ownership shares (<i>stock</i>) are tradeable on public markets.	Listed or public stock shares, unlisted private shares, and private equity financing
Investment Funds	Vehicles for pooling capital from multiple investors to reduce transaction costs and diversify risks and potential returns on investment to increase access to financing or reduce the costs. Investment funds can be private or publicly traded.	Debt funds, equity funds, mutual funds, bond funds, private debt funds, venture capital funds, yieldcos, specialized funds (emerging market or socially responsible investment funds)
Risk Mitigants (De-risking)	Methods to reduce, manage, or share the risks of potential investment losses or the failure to honor financial obligations. Risks that can be mitigated include currency inconvertibility or exchange rate changes, government expropriation, war, terrorism, civil disturbances, extreme weather, accidents, construction delays, supply chain disruptions, natural resource availability, and technology failures.	Subordination, securitization, loan guarantees, insurance and reinsurance, index-based insurance, hedging, and swaps and derivatives
Transaction Enablers	Incentives that promote private investment by reducing the transaction costs of obtaining or providing financing through cash or in-kind services. Transaction enablers may be offered by governments, donors, development banks, NGOs, funds, or impact investors.	Seed capital, planning assistance, cornerstone stakes, grants, cooperative agreements, capacity development services, and concessional financing

I.3 ROAD MAP: ANALYSIS FRAMEWORK

This report includes separate chapters on scaling up investments in clean energy, adaptation, and sustainable landscapes. Each chapter describes key challenges and assistance options for the three building blocks for investment:

- Strengthening the enabling environment;
- Increasing capacity and information; and
- Improving global and domestic financing instruments and markets.

The report highlights useful applications and examples to help inform development assistance organizations and countries of the context, opportunities, and challenges. The list of options presented in the report is not exhaustive but is illustrative opportunities that have been successfully used for climate-related investments at various scales, levels of resources, and timeframes. These options are based on an assessment of prior programs and projects and the literature. Criteria for selecting options from the list include the national and local context, costs, timeframe, replicability, scalability, impact potential, and value for money.

2. CLEAN ENERGY INVESTMENTS

2.1 OVERVIEW

This chapter describes the opportunities and challenges for development assistance organizations to help scale up public and private sector investment in clean energy (CE). USAID defines *clean energy* as cost-effective renewable energy (RE) and energy efficiency (EE) support economic development and help countries achieve their national goals for greenhouse gas emission reductions. Section 2.2 reports on CE financing flows. Section 2.3 summarizes the range of options for development assistance organizations to scale up public and private sector CE financing. Sections 2.4 to 2.6 provide more detailed information and examples on these options within the three categories of 1) strengthening the enabling environment, 2) enhancing capacity and information, and 3) improving financing instruments and markets.

2.2 CLEAN ENERGY FINANCING FLOWS

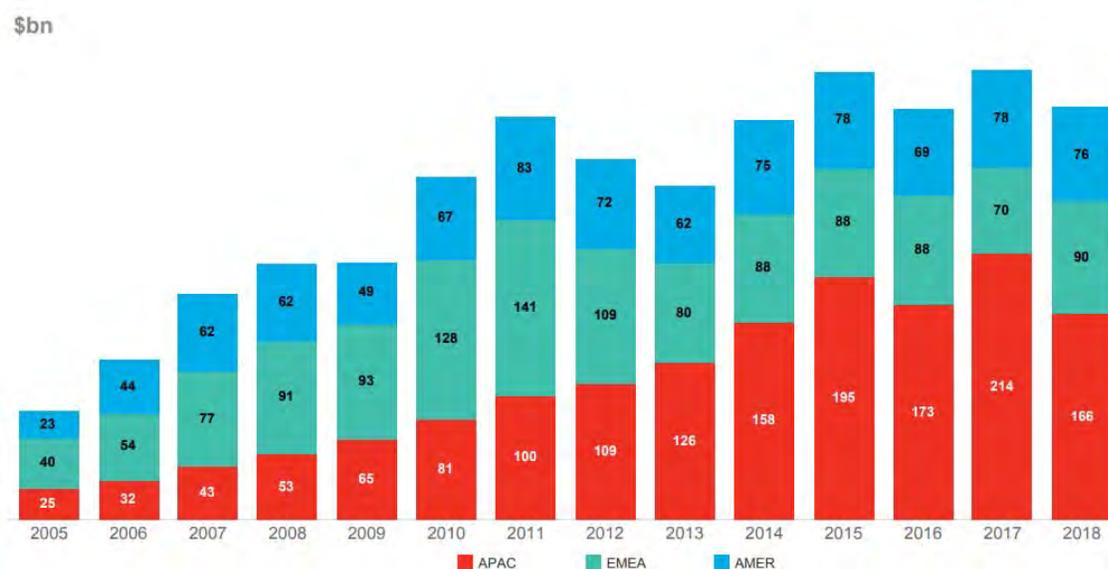
Global financing for CE amounted to \$371 billion in 2017/2018 (Buchner *et al.* 2019). In most developing countries, private and public investments in CE were still less than investments in nonrenewable energy development and fossil fuel subsidies. Nevertheless, many previous barriers to CE financing have decreased or reversed. The levelized cost of energy for renewable sources of electricity dropped below that of nonrenewable sources, particularly for large-scale wind power and off-grid and grid-connected photovoltaics. The unit cost reductions were due to technology and manufacturing improvements, economies of scale, and learning curves in adoption and use. Commercial banks have gained experience in CE lending.

Between 2012 and 2017, the CE financing challenges moved from demonstrating financial and field success to scaling, integrating, and mobilizing finance. Wind power and photovoltaics have become cheaper than electric power generation from fossil fuels in developed and developing countries. The International Renewable Energy Agency (IRENA) projected that all major RE investments will be cost-competitive with nonrenewable sources of electricity by 2020 (IRENA 2018).

Governments in Brazil, China, India, Mexico, and South Africa have made significant contributions to national RE capacity, especially for wind and solar, that have helped scale up global CE investments. Between 2017 and 2018, the value of new global investment decreased 7-8 percent for RE and three percent for EE (International Energy Agency 2018; Bloomberg New Energy Finance (BloombergNEF) 2019). The lower unit cost of the technologies was the main reason for the decrease in RE investment. The generation capacity of new RE installations actually increased. Another reason for the decrease in RE investment was the reduction of tax incentives in the United States. The cost advantages of RE technologies over conventional energy sources are expected to continue to grow. However, the pace of CE investment has remained limited by the availability of financing.

Figure 2-1 shows regional CE financing trends from 2005 to 2018 (BloombergNEF 2019). Overall investment dropped from \$362 billion in 2017 to \$332 billion in 2018. Since 2013, the Asia-Pacific region has had the largest amount of CE investment. Wind power investments increased three percent from 2017 to 2018, but solar power investments dropped 24 percent to \$130.8 billion. The decrease in solar photovoltaic (PV) investments reflected the lower unit costs and policy changes in China, where PV investment dropped 54 percent. India, Mexico, Morocco, South Africa, Taiwan, Ukraine, and Vietnam all individually surpassed \$2 billion in CE investments in 2018.

FIGURE 2-1. Clean Energy Investments by Region (2005-2018)



Source: BloombergNEF (2019)

Global CE financing trends are reflected in emerging and developing countries where stable, effective policy environments and financial markets exist and market price signals can overcome historic barriers to entry. Many emerging and developing countries have increased their commitment to on-grid and off-grid CE over the past decade despite global reductions in CE financing (BloombergNEF 2017). Brazil, El Salvador, India, Malaysia, Mexico, Peru, South Africa, and Thailand have replaced subsidized feed-in tariffs and public financing of RE with reverse auctions for power purchase agreements that can make price discovery more efficient and attract private sector financing (Molina, Scharen-Guivel, and Hyman 2018; O’Mealy *et al.* 2020).

Other policies that have facilitated RE investment include RE standards and net metering. Multilateral development banks and many government development banks have provided concessional financing for RE investments. A few countries, such as China and India, have greatly scaled up RE financing by issuing green bonds to access lower-cost capital.

The United States Government (USG) has helped many emerging and developing countries to improve their electric power generation and distribution systems. The U.S. Department of the Treasury is the lead agency for the *America Crece* Bilateral Agreements Initiative, which began in 2018. *America Crece* will help Latin America and Caribbean countries boost economic growth through support for investments in CE, innovative power technologies, energy infrastructure, and greater access to electricity for underserved, rural populations. Other USG agencies participating in this initiative include the Department of State, Department of Energy, USAID, the U.S. Trade and Development Agency (USTDA), and the Development Finance Corporation (formerly, the Overseas Private Investment Corporation, OPIC). The initiative has a target of generating at least \$100 million of investments over five years. As of May 2019, the U.S. Treasury had bilateral cooperation agreements with Argentina, Chile, Jamaica, and Panama under this initiative (Silk 2019).

Asia Enhancing Development and Growth through Energy (Asia EDGE) is a USG initiative to help develop sustainable and secure energy markets in the Indo-Pacific Region by providing expertise and resources from the federal government, private sector, and international financial institutions, and other partners. USAID, the Department of State, Department of Energy, Department of Commerce, Department of the Treasury, U.S. Trade and Development Agency, and the U.S. Development Finance

Corporation support this initiative. Asia EDGE has four strategic objectives: 1) strengthening the energy security of allies and partners; 2) creating open, efficient, rule-based, and transparent energy markets; 3) improving free, fair, and reciprocal energy trading relationships; and 4) expanding access to affordable, reliable energy (<https://www.state.gov/wp-content/uploads/2019/04/2019-04-12-AsiaEDGE-One-Pager-Reformatted.pdf>; <https://www.usaid.gov/energy/asia-edge>).

BOX 2-1. Factors Affecting Private Sector Participation in Clean Energy Markets

CE systems are fundamentally market-based, although strongly affected by the policy and regulatory environments. CE investment has greatly expanded due to the following trends:

1. **Lower prices and improvements in RE technologies.** The downward price trends for RE technologies (especially wind and photovoltaics), along with strong capabilities for market penetration, are expected to continue.
2. **Increasing demand for CE generation globally,** particularly in emerging markets.
3. **Innovations in financial products for CE and demonstrated profitability** have raised investor interest in structuring tailored financial products for CE investments. Better monitoring of CE financing flows and returns can help provide the data needed to design better financial instruments.
4. **A growing role for commercial financial institutions.**

Source: BloombergNEF (2017); Buchner et al. (2017)

2.3 OPTIONS FOR SCALING UP CLEAN ENERGY INVESTMENT

Table 2-1 presents options for scaling up investment in grid-connected RE; off-grid RE; industrial, commercial, and household energy efficiency; and energy-efficient transportation. Sections 2.3 to 2.5 describe these options in detail and highlight applications and case studies.

TABLE 2-1. Options to Scale Up Clean Energy Investment

Building Blocks	Options	Types of Assistance by Clean Energy Source			
		On-Grid Renewable Energy	Off-Grid Renewable Energy	Energy Efficiency	Energy-Efficient Transportation
Enabling Environment	CE-1. Create smart, competitive incentives for clean energy markets	Capacity additions, tenders and auctions, tradable certificates, RE portfolio standards, RE zones, private power generation, and payment guarantees	Mini-grid support, decentralization of power production network, and off-grid tariff cross-subsidization	Appliance standards, building codes, and preferential permitting	National, state, and local transport energy incentives and regulations
	CE-2. Encourage robust fiscal, tax, investment, and legal policies for CE	Renewable energy zones, accelerated depreciation, value-added tax (VAT) exemptions, tax credits, carbon cap and trade systems, carbon taxation, and voluntary carbon markets	VAT exemptions, accelerated depreciation, and investment tax credits	Import duty relief, investment tax credits, and accelerated depreciation	Green bonds and accelerated depreciation
	CE-3. Standardize CE contracts and quality assurance programs	Power purchase agreements (PPA), technical specification standards, and reporting protocols	Certification programs and standards	EE equipment standards, certification programs, and labels	Performance specifications and standards and certification and labeling programs
	CE-4. Foster CE public-private partnerships (PPPs)	PPPs between governments or utilities and private companies for RE generation, transmission, and distribution	PPPs for distributed, household RE and minigrid or microgrid establishment and operation	Energy service companies (ESCOs)	Partnerships with infrastructure and equipment suppliers
	CE-5. Align and integrate CE investment incentives with national, state, or local development and climate strategies and plans	Harmonize strategies, plans, and targets in nationally determined contributions (NDCs), low emission development strategies (LEDS), SDGs, and development plans	Off-grid electrification plans and strategies	Sectoral EE standards	Public transit systems based on RE and greater use and efficiency of public transport through rationalization of traffic and land use planning

TABLE 2-1. Options to Scale Up Clean Energy Investment (Continued)

Building Blocks	Options	Types of Assistance by Clean Energy Source			
		On-Grid Renewable Energy	Off-Grid Renewable Energy	Energy Efficiency	Energy-Efficient Transportation
Information and Capacity Development	CE-6. Assess capacity gaps and support capacity development for clean energy professionals	Cost-benefit and cost-effectiveness analyses, electricity rate restructuring, smart grids for better integration of variable RE, utility mentoring and exchanges, business advisory services, and business incubators	Market assessments; exchanges and mentoring of pay-as-you-go (PayGo) company managers staff; trade associations and other network organizations, business advisory services, and business incubators	Commercial, industrial, tourism, and residential EE diagnostics; staff training and mentoring for ESCOs, trade associations and other network organizations, and business incubators	Transportation network and land use modeling, study tours and exchanges, and matchmaking with suppliers of energy-efficient transport products and services
	CE-7. Improve quality, access, and use of CE resource information	Mapping of major RE production centers vs. existing and planned grid connections	Mapping of underserved areas or areas of potential demand and RE resource availability	Provide information on EE technologies, suppliers, and analysts	Mapping of RE fuel supplies and potential demand centers
	CE-8. Develop the capacity of financial institutions to increase CE lending	Clean Energy Lending Toolkit training and diagnostics	Clean Energy Lending Toolkit training and diagnostics	Clean Energy Lending Toolkit training and diagnostics	TA on structuring and leveraging financing for public-private partnerships
	CE-9. Support financing networks and platforms	Private Financial Advisory Network (PFAN) support for independent RE developers	Power Africa Beyond the Grid planning and financing support for distributed energy developers	Support for networks of domestic banks or microfinance institutions interested in EE lending	Sharing of municipal and regional transport network information through digital platforms
	CE-10. Support CE innovation labs and business incubators	Business advisory services and incubators for independent power producers and smart grid and power storage technology suppliers and users	RE zones, and financing for PayGo systems and battery energy storage	Business incubators and trade associations for ESCOs	Business incubators and trade associations for energy-efficient transport and alternative transport fuels

TABLE 2-1. Options to Scale Up Clean Energy Investment (Continued)

Building Blocks	Options	Types of Assistance by Clean Energy Source			
		On-Grid Renewable Energy	Off-Grid Renewable Energy	Energy Efficiency	Energy-Efficient Transportation
Financial Instruments and Markets	CE-11. Provide technical or financial assistance for risk mitigants	Loan guarantees, power purchase agreement (PPA) guarantees, put options, foreign currency guarantee funds, currency hedging, expropriation, and political risk insurance	Market assessments for off-grid power suppliers	Assess and share lessons learned from EE programs within and outside the country	Financial and economic analyses of energy-efficient transport systems
	CE-12. Support CE lending facilities or funds	TA for early-stage development of CE lending facilities or funds, provision of seed capital, and leveraging of finance	Concept design, market assessment, feasibility studies	Loans or credit lines for ESCO working capital	Grants or loans for planning and development
	CE-13. Support green credit lines in commercial banks or development banks	Credit lines for independent producers of grid power	Credit lines for off-grid power producers	Loans for ESCOs or adoption of energy-efficient technologies	Green credit lines for energy-efficient transport supply chains
	CE-14. Support the development of green bonds CE lending	Aggregation and warehousing or sale of RE loans for future green bond issuance	Aggregation and warehousing or sale of minigrid or microgrid loans for future green bond issuance	Aggregation and warehousing or sale of EE loans for future green bond issuance	Green bonds for municipal transport systems
	CE-15. Support innovative payment systems for beyond-the-grid renewable energy users	Performance payments tied to renewable electric power purchases by the grid, rather than development of new RE capacity or power generation	PayGo systems for distributed energy and expansion of mobile money services	ESCOs and payments for energy efficiency performance	Fixed price contracts and incentive payments for designing, building, and operating energy-efficient public transit systems

2.4 STRENGTHENING THE ENABLING ENVIRONMENT

Despite the substantial growth in CE financing, some developing countries still lack a favorable policy and regulatory environment for scaling up public and private CE investment. Development assistance organizations can help partner governments design and implement policy and regulatory reforms. The needs vary with the policy and regulatory environment, per capita gross domestic product (GDP), domestic revenue mobilization, public financial management, financial markets, and cultural and socioeconomic conditions in each country.

Option CE-1. Create Smart, Competitive Incentives for Clean Energy Markets

A *power-purchase agreement* (PPA) is a contract between a private company and a public sector entity to establish and/or operate infrastructure for public benefit. These contracts typically specify a price or price formula for an agreed time period. The developer is often responsible for maintaining the system and may retain indefinitely or turn it over to the government at a specified time.

Competitive procurements are an efficient, equitable, and transparent way to arrange a PPA. RE auctions can reduce the costs of electricity for utility companies and consumers and decrease transaction costs and the potential for corruption. In addition, it can reduce risks for RE developers and operators by providing market and price guarantees over a relatively long period of time. This can help developers and operators access financing and achieve profitability.

Good practices for a competitive RE procurement include long-term PPAs a fair mechanism for adjusting future prices. Long-term PPAs are critical in helping energy developers obtain financing from banks and investors. PPAs for 15-20 years are needed to provide developers of utility-scale RE sufficient time to recoup their costs and meet their expectations for financial returns by guaranteeing purchases and prices. Ideally, prices would be denominated in a major foreign currency and indexed to the inflation rate in that currency. PPAs can fail if prices are fixed in local currency or lack an inflation adjustment (Molina, Scharen-Guivel, and Hyman 2018).

Table 2-2 shows the advantages and disadvantages of different types of competitive procurements. Development assistance organizations can promote competitive tendering or reverse auctions RE auctions can be based on installed capacity in megawatts (MW) established during the contract period or the amount of firm power generated in megawatt-hours (MWh) over a specified time period.

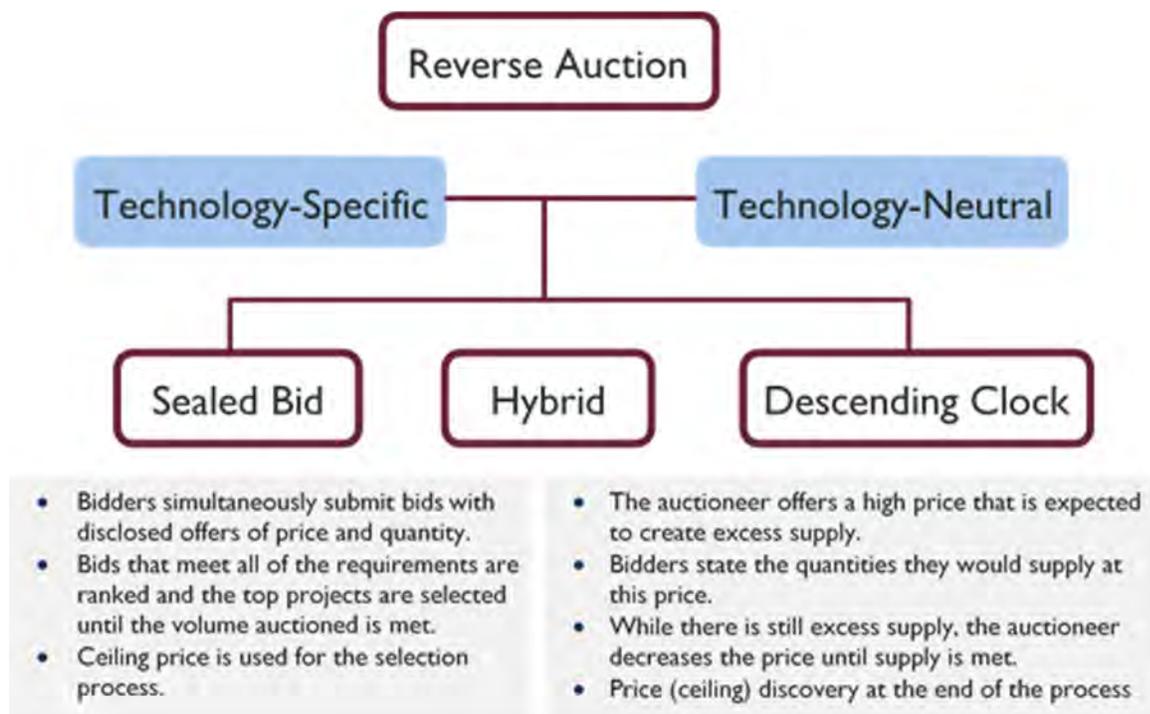
TABLE 2-2. Advantages and Disadvantages of Different Types of Auctions for Grid-Connected Power

Auction Type	Advantages	Disadvantages	Country Examples
First-price, sealed-bid auction (single product)	<ul style="list-style-type: none"> • Simplicity; easy to implement • Accommodates weak competition 	<ul style="list-style-type: none"> • No price discovery 	Peru, Vietnam
Pay-as-bid auction (multiple units of a single product)	<ul style="list-style-type: none"> • Simplicity; easy to implement • Handles weak competition 	<ul style="list-style-type: none"> • No price discovery • Possibly high political cost 	Mexico, Peru, Panama,
Uniform price auction (multiple units of a single product)	<ul style="list-style-type: none"> • Simplicity; easy to implement • Handles weak competition • Viewed as fair • Attracts small bidders 	<ul style="list-style-type: none"> • No price discovery 	United States
Descending clock auction (single or simultaneous) Ascending clock auction (auctioneer sells)	<ul style="list-style-type: none"> • Easy to implement • Good price discovery • Suitable for multiple products (simultaneous auctions) • Less vulnerable to corruption than sealed-bid auctions • Winners do not need to reveal all of their bid information 	<ul style="list-style-type: none"> • Possibility of collusion when competition is weak • More complex 	Descending clock auction: Colombia, Spain, United States Ascending clock auction: Canada, France, Spain, United States
Hybrid auction (descending clock auction in the first phase with a pay-as-bid auction in the second phase)	<ul style="list-style-type: none"> • Speeds price convergence • Accommodates weak competition • Good price discovery 	<ul style="list-style-type: none"> • Second phase is more difficult to implement with multiple products • Exposure problem (with multiple products) 	Brazil
Combinatorial auction	<ul style="list-style-type: none"> • No exposure problem • Good price discovery if done in multiple rounds 	<ul style="list-style-type: none"> • Difficult to implement 	Chile
Two-sided auction	<ul style="list-style-type: none"> • Can increase economic welfare • Can mitigate anti-competitive behavior 	<ul style="list-style-type: none"> • More complex, less familiar • Problem in engaging demand to respond to prices 	U.S. not-for-profit, regional electric power transmission organizations (ISO-New England and PJM Interconnection)

Source: Adapted from Barroso and Maurer (2011)

In a regular auction, buyers bid against each other, pushing the price up from a relatively low starting bid. In a *reverse auction* (*Dutch auction*), the sellers bid against each other, pushing the price down from a relatively high starting point. Reverse auctions are often recommended for government or utility procurements of renewable power. They are useful for competitive bidding by eligible project developers seeking to supply a specified amount of renewable electric power capacity or generation over an agreed period of time at a stated price or price formula. Reverse auctions can be *technology-specific* (e.g., for wind or photovoltaic power) or *technology neutral* (power supplied from any RE or conventional source). Figure 2-2 compares sealed bid, hybrid, and descending clock auctions.

FIGURE 2-2. Types of Reverse Auctions for Grid Power Generation



Source: Ferroukhi, Hawila, and Lucas (2013).

Auctions for grid power generation have strengths and weaknesses (Ferroukhi, Hawila, and Lucas 2013). They are helpful for establishing competitive pricing; this price competition leads to cost efficiencies, which makes the auctions useful for volume and budget control. They can increase the predictability of renewable electricity supply and offer good security for investors if linked to long-term power purchase agreements. Auctions can also enable governments to achieve other policy objectives, such as preferences for location in relatively undeveloped areas. However, auctions can lead to discontinuous market development (stop-and-go cycles). They can also pose some problems for bidders, such as high investment costs relative to the present value of net benefits and the risks of not winning a contractor risk of bidding too low on an accepted bid (“winner’s curse”).

Option CE-2. Encourage Robust Fiscal, Tax, Investment, and Legal Policies for Clean Energy

Development assistance organizations can promote the adoption of production-based, fiscal (tax or subsidy) and legal incentives to create a favorable environment for public and private financial flows to help mobilize CE investments. Changes in the policy, regulatory, governance, and enabling environments may be critical for scaling up private sector investment in clean energy. Countries may need to select different types of incentives based on the strengths of their regulatory, fiscal, and legal systems.

Examples of policy and regulatory changes that can be used to promote CE are listed below:

- Production and investment tax credits, rebates, or deductions;
- Subsidies (direct spending);
- Pricing policies such as feed-in tariffs;
- Provision of financing
- Value-added tax (VAT) exemptions;
- Income tax credits;
- RE zones;
- Contract facilitation and enforcement;
- Power purchase agreements;
- Accelerated depreciation for tax purposes;
- Intellectual property protection;
- Carbon pricing or taxation
- Carbon limits or cap-and-trade systems;
- RE or EE quotas, targets, certificates, or portfolio standards; and
- Energy-efficient building and land use codes.

RE zones are priority areas for public and private sector investments and donor support of large-scale RE development. They can increase interest in RE development and may make it easier to obtain regulatory approvals and financing, reduce the risks and costs of doing business, or increase profitability. RE zones have been used effectively in some states within the United States, but have not been applied much in developing countries. Governments can offer expedited approval processes, special financing, and other incentives for developers in RE zones. They can support infrastructure investments, such as grid extensions or road improvements for RE zones. There may also be some benefits or cost savings from economies of scale or agglomeration, but there can also be some negative, external costs from the concentration of RE investments in limited locations. Development assistance organizations can promote RE zones by:

- Helping national and subnational governments analyze the advantages and disadvantages of establishing RE zones;
- Facilitating inclusive, stakeholder engagement before and after RE zone designation, which can make the approach more likely to be successful;
- Assessing the enabling environment in RE zones; and
- Supporting analysis and design of incentives and infrastructure requirements for RE zones (e.g., grid integration studies and cost-benefit analyses).

Governments will need to select policies that are appropriate for their regulatory, fiscal, and legal system strengths and weaknesses. However, it can be difficult and slow to obtain government approval of policy and regulatory changes. Furthermore, some changes may have unintended consequences or lead to unnecessarily lengthy subsidization that can be hard to end. Special interests can dominate the domestic political debate and relatively large, wealthy, or politically connected companies may benefit

disproportionately. Development assistance organizations can help governments analyze the positive and negative effects and feasibility of policy and regulatory changes.

Option CE-3. Standardize Clean Energy Contracts and Quality Assurance Programs

A strong, enforceable legal environment is important for scaling up RE investment. Standardized contracts and transparent, independent quality assurance programs can provide the assurances that private developers and investors want to make informed decisions. Development assistance organizations can promote *standardization of contracts and leases* by:

- Preparing or sharing standard contracts, leases, and concessions for CE development (Box 2-2);
- Helping utilities and power buyers prepare templates or standard contracts for PPAs. Contracts should specify electricity purchase requirements and prices, grid interconnection and transmission responsibilities, procedures for assignment or termination of agreements, handling of adverse regulatory or tax changes, dispute resolution, and force majeure provisions that free both parties from obligations if extraordinary events occur (IRENA 2016);
- Helping commercial banks standardize CE loan application forms, requirements, risk assessments, and agreements, and ensure that staff use the templates and procedures correctly;
- Supporting outreach campaigns to make stakeholders aware of the availability of CE financing and improvements in bank processes;
- Providing technical assistance (TA) and facilitating stakeholder buy-in workshops to develop industry standards with developers, investors, deal facilitators, rating agencies, technology manufacturers, regulators, and consumers); and
- Supporting capacity development on PPA terms, processes, procedures and financing, risk mitigation, and insurance.

Standardization of CE leases, concessions, and contracts can improve their ability to withstand legal scrutiny, ensure transparency, reduce due diligence and transaction costs, and increase access to capital by facilitating appraisal by banks, credit rating agencies, and other investors. Standardization can be particularly beneficial if there are plans to pool and securitize assets for sale in capital markets.

Quality assurance programs can increase consumer confidence in new or unfamiliar products and suppliers. Successful commercialization of CE technologies can be jeopardized if high-quality products attract cheaper, lower quality products that flood the market. Development assistance organizations can help public or private sector partners set product specifications, performance standards, and certification programs and communicate the benefits of high-quality CE technologies. Eventually, there may no longer be a need for certifying these technologies as they become established products or these functions are taken over by the industry or manufacturers.

BOX 2-2. Good Practice Guides for Financing Photovoltaics

The U.S. National Renewable Energy Laboratory (NREL) established a Solar Securitization and Solar Access to Public Capital Working Group. This working group developed standardized photovoltaic system leases and contracts to facilitate financing and deal-making. It also produced best practice guides for residential, commercial, and industrial photovoltaic system installation. The various tools and guides can be found at <https://search4.nrel.gov/texis/search/?pr=metanrel&query=Solar+Access+to+Public+Capital>.

Sources: Ardani, Keating, and Walker (2015); Dabbagh et al. (2015); Doyle et al. (2015)

Option CE-4. Foster Clean Energy Public-Private Partnerships (PPPs)

A *public-private partnership* is a contractual agreement between a private sector company and a public sector entity for supplying goods or services for public benefit. The public sector may or may not provide planning support, financial contributions, and in-kind resources (such as land), depending on the agreement. The private company is often responsible for obtaining financing and bearing the risks in developing and operating the investment. A PPP helps the public sector overcoming capital constraints or obtain goods and services at a lower cost or with less government involvement or risk. The private company may benefit from government resources, authority, influence, and experience in developing the infrastructure, and profits from the sale of goods or services.

A PPP can leverage private financing with limited public funds. PPPs can enable development assistance organizations to achieve greater impact, increase participation and ownership by nongovernmental stakeholders, and improve prospects for sustainability after their support ends. These partnerships can be at a global, regional, country, or local level. Careful due diligence is critical before proceeding with a PPP.

Development assistance organizations can sponsor competitive challenges or prizes to help transnational or domestic companies, communities, and NGOs achieve common goals. Box 2-3 describes the USAID Global Development Alliance Program's model for PPPs.

The U.S. whole-of-government Power Africa Initiative facilitates the development of transactions for expanding access to the electric grid. USAID and its public and private sector partners in Power Africa help governments, power producers, financial institutions, and CE developers in Sub-Saharan Africa identify opportunities for PPPs for electric power generation, transmission, and distribution. Power Africa has agreements with over 130 private sector partners who have pledged a total of more than \$20 billion for development of 16 gigawatts (GW) of new power generation. This private investment has been leveraged by over \$34 billion in international and domestic public sector commitments (<https://www.usaid.gov/powerafrica/aboutus>). Power Africa also shares examples and lessons learned to help clients prepare pre-qualification CE lending documents, model bidding documents, and sample contracts and agreements. Power Africa's Beyond the Grid (BTG) program has more than 40 private sector partners developing minigrids and distributed PV services for rural and peri-urban populations.

BOX 2-3. USAID Global Development Alliance

USAID's Global Development Alliances (GDAs) are PPPs designed to leverage private resources for development gains that:

1. Leverage at least as much cash or in-kind support from non-USAID sources as from USAID;
2. Define common goals for all partners;
3. Jointly identify solutions to a social or economic development problem;
4. Incorporate nontraditional resource partners, such as companies and foundations;
5. Share resources, risks, and results; and
6. Include innovative, sustainable approaches that are co-designed, co-funded, and co-managed by partners with shared risks, responsibilities, and rewards.

A GDA may be appropriate when private sector business interests intersect with USAID's strategic development objectives. For example, USAID's GDA with the investment advisory firm, Evensen Dodge International, has increased access to capital markets for municipal investments in energy-efficient street lights in Mexico.

Option CE-5. Align and Integrate Clean Energy Investment Incentives with National, State, or Local Development and Climate Strategies and Plans

Most developing countries have prepared national strategies or plans for climate mitigation and adaptation or energy development. The broader strategies and plans include NDCs, LEDS, and national plans for meeting the sustainable development goals (SDGs) set by the United Nations General Assembly in 2015 for the year 2030. Strategies and plans should include specific, time-bound CE targets and institutional responsibilities. They may propose changes in policies and regulations and actions to increase public and private financing. Development assistance agencies often support preparation of these plans and strategies, but more attention is usually needed to support implementation by:

- Determining financing needs and options for CE investment pipelines that align with these plans;
- Developing energy sector or broader development plans that integrate the higher-level strategies and plans (e.g., NDCs and SDGs);
- Conducting financial, economic, environmental, and social analyses to estimate CE costs and benefits and evaluate risks and feasible financing terms; and
- Matching investment priorities with sources of financing.

Another common role for development assistance agencies is to help develop the capacity of the public and private sectors and key stakeholders. Examples of continuing efforts for developing the capacity for CE investment in developing countries include the U.S. National Renewable Energy Laboratory (NREL), Power Africa, the Private Financing Advisory Network (PFAN), the LEDS Global Partnership (LEDS GP) Network (Box 2-4), and various programs of bilateral donors and multilateral development banks.

EXAMPLE

BOX 2-4. The Low Emission Development Strategies Global Partnership

Background. The Low Emission Development Strategies Global Partnership (LEDS GP) facilitates peer learning, technical cooperation, and information exchange to support the formation and implementation of low emission development strategies in developing countries. LEDS 1) reduce GHG emissions, 2) increase resilience to climate change impacts, and 3) achieve social, economic, and environmental development goals.

Challenge. There is limited public and private funding for preparation and implementation of LEDS.

Approach. LEDS GP supports knowledge sharing, training, and other services to drive forward investments to implement low emission development actions. It has regional platforms in 1) Africa, 2) Asia, 3) Europe and Eurasia, and 4) Latin America and the Caribbean. The LEDS global secretariat is managed by the Climate and Development Knowledge Network and NREL. It has six technical global working groups: 1) Agriculture, Forestry and Other Land Use; 2) Benefits; 3) Energy; 4) Finance; 5) Subnational Integration; and 6) Transport. LEDS GP supports peer learning, TA, knowledge resources, and early mover projects with donor and multilateral development bank support.

Expected results. LEDS GP produced a [Resource Guide for NDC Finance](#) in developing countries with case studies and resources, [Development Impact Assessment Toolkit](#), an [Energy Toolkit](#), and a [Transport Toolkit](#).

Sources: Halstead et al. (2017) and LEDS Energy Working Group and Worldwatch Institute (2016)

2.5 ENHANCING INFORMATION AND CAPACITY DEVELOPMENT

Information and capacity limitations at the individual, organizational, and system levels can make it challenging to mobilize public or private financing (Hinsz *et al.* 2016). Governments may have insufficient resources for sharing information across agencies and with the private sector. CE developers may be unaware of the full range of financing sources and the processes and requirements for accessing financing. Foreign technology suppliers might not understand the context of specific countries, including the supply and demand for various types of energy and the business and regulatory environment. Commercial banks often prefer short-tenor lending with high collateral requirements and may be unfamiliar with new technology options, business models, costs and benefits, and risks of CE lending (Patel 2011; Frisari *et al.* 2013).

Government agencies without a specialized focus on energy may also lack expertise on CE technologies and businesses. These capacity limitations may make it difficult for CE developers to finance and implement their business ideas and may make potential financing sources more reluctant to invest (Hussain 2013; Chandra Barua *et al.* 2014). In some developing countries, there might not be enough people with the skills needed to design, develop, install, or operate some CE systems successfully (Gray and Tatrallyay 2012).

Often, key data needed to understand the viability and risks of CE projects are not readily available to governments, developers, and financiers. Data gaps make it difficult to design and select sites for CE systems and to project their financial and economic viability and environmental and social impacts (Patel 2011).

Development assistance organizations can help catalyze CE financing by sharing information and developing the capacity of government agencies, developers and suppliers, customers, financial institutions, financing networks and platforms, and innovation labs and business incubators. Such assistance can help the public and private sectors identify technology options, improve designs, assess CE proposals, and identify and leverage financing.

Option CE-6. Assess Capacity Gaps and Support Capacity Development for CE Professionals

BOX 2-5. Clean Energy Project Preparation Facilities

The Overseas Development Institute (ODI) identified 150 project preparation facilities (PPFs) for CE investments, including 40 percent solely focused on CE. It found that PPFs used diverse approaches that vary by geography, institution, and intervention stage, but concluded that they have often not achieved their potential. ODI recommended that PPFs improve their understanding of complementary approaches and institutions and evaluation communication and knowledge sharing efforts.

Source: Nassiry *et al.* (2018)

Development assistance organizations can provide TA for gap analyses and needs assessments for energy planning agencies and other stakeholders. They can also assist project preparation facilities (PPFs) to help speed up technical, legal, and regulatory approvals and obtaining financing. However, PPFs have not always achieved their potential (Box 2-5).

Information on the market for CE lending can increase the willingness of financial institutions and investors to finance CE investments. For example, the Climate Economic Analysis for Development, Investment, and Resilience (CEADIR) Activity prepared national market assessments for CE lending in four Central American and eight West African countries.

Development assistance organizations can also support workforce development for CE professionals and business advisory services. Workforce development programs improve the skills needed to assess, design,

finance, and operate CE investments. They can include continuing education, skills training, university degrees, and certifications that may be obtained in-person or online.

Business advisory services include TA, mentoring, or study tours. For example, CEADIR helped CE developers and customers prepare loan applications for CE investments in Ghana and Rwanda (Torres *et al.* forthcoming). CEADIR used a pay-for-performance approach that tied remuneration of the business advisory services providers to completion of milestones in the loan application process. The bulk of the payment was only provided after a participating bank approved issuing the loan.

The Rocky Mountain Institute's Climate Finance Access Service posts climate finance professions in developing countries for two years to help secure financing for priority national climate-related projects (Bodnar, Kessler, and Ott 2018). Strengthening the capacity to develop, finance, and implement CE projects in developing countries can also help catalyze private sector financing.

Option CE-7. Improve Quality, Access, and Use of Clean Energy Resource Information

Good information is needed to design, analyze, and finance CE projects and create a favorable policy, regulatory, and enabling environment. Development assistance organizations can improve the quality, access, and use of RE resource information by supporting preparation of maps or databases. RE resource maps and databases can help governments designate RE zones, design RE policies, and help the private sector select sites for RE investments.

RE maps and databases require the collection and compilation of locational data on solar radiation, wind speeds and directions, hydrological flows, and geothermal resources. Maps and databases may also include other location-specific factors that affect the costs, benefits, and environmental and social impacts of RE development, such as topography and geomorphology, existing land uses, human settlements and economic activities, and climate risks. NREL's website contains extensive information on RE resource mapping (www.nrel.gov).

IRENA (an intergovernmental platform on RE policy, technology, and resources) has an online Global Atlas for Renewable Energy that includes wind, solar, hydro, bioenergy, marine energy, and geothermal resources (<https://www.irena.org/globalatlas>). Development assistance organizations can help develop the capacity of government agencies, developers, and banks to use this information in regulatory decisions; financial and economic analyses; grid integration studies; and planning, maintenance, and expansion of the transmission and distribution system.

Development assistance organization can also disseminate knowledge and support public information networks that share information on RE resources and investments. IRENA's Sustainable Energy Marketplace is a virtual platform on RE investments, developers, investors, financing sources and markets, regulations, and incentives (<https://www.irena.org/marketplace>). The U.S. Department of Energy's Open Energy Information (OpenEI) wiki allows users to view, edit, add, and download free RE data (https://openei.org/wiki/Main_Page). The Climate Finance Lab has an information-sharing network for CE financing (www.climatefinancelab.org).

Improvements in the accessibility and quality of RE resource information can reduce barriers in the pre-investment stage by enabling governments and project developers plan and make data-driven decisions. This can increase transparency, improve the ease of doing business, and catalyze interest in RE development.

Option CE-8. Develop the Capacity of Financial Institutions to Increase CE Lending

The USAID-funded Analysis and Investment for Low-Emission Growth (AILEG) Activity developed a Clean Energy Lending Toolkit. The purpose of this toolkit was to train bank managers and staff on technologies and business models for CE development, appropriate loan products for CE, and assessing the market and profitability of CE lending. It helps banks identify their existing capacity and needs to successfully serve the market, create loan products and processes for lending to CE companies, and understand how other financial institutions started or expanded CE lending (Counts *et al.* 2014). For example, USAID support helped Sasfin, a commercial bank in South Africa, begin offering turnkey CE financing.

CEADIR translated the Clean Energy Lending Toolkit into French and Spanish and provided diagnostics and training to help interested banks in four Central American countries and eight West African countries begin or expand CE lending (Counts *et al.* 2016). This support contributed to the establishment of new CE loan products, funds, and financing windows.

Despite progress in expanding CE lending, significant gaps remain between the supply and potential demand. Development assistance organizations can support the replication of trainings and diagnostics built on the toolkit for additional banks and other countries. They can also help fill these gaps by promoting many other existing tools:

- The LEDS Energy Toolkit 2.0 is a reference guide to free or low-cost instruments and methods for sustainable energy planning (LEDS Energy Working Group and the Worldwatch Institute 2016). It featured 26 tools, including NREL's Jobs and Economic Development Impact Model and Natural Resources Canada's RETScreen Clean Energy Management Software.
- BloombergNEF offers energy project asset valuation models for subscribers. The model contains standard preloaded data that can be replaced with customized, site-specific data. It calculates discounted cash flows, net present values, internal rates of return, payback periods, buyout values, levelized costs of energy, and energy asset values.
- NREL's RE Explorer provides data and analytical tools for RE decision making and investment (<https://www.re-explorer.org/>).

- The Power Africa Tracking Tool (PATT) is a mobile app and web portal that facilitates real-time tracking of electric power transactions in sub-Saharan Africa (<https://itunes.apple.com/app/patt/id1039913424?mt=8>). The PATT can help inform financing opportunities, promote private sector deal closures, and increase transparency. Users can view the status of power transactions and active investments by country.

These tools can help the private and public sectors design CE investments faster and with lower transaction costs. They can also help demonstrate the financial viability of renewable electric power financing.

Option CE-9. Support Financing Networks and Platforms

Financing networks or platforms link various stakeholders to exchange information on project design, markets, and financing sources. They can increase the likelihood of securing financing, speed up financial closure, and help design credit enhancements for borrowers and risk mitigants for financial institutions. Financing networks or platforms have the potential to become self-sustaining after an initial period of donor funding if subsequent funding can be obtained from users or transaction fees.

Examples of financing networks and platforms include LEDS GP, the Renewable Energy Platform for Institutional Investors (Box 2-6), PFAN (Box 2-7), and Odyssey Energy Solutions.

Odyssey Energy Solutions developed an information database for mini-grid investments with site data, load forecast, system design, tariff design, and financial projections (Odyssey Energy Solutions 2018). The Clean Energy Solutions Center is a web-based resource that helps governments facilitate deployment of RE technologies. Its Ask an Expert service matched requestors with global experts (<https://cleanenergysolutions.org/about>).

BOX 2-6. The Renewable Energy Platform for Institutional Investors (REPIN)

Refinancing can improve the balance sheets of RE developers or commercial banks and reduce financing costs. Aggregation of smaller loans into larger loans and securitization can help institutional investors find investment opportunities at scale with relatively low transaction costs and high liquidity. It can also increase the quality of the assets by pooling risks.

The Global Innovation Lab for Climate Finance established REPIN to facilitate institutional investor participation in the refinancing of large-scale RE development. REPIN blends financing from institutional investors, commercial banks, and public institutions. It structures financial instruments to meet investor preferences and market requirements in specific countries. These instruments range from simple project debt pass-throughs to full securitization. REPIN also offers credit enhancements and risk mitigants. REPIN targeted South Africa in its pilot phase and plans to expand to other middle-income countries.

Source: <https://www.climatefinancelab.org/project/renewable-energy-platform-for-institutional-investors-repin/>

Development assistance organizations can expand the work of financing networks and platforms by:

- Supporting new or existing networks or platforms that facilitate or broker financial deals;
- Leveraging funding to support financial networks or platforms through partnerships;
- Connecting CE developers, technology manufacturers and suppliers, investors, financial institutions, and investors;
- Analyzing the efficiency, effectiveness, and sustainability of networks and platforms;

- Identifying gaps in the landscape of climate financing networks and platforms and opportunities to expand deal facilitation;
- Determining effective methods for capacity development and information exchange, such as mentoring, peer exchanges, study tours, or marketplace conferences; and
- Collecting and disseminating lessons on strengthen and scale up networks and platforms.

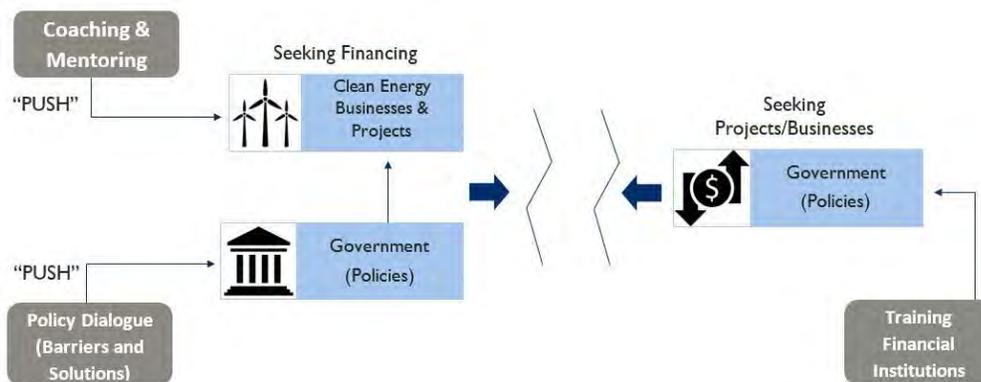
EXAMPLE

BOX 2-7. The Private Financing Advisory Network (PFAN)

Background. PFAN is a multilateral public-private partnership with regional networks in Latin America, Asia, and Africa. It also has country networks.

Challenge. Existing CE finance networks and platforms are often small and lack the resources to have a large impact on a particular region, country, or market. In some developing countries, there is a “missing middle” for medium-scale financing. PFAN helps to address this challenge by providing information and matchmaking link CE suppliers with financing sources (see below).

Approach. PFAN identifies promising, early-stage CE projects and helps RE developers prepare business plans, investment pitches, and growth strategies PFAN selects the business plans with the best potential for economic and environmental benefits. It then provides coaching services to developers and links them to i potential investors at CE financing events. PFAN does not charge the developers any upfront costs for its services. It receives core funding from USAID and other development assistance organizations and a negotiated success fee on investments that it has facilitated. PFAN has country, regional, and international networks of investors and advisors who can access information on the pipeline of potential investments. PFAN membership is free and voluntary. Members can provide investment advisory services and have a right of first offer to provide financing advice and other services to client businesses.



Expected results. PFAN has facilitated hundreds of transactions and guided millions of dollars into CE investments worldwide. Its technology-neutral model has resulted in financial closure of over 100 projects. It helped clients obtain over \$1.2 billion in CE financing in 2018. In 2019, PFAN restructured its project pipeline to focus on a smaller number of projects that are higher quality and ready for investment.

Sources: PFAN (2018; 2019); http://cti-pfan.net/about/#a_about_us

BOX 2-8. World Bank Support for Climate Innovation Centers

Background. The World Bank’s InfoDev Program supports entrepreneurship development in developing countries. InfoDev’s Climate Technology Program helps entrepreneurs in developing countries to promote effective and profitable private sector solutions for climate-related challenges.

Challenge. Inability to access information on viable climate technology, business models, and financing opportunities and promoting new clean technology businesses has been a serious barrier to market expansion in many developing countries.

Approach. The Climate Technology Program established locally owned and operated Climate Innovation Centers in developing countries to provide technical and business management training and TA and connect project developers with financing. The Climate Innovation Centers use a competitive application process to award proof-of-concept grants (up to \$50,000) and seed capital (up to \$1 million) to promising clean technology entrepreneurs and start-ups. The centers also conduct sector policy research and engage with governments on small and medium-sized enterprise (SME) development. The centers build a pipeline of growth-oriented clean technology companies that can reduce GHG emissions and increase climate resilience.

Expected results. The Climate Technology Program has supported the development and expansion of CE in Ethiopia, Guatemala, India, Kenya, South Africa, and other countries. It is expected to facilitate financing for 2,500 innovation companies, provide 1,400 MW of off-grid renewable energy, and mitigate 50 million tCO₂e.

Source: World Bank (2018)

Option CE-10. Support Business Incubators and Clean Energy Innovation Labs

Business incubators (accelerators) provide TA and financial support to start-ups, early-stage companies, and nascent markets. They can reduce barriers in the early stages of product development and market entry, including problems in setting up operations, overcoming regulatory issues, improving

BOX 2-9. Global Innovation Lab for Climate Finance

The Global Innovation Lab for Climate Finance was established in 2014 by the United States, United Kingdom, and Germany. It has partnerships with other bilateral climate finance donors and development finance institutions, and with private pension funds, investment banks, and developers.

The Climate Policy Initiative is the Lab’s secretariat. It facilitates the identification, design, and development of climate finance instruments through a global public-private platform. This platform mobilizes private investment for climate change mitigation and adaptation in developing and emerging market countries. The Lab has annual review cycles for crowdsourced funding that can be developed into bankable instruments.

Source: <http://climatefinancelab.org/>

management, and accessing seed capital. They offer various forms of assistance to specific firms—capacity development, access to information, introductions to investors and financing sources, and policy recommendations. They can supply physical space, shared administrative services, support for financial management and regulatory compliance, and seed capital. They can also help companies build relationships with other sources of financing and promote new technologies and develop markets. Development assistance organizations can help business incubators expand or provide additional financing. Box 2-8 describes the Climate Innovation Centers funded by the World Bank.

An *innovation lab* fosters collaboration with diverse stakeholders to create and test new or relatively risk solutions to identified problems (Gryszkiewicz, Lykourantzou, and Toivonen 2016). Innovation labs can spur entrepreneurial thinking, creative problem solving, and collaborative action. They typically have an open-ended solicitation process with low administrative costs relative to the potential, long-term financing leveraged. Donors, multilateral financial institutions, governments, foundations, not-for-profit organizations, impact investors, and commercial lenders can support innovation labs. Box 2-9 describes the Global Innovation Lab for Climate Finance. Box 2-10 summarizes the work of the India Innovation Lab for Green Finance.

Development assistance organizations can:

- Accelerate CE technology development and deployment and information-sharing through business incubators and innovation labs that offer seed funding, TA, and collaborative partnerships to kick start investments or generate and implement projects;
- Support new or existing business incubators or innovation labs at the international, regional, national, or subnational levels; and
- Help innovation labs develop and promote CE financing approaches that have not yet been demonstrated in an area.

USAID has supported some similar approaches, including Grand Development Challenges, the Development Innovation Ventures (DIV), and Broad Agency Announcements for co-creation of innovative activities.

EXAMPLE

BOX 2-10. India Innovation Lab for Green Finance

Background. The India Innovation Lab for Green Finance is one of four innovation labs in the country. It was established in 2014 and has been supported by the public and private sectors and development assistance organizations.

Challenge. The Government of India has placed a high priority on increasing CE use, but there are many competing claims for investment funds.

Approach. The India Innovation Lab for Green Finance promotes use of green finance instruments for infrastructure development. It has helped pioneer and field test two new instruments for CE financing in India:

- **Solar energy investment trusts (SEITs).** SEITs fund or purchase a portfolio of solar energy investments and allow equity investors to participate by buying public mutual fund shares similar to real estate investment trusts. Cleanmax Solar has promoted this idea in India.
- **Sustainable energy bonds (SEBs).** SEBs are publicly traded debt instruments that allow impact investors to obtain positive, but relatively low financial returns along with favorable environmental or social impacts. The impacts are monitored and reported. SEBs can reduce transaction costs and mitigate risks for investors by pooling investment capital. cKers Finance has promoted SEBs in India by establishing credible benchmarks for impact evaluation, reducing transaction costs, and de-risking small-scale lending.

Expected results. The India Innovation Lab for Green Finance has helped develop and launch 25 investment instruments that have mobilized \$977 million for CE public-private partnerships.

Source: <https://www.climatefinancelab.org/the-labs/india/>

2.6 IMPROVING FINANCIAL INSTRUMENTS AND MARKETS

Public and private investments in CE have been the largest sources of climate-related finance since 2012 (BloombergNEF 2017; Buchner *et al.* 2019). However, CE financing challenges remain, including: 1) commercial bank misperceptions about the profitability and risks of CE investments; 2) limited use of securitization of CE loans; and 3) a perceived shortage of bankable loan applications. The Basel III accord also set higher bank capital requirements that may make it more difficult to offer unsecured, long-tenor loans (<http://www.basel-iii-accord.com/>). CE investments often require a relatively long tenor to reach cash flows and investment return targets. Commercial banks often prefer to make secured, low-risk, long-tenor loans (mortgages) or higher-risk, short-tenor loans with relatively high interest rates (credit cards and consumer debt). Additional private and public finance for CE investments in developing countries can be mobilized faster if development assistance organizations provide loan capital, risk mitigants, or support for credit enhancements to financial institutions.

Option CE-11. Provide Technical or Financial Assistance for Risk Mitigants

Risk mitigants for CE financing include loan guarantees, insurance, and TA to reduce project performance risks. Risk mitigants can increase loan investment by reducing projected bank losses from loan defaults. They can also increase equity investments by improving risk-adjusted net returns to CE developers and operators. Table 2-3 provides examples of risk mitigants for CE financing.

TABLE 2-3. Examples of Types of Risk Mitigants for Clean Energy Financing

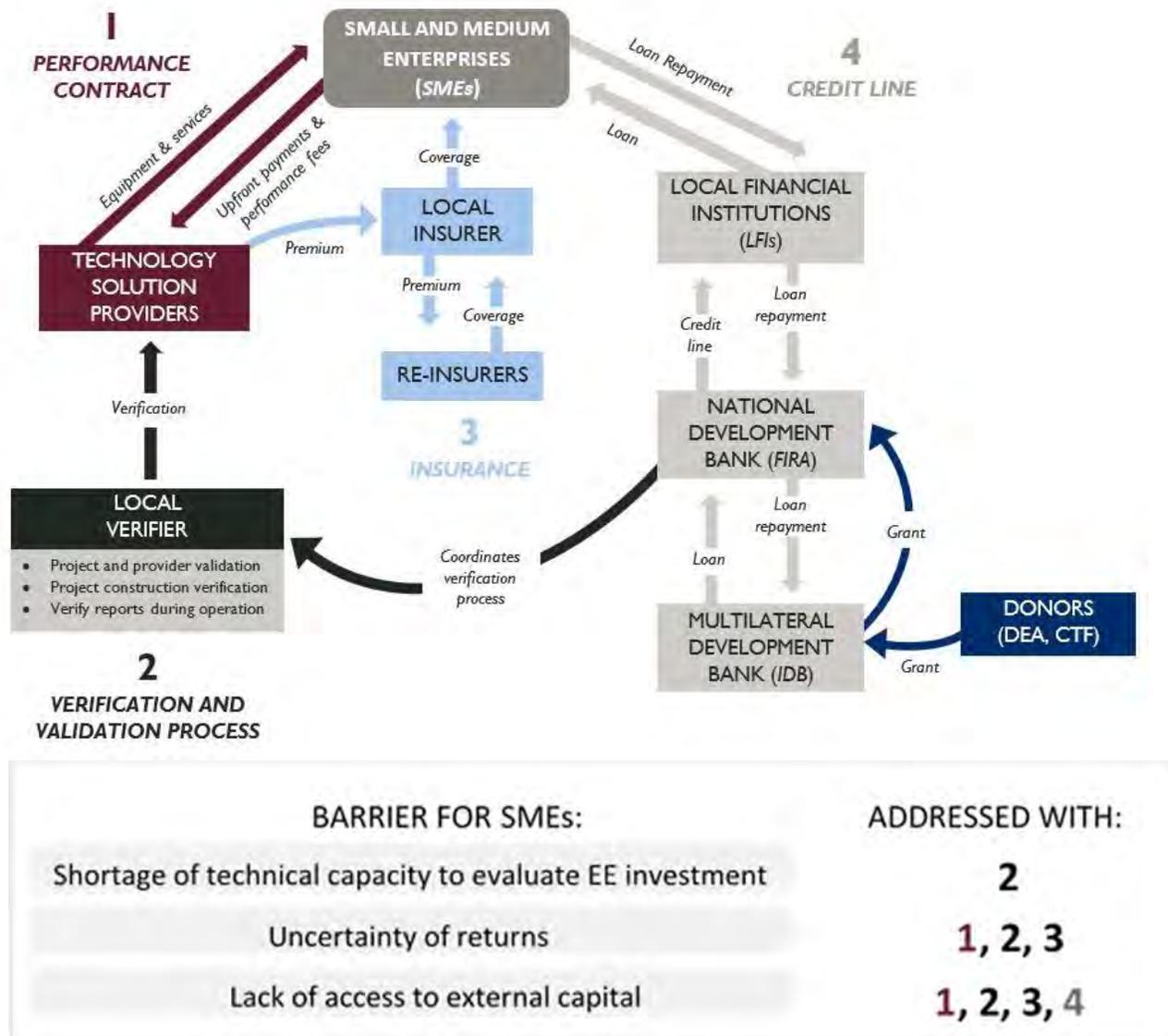
	Political	Policy and Regulatory	Counterparty (Power Off-taker)	Grid Inter-connection & Transmission Line	Technology Risk	Currency	Liquidity and Refinancing	Resource
Government guarantees	√	√	√					
Political risk insurance	√	√	√	√		√		
RE resource or weather-indexed insurance								√
Energy savings insurance					√			√
Partial risk/credit guarantees	√	√	√	√	√			
Export credit guarantees	√	√	√	√	√			
Currency risk hedging instruments						√		
Currency risk guarantee funds						√		
Local currency lending						√		
Commodity swaps			√					√
Internal or external liquidity facilities			√				√	
Liquidity guarantees							√	
Put options							√	
Grants or convertible grants								√
Resource guarantee funds								√
Resource production exploration insurance (geothermal)								√
Loan guarantees								√

Source: Adapted from IRENA (2016).

Development assistance organizations can support the provision or expansion of the following risk mitigants:

- *RE resource or weather-indexed (parametric) insurance.* Insurance enables companies to reduce their risks of large revenue losses from reduced RE resource availability due to unusual weather events. Insurance can be costly at market rates, especially for small businesses. Development assistance organizations or governments can subsidize insurance premiums for an initial period if there is a strong social or environmental rationale and it helps to develop a sustainable market, rather than impede it. Transaction costs and moral hazard can be reduced if the insurance payouts are indexed to available, local weather records instead of paying claims based on actual estimated damages (insurance adjustment process). Resource or weather-indexed insurance is most applicable for large wind power, PV, or hydropower facilities with high expected revenues in good years. Ramirez-Leiva *et al.* (2019) discusses the market potential for weather-indexed insurance for renewable electric power generation in Central America.
- *Energy savings insurance.* Energy savings insurance pools risks to ensure that customers obtain their promised energy cost reductions when they buy services from an EE company or ESCO (Figure 2-3). The Global Innovation Lab for Climate Finance is pilot-testing energy savings insurance to encourage agroindustry SMEs in Mexico to make EE investments. Providers of EE technologies and services will buy this insurance to guarantee that their clients will obtain the projected energy savings in their purchase contracts. The pilot relies on standardized contracts and third-party verification of energy savings. The Global Innovation Lab estimated that energy savings insurance could stimulate \$10-\$100 billion in additional EE investments in developing countries. The resulting energy savings could reduce GHG emissions by 27-234 metric tons of carbon dioxide equivalent (tCO₂e) in 2030 (<http://climatefinancelab.org/idea/insurance-for-energy-savings/>).
- *Currency risks: hedging instruments and risk guarantee funds.* Currency risks caused by fluctuating values for capital needed in local currencies can be reduced through market-based hedging instruments. Currency risks can also be reduced through currency risk guarantee funds and technical assistance to improve management of foreign currency assets and liabilities.
- *Commodity forward market transactions or calls.* These financial contracts can be purchased to hedge against price increases. *Call options* provide an option to purchase a specified amount of a product at a fixed price for a specified period, even if the spot market price increases. Similarly, *put options* allow a buyer to sell an agreed amount of a product at a fixed price even if the spot market price falls.
- *Liquidity facilities.* Short-term letters of credit or credit lines allow companies to access cash as needed on specified terms. Independent power producers may find liquidity facilities useful in maintaining their cash flows if the value of their electricity sales is lower than the projections.

FIGURE 2-3. Energy Savings Insurance Scheme



Source: Adapted from <http://climatefinancelab.org/idea/insurance-for-energy-savings/>

Option CE-12. Support CE Lending Facilities or Funds

Many project developers have insufficient capital or capacity to complete the pre-investment analyses and other requirements for financing from banks or other investors. Some commercial banks in developing countries have limited experience in CE lending—obtaining a pipeline of bankable loan applications, reviewing applications, and structuring and monitoring the loans. Development assistance organizations can provide technical and financial assistance to CE lending facilities and funds (Box 2-11).

BOX 2-11. The Energy Access Fund of responsAbility Investments

Background. The company responsAbility Investments AG provides debt and equity financing to non-publicly listed firms in emerging markets that promote renewable energy, agriculture, and financial inclusion. This company launched an Energy Access Fund in 2015 to provide working capital financing to CE companies in Sub-Saharan Africa and the Asia-Pacific Region.

Challenges. Achieving universal electricity access will require investments far larger than the current financing for RE in emerging markets. Although RE financing has increased, there are still gaps for companies with limited or absent credit history. Financing has been less accessible for SMEs. The fund will finance companies selling solar lanterns or PV systems for low-income households.

Approach. The Energy Access Fund aims to bridge the gaps by providing debt financing to firms across the entire energy sector, including small-and medium-sized enterprises that serve other SMEs and low-income households. The fund's average investment size was \$1.5 million.

The fund is a blended finance vehicle that offers risk-tolerant capital to create attractive investment opportunities for private sector investors. The Fund complemented by a Technical Assistance Facility that strengthens the capacity of companies in market development, scaling up operations, business management, and financial modeling.

Expected results. The fund will expand RE services for populations with little or no access to reliable grid electricity. The company aimed to 1) reduce lighting costs and reliance on polluting sources of lighting; 2) increase productive hours for work and education; 3) increase internet connectivity for information access; and 4) decrease greenhouse gas emissions.

Source: <https://thegiin.org/case-study/energy-access-debt-fund>

Development assistance organizations can provide pay-for-performance grants or concessional loans to banks and microfinance institutions and RE suppliers. Grants can reduce pre-investment barriers by providing TA and training and development of business plans and applications for financing. USAID has supported many CE lending facilities and funds:

- **Clean Energy Financing Facility for the Caribbean and Central America (CEFF-CCA).** This collaborative financing mechanism brought together USG expertise and resources to catalyze public and private sector investment in clean energy in the Caribbean and Central America. The USG partners were the Department of State, USAID, U.S. Trade and Development Agency, and OPIC. CEFF-CCA provided TA and grants on a competitive basis for early-stage development of applications for certain types of CE financing in specified countries. This program has ended, but could be replicated by other development assistance organizations (<https://ustda.gov/sites/default/files/ceffcca/CEFF-CCA-Fact-Sheet.pdf>).
- **Power Africa.** Power Africa is a whole-of-government USG initiative that partners to increase the number of people with access to on-grid and off-grid electric power in sub-Saharan Africa. It has focused on early-stage transaction support, finance, and policy and regulatory reforms. As of March 2018, Power Africa had helped facilitate more than 60 million new energy connections and 30,000 MW of clean power capacity. Power Africa's Beyond the Grid Program uses TA to accelerate transactions and reforms to facilitate investment in off-grid and small-scale energy (Box 2-12).

- **Small-Scale Renewables Financing Facility.** The Global Innovation Lab for Climate Finance established the Small-Scale Renewables Financing Facility with support from the USG and other donors. The purpose of this facility is to expand financing for small (1 to 20 MW) renewable electric power generation systems (<https://www.climatefinancelab.org/project/small-scale-renewables-finance/>).

EXAMPLE

BOX 2-12. Power Africa Beyond the Grid (BTG) Fund

Background. A minigrid is an electric power generation system with a capacity of 10 kilowatts (kW) to 10 MW that serves a limited number of consumers through a distribution network that is not connected to the electric power grid. Microgrids are smaller (less than 10 kW).

Challenges. Two-thirds of the population in Sub-Saharan Africa lacks access to the electric grid and expansion of the grid to remote or rural areas is expensive. Minigrids can be a good alternative to grid service, but may face socioeconomic, political, regulatory, and financial obstacles.

Approach. Power Africa and other donors established the BTG Fund to provide catalytic, early-stage grants for scaling up minigrids and off-grid PV systems in Sub-Saharan Africa. The fund is structured to meet the needs of companies and investors in senior, mezzanine, and junior debt. It focuses on Sub-Saharan Africa, India, and the Pacific. Investments provided through the BTG Fund have ranged from \$100,000 to \$5 million and typically have rate of return expectations of 4-7 percent per annum.

Expected results. The BTG Fund and its partners have committed to investing over \$1 billion to serve 25-30 million households through microgrids or distributed photovoltaics by 2030.

Sources: <https://www.usaid.gov/powerafrica/aboutus>, <https://thegiin.org/case-study/sunfunder-beyond-the-grid-fund>; Torres et al. (2019); Lazat (2018)

Development assistance organizations can support CE lending facilities and funds by:

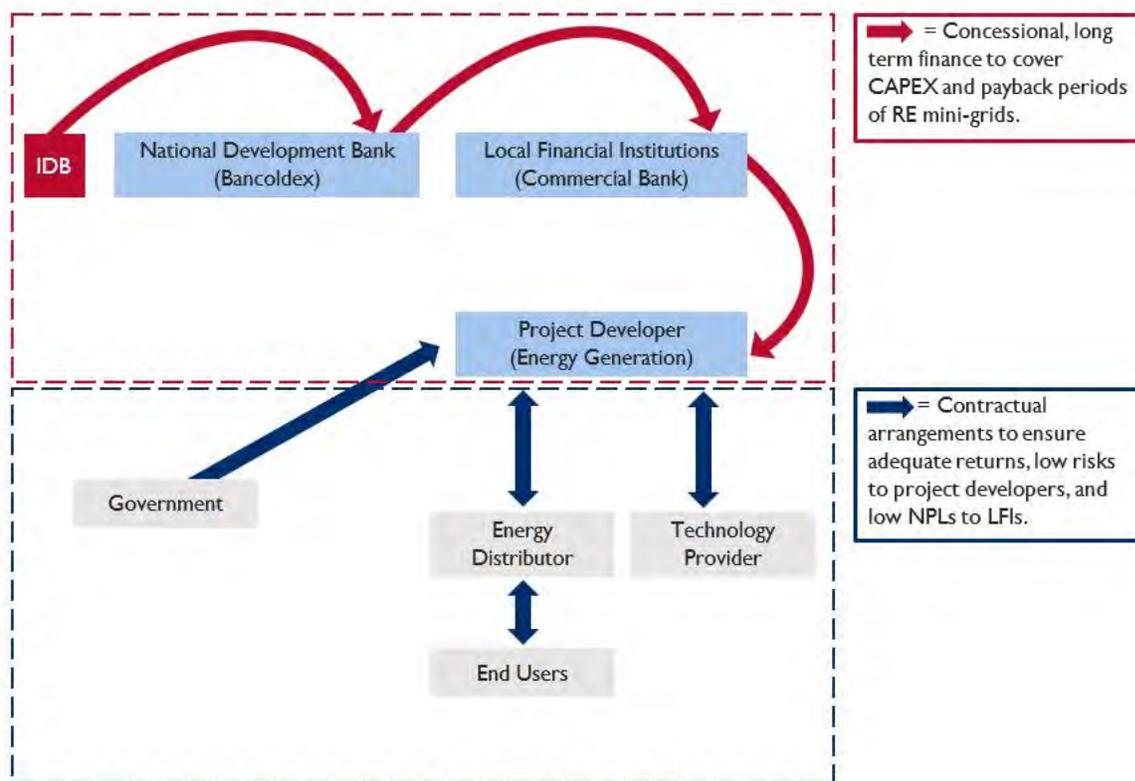
- Providing grants or cooperative agreements to help public or private sector entities cover the costs of RE feasibility studies, market studies, legal fees, permitting costs, and obtaining investment capital;
- Delivering TA to accompany grants or cooperative agreements in areas with significant CE potential;
- Supporting new or existing pre-investment stage grants and TA facilities; and
- Connecting developers with commercial banks, development banks, and other sources of grants, convertible grants, or loans (“matchmaking”).

Option CE-13. Support Green Credit Lines in Commercial or Development Banks

Green credit lines are loan funds for environmentally beneficial lending. Development assistance organizations, government development banks, and commercial banks can provide capital for green credit lines to a bank, microfinance institution, or other financial intermediary for on-lending. Green credit lines can be offered on concessional (below market) terms to give the lenders an incentive to make loans that may be more costly to administer or have higher risk. Development assistance organizations can combine green credit lines with risk mitigants or technical and managerial assistance to help the lenders design loan eligibility standards, establish systems and procedures, implement risk assessment tools, or design new loan products or structures.

The Inter-American Development Bank (IDB) provided a \$19.265 million credit line to Bancóldex, a government development bank in Colombia. Bancóldex then provided loans to domestic commercial banks interested in lending to private minigrid developers. The IDB also provided TA to help Bancóldex 1) develop bankable projects, structure concessions, and PPP contracts; 2) help the other banks develop new financial and nonfinancial products; and 3) establish monitoring, reporting, and verification systems (Figure 2-4). The IDB anticipated that the green credit line would leverage an additional \$8.7 million in private financing and develop 12 RE minigrids with a total capacity of 8.8 MW that could reduce GHG emissions by 42,741 tCO₂e per year (<http://www.iadb.org/en/sector/financial-markets/financial-innovation-lab/scaling-up-private-investments-in-concessions-and-ppps-for-renewable-energy-mini-grids,19730.html>).

FIGURE 2-4. Inter-American Development Bank Green Credit Line for Minigrids in Colombia



Source: <http://www.iadb.org/en/sector/financial-markets/financial-innovation-lab/scaling-up-private-investments-in-concessions-and-ppps-for-renewable-energy-mini-grids,19730.html>

Option CE-14. Support Development of Green Bonds for Clean Energy Lending

Green bonds are tradeable debt securities used to finance CE or other productive, environmental investments. Typically, a green bond is for \$80-100 million or more because the transaction costs of issuing a bond are high. Domestic investors such as pension funds and insurance companies and foreign investors that are seeking modest but positive and stable returns over a long period are potential buyers of green bonds (Laird *et al.* 2015). Standards have been developed for many types of green bond investments and certification systems have been established to confirm that specific offerings meet these standards. To date, green bonds have generally not yet resulted in lower financing costs than standard bonds because the market is still in an early stage, but this may be a future possibility. It may also be

easier to market green bonds to investors interested in environmental benefits as well as financial returns.

The Climate Bonds Initiative (2018b) estimated that over \$150 billion of green bonds were issued in 2017, compared to \$82 billion in 2016. Green bonds have mobilized large amounts of private sector finance for CE investments in large countries, such as China and India. USAID provided TA to support development of a large green bond for CE in India.

The Climate Bonds Initiative (2017 and 2018a) identified key areas for development assistance organization support for green bonds:

- Increase the pipeline of bankable investment by working with national and subnational governments and the private sector to develop a pipeline of CE investments suitable for financing through green bonds;
- Work with national and municipal governments and banks to issue a strategic green bond to kick-start the market and provide initial liquidity;
- Facilitate government tax incentives and support credit enhancements and risk mitigants so that green bonds meet institutional investor requirements (e.g., through partial loan guarantees, subordinated debt, or insurance);
- Inform potential investors about this asset class through communication campaigns; and
- Support the establishment of sector-specific green bond standards and certification to increase confidence that the environmental benefits will materialize.

Laird *et al.* (2015) conducted an initial market assessment on the feasibility of using green bonds to finance CE, SL, and AD investments in Peru. This assessment concluded that the most likely market for a local currency green bond for Peru would be domestic insurance companies and pension funds. However, this type of bond could also interest international investment funds and impact investors that emphasize environmental, social, and governance issues.

Option CE-15. Support Innovative Payment Systems for Beyond-the-Grid Renewable Energy

Performance-based payments (pay-for-results, payment by results, or cash-on-delivery programs) provide incentives for efficient and effective achievement of planned development results. Examples include performance-based contracts or grants, prizes, social impact bonds, conditional cash transfers, and advance market commitments (Camp and Fernandez 2017).

Performance-based payments are a relatively new approach to development assistance. Some donors are interested in expanding this approach to ensure greater value for money. With support from Power Africa's BTG Program, CEADIR implemented a small pilot test of results-based payments to provide an incentive for competitively selected business advisory service providers in Ghana and Rwanda to help off-grid RE suppliers and users obtain loans from participating commercial banks. CEADIR compensated the business advisory service providers with small payments for achievement of specific milestones in the loan application process, and large success fees if a bank approved the loans (Torres *et al.* 2019).

The World Bank provided funding to Odyssey Energy Solutions for results-based grants to private companies serving off-grid RE customers in Nigeria. Odyssey Energy Solutions disbursed the grants when the companies began providing electricity to the new customers.

Pay-as-you-go (PayGo) is a financing mechanism that allows households without access to reliable grid electricity to afford the capital costs of a home PV system, even if they do not have the credit history or collateral needed to obtain bank loans to obtain distributed RE systems. Participating households pay

the PV supplier for the metered amount of electricity that they use, often through mobile money payment services. If households do not pay for electricity service, they may lose access to the system. After repaying the capital costs of the system and the financing costs through electricity use fees, the households are usually given ownership rights to the system. The households can then obtain electricity from the PV system without any further payments. PayGo payments can also help low-income customers establish a credit history.

The suppliers need credit to buy and install the PV systems. PayGo loans are relatively easy for commercial banks to structure with low transaction costs and relatively low risks since the borrower is the service company (Baiden 2018). CEADIR has trained commercial banks on the feasibility of lending to PayGo suppliers in ten African countries. Azuri Technologies supplies PayGo PV systems in Africa (**Error! Reference source not found.**).

EXAMPLE

BOX 2-13. Delivering PayGo Solar Systems to Off-Grid Communities

Background. Azuri Technologies is a United Kingdom-based company that provides small PayGo PV systems for households in Sub-Saharan Africa. It has received grants from USAID and the Africa Enterprise Challenge Fund and obtained capital from private investors and banks.

Challenge. Azuri addresses the need for safe and low-cost cell phone recharging and lighting in areas off the power grid or without reliable grid electricity.

Approach. Azuri works with a network of local distributors, installers, and service agents. It has served over 10,000 households in 11 countries. The company's entry-level system provided phone charging and up to eight hours a day of lighting for two rooms. Azuri offered LED card lamps designed to last for at least 15,000 hours.

Customers paid an installation fee of approximately \$10 and used a mobile money service to add service time weekly or monthly. A week of basic service typically cost about \$1.50, which is less than the cost of kerosene lighting and microenterprise mobile phone charging services in villages. Customers purchasing service time received a text message code to keep the system operating. After about 18 months of paid service, the capital cost was paid off and the customer could either unlock the system for free use or upgrade to a larger model and pay the cost of the new system through service fees.

Expected results. Azuri aimed to reduce the costs of cell phone charging and lighting for its customers by 50 percent compared to grid service while also reducing safety risks from kerosene or candle use. PV lighting systems can also allow children to spend more time studying at night.

Source: <http://www.azuri-technologies.com/what-we-do>

3. SUSTAINABLE LANDSCAPE INVESTMENTS

3.1 OVERVIEW

Sustainable landscapes (SL) is USAID’s term for improved practices for agriculture, forestry, and other land uses (AFOLU) that slow, halt, or reverse greenhouse gas (GHG) emissions while increasing long-term productivity. These practices include better management of farms, natural forests, plantations, and other lands for development as well as conservation of natural forests and protected areas. This chapter discusses challenges and opportunities for development assistance organizations to help scale up public and private sector SL investments through financial or technical and managerial assistance.

Challenges that may limit the adoption of improved SL practices include the 1) new or unproven technologies for the local areas; 2) natural risks, such as weather, climate, pests, and diseases; 3) difficulties in securing adoption of new practices, especially by small-scale farmers and other producers; 4) uncertainty about the financial costs and benefits to the producers; 5) longer time needed to obtain positive financial returns than the time horizon of many producers, and 6) externalities – environmental or social impacts on others that are not considered or valued in decision making.

Section 3.2 reports estimates of SL financing flows. Section 3.3 summarizes the range of options for development assistance organizations to scale up public and private sector SL financing. Sections 3.4 to 3.6 provide more detailed information and examples on these options within the three categories of 1) strengthening the enabling environment, 2) enhancing capacity and information, and 3) improving financing instruments and markets.

3.2 SUSTAINABLE LANDSCAPES FINANCING FLOWS

Buchner *et al.* (2019) estimated that global financing for land use was \$21 billion in 2017/2018. However, this included land use investments for climate mitigation and adaptation. The Climate Bonds Initiative (2018a) reported that about \$5 billion of sustainable land use and forestry bonds were issued in 2017. However, the ability to track SL investments is hindered by inconsistent data sources and definitions. In particular, it is unclear whether related agricultural investments have been included.

SL investments could play a more prominent role in meeting GHG emission reduction targets. Credit Suisse’s global investment group estimated that pension funds and other institutional investors and individuals could allocate \$200-300 billion a year for SL investments that yielded market-rate returns (Center for International Forestry Research 2015).

3.3 OPTIONS FOR SCALING UP SUSTAINABLE LANDSCAPE INVESTMENTS

Table 3-1 presents options for development assistance organizations to help mobilize SL financing.

TABLE 3-1. Options to Scale Up Sustainable Landscapes Investment

Building Blocks	Options	Types of Assistance
Enabling Environment	SL-1: Support sustainability standards and certifications	<ul style="list-style-type: none"> • Convene stakeholders to identify problems and solutions • Support the analysis, promotion, and financing of greening the value chain approaches • Analyze the costs, benefits, and structuring of product sustainability standards or certifications • Help the public and private sectors develop and roll out sustainable management standards and comply with inspection and reporting requirements
	SL-2: Improve policies and incentives for SL investments	<ul style="list-style-type: none"> • Help governments identify, assess, and strengthen policies and incentives for SL investments • Analyze the benefits and costs of policy and regulatory changes • Identify ways to ensure that vulnerable groups benefit and are protected from adverse impacts
	SL-3: Foster public-private partnerships (PPPs) for SL	<ul style="list-style-type: none"> • Help national or subnational governments understand and implement policy, institutional, and legal reforms needed for PPPs • Identify opportunities for PPPs, assess different models, and design effective risk and benefit and cost-sharing structures • Share examples, lessons learned, and good practices for PPPs • Help governments prepare prequalification documents, model bidding documents, and sample contracts and agreements for PPPs
	SL-4: Develop investment strategies and financing plans	<ul style="list-style-type: none"> • Develop the pipeline of SL investments ready for financing • Map the priorities and requirements of financing sources • Conduct financial, economic, environmental, and social impact analyses to support applications for financing • Develop road maps or action plans for financing, implementation, and adaptive management of SL investments
Information and Capacity Development	SL-5: Support REDD+	<ul style="list-style-type: none"> • Identify projects and areas that could qualify for REDD+ financing; • Align REDD+ projects with national or jurisdictional strategies; • Assess financial and economic benefits and costs and social impacts; • Improve local buy-in, benefit sharing, and agreement enforcement; • Developing assumptions and gathering data for projecting carbon sequestration benefits from REDD+ activities; • Identify markets and prices for carbon credits; • Facilitate REDD+ transactions; • Reduce risks of leakage and future losses of already credited carbon • Support measurement, reporting, and verification (MRV) and safeguard information systems

TABLE 3-1. Options to Scale Up Sustainable Landscapes Investment (Continued)

Building Blocks	Options	Types of Assistance
	<p>SL-6: Help banks and companies increase the pipeline of bankable SL investments</p>	<ul style="list-style-type: none"> • Develop multiple product revenue streams to increase ability to repay loans • Create new loan products that meet the requirements of SL investments • Provide technical and financial assistance for market assessments, business plans, and bankable loan applications • Support credit rating agencies
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Information and Capacity Development</p>	<p>SL-7: Develop capacity for design, financing, implementation, and monitoring of SL investments</p>	<ul style="list-style-type: none"> • Strengthen enforcement of forest and land use codes • Help companies and producers comply with laws and regulations • Help governments and companies comply with reporting requirements for GHG emission inventories and carbon credits • Support market assessments, feasibility studies, and business plans to help producers, producer associations, cooperatives, and companies obtain and allocate financing • Help banks understand the market, business models, loan product requirements, and risk pooling or sharing options for SL investments
	<p>SL-8: Support innovation labs and financial technologies (FinTech)</p>	<ul style="list-style-type: none"> • Support new or existing innovation labs • Support financial technologies to reduce transaction costs, information asymmetries, and financing risks • Expand the private sector role in forestry and agricultural extension services through value chain or pay-for-performance approaches
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Improve Financial Markets and Mechanisms</p>	<p>SL-9: Support insurance and other risk mitigants</p>	<ul style="list-style-type: none"> • Support the development, structuring, testing, evaluation, and expansion of risk mitigation measures • Assess the market potential and subsidy requirements for weather-indexed insurance products • Work with insurers, banks, governments, and companies to promote weather-indexed insurance • Provide TA to primary producers and processors that produce, buy, or commercialize sustainably produced goods
	<p>SL-10: Support funds for SL investments</p>	<ul style="list-style-type: none"> • Help design, establish, and manage funds for SL investments • Develop the capacity to manage trust funds, commercial funds, and credit lines • Share examples and good practices on SL-focused funds, trust funds, commercial revolving funds, and credit lines • Provide portfolio loan guarantees or other risk mitigants for the funds

TABLE 3-1. Options to Scale Up Sustainable Landscapes Investment (Continued)

Building Blocks	Options	Types of Assistance
<p style="text-align: center;">Improve Financial Markets and Mechanisms</p>	<p>SL-11: Expand bank access to capital and support loan intermediation</p>	<ul style="list-style-type: none"> • Identify the potential for loan aggregation to enable banks to increase their liquidity and obtain new capital from the sale of loan portfolios or issuance of green bonds or climate bonds • Help government development banks or multilateral development banks buy and warehouse aggregated loans from commercial banks • Assess legal requirements for loan portfolio sales or securitization • Help banks analyze the costs and benefits of selling or securitizing loan portfolios • Reduce the high perceived risks and transaction costs of commercial bank lending to farmers and other small-scale producers by working through intermediaries, such as microfinance institutions, cooperatives, producer associations, NGOs, and large processing or trading companies buying from independent suppliers or contract farmers
	<p>SL-12: Support payments for ecosystem (environmental) services (PES)</p>	<ul style="list-style-type: none"> • Analyze the benefits, costs, market potential and legal and institutional framework for payments for ecosystem services (including land tenure and resource use rights) • Share successful examples and lessons learned

3.4 STRENGTHENING THE ENABLING ENVIRONMENT

Unclear, insecure, or unenforced land tenure and natural resource use rights can contribute to high rates of deforestation and forest resource degradation (Asner *et al.* 2009). Insecure land or resource tenure can weaken incentives for long-term, sustained yield management, conservation and private investment. They can also be a barrier to lending because banks often require land titles as loan collateral. Some developing countries have improved forest management on government-owned or open-access lands by recognizing customary land and resource rights and promoting local community management.

Weak or unenforced policies and regulations for forests, fragile lands, and aquatic ecosystems reduce the motivation for sound management and investment decisions. Political or macroeconomic instability and market failures hinder sustainable AFOLU investment (Broadhead *et al.* 2015). Establishment or expansion of parks and protected areas can increase the value of environmental services locally and in other areas downstream or at lower elevations. However, developing country governments often lack the resources or political will to manage and police parks and protected areas effectively.

Option SL-1. Support Sustainability Standards and Certifications

Product sustainability standards often require producers to follow specific management practices or principles. There are some voluntary general guidelines on sustainability-linked loans (Loan Market Association, Asia Pacific Loan Market Association, and Loan Syndications & Trading Association 2019). Compliance with standards can sometimes help producers obtain higher unit prices or reduce their marketing costs, but price premiums are often not available without the additional step of certification.

Certification systems combine sustainability standards with third-party verification of compliance through independent, initial and recurring inspections. Producers bear the additional costs of meeting sustainability standards. International certification costs are generally too high for small-scale farmers and other producers unless subsidized by development assistance organizations, governments, or the companies that buy their products. Certification inspections often involve foreign experts. Certification systems may also impose additional continuing costs for monitoring and reporting on producers.

Certification can sometimes enable producers to obtain higher unit prices for their products. However, the lack of a significant price premium has been a barrier to wider adoption of certification systems. Certification systems have been established for some major tropical products due to international consumer demand or corporate reputational concerns about deforestation, other environmental impacts, child labor, and worker safety. Certification systems vary, but typically address production practices and locations, harvesting rates and methods, compliance with laws and international treaties, benefits and costs to local communities and indigenous populations, worker protection, child labor, and environmental impacts. Certification generally encompasses the entire distribution chain of custody to provide greater assurance to end consumers and reduce risks of illegal activity. Box 3-1 describes an example of donor-support for certification of forest products.

The Roundtable on Sustainable Palm Oil established a certification system for oil palm. The Forest Stewardship Council and the Programme for the Endorsement of Forest Certifications certify timber and pulpwood products. The Round Table on Responsible Soy certifies soybean production. Major buyers have made a greater push for certification of palm oil and timber and pulp and less on soybeans and beef (McCarthy 2016, Donofrio *et al.* 2017). However, only a small share of the production of these commodities has been certified.

BOX 3-1. The Borneo Initiative

Background. The Borneo Initiative supports the certification of natural forest areas in Kalimantan. It involves the Indonesian Association of Forest Concessionaires, the Worldwide Fund for Nature, and some international donors.

Challenge. Proper inspection and tracking of forest products can help ensure that trees are harvested in appropriate locations and ways while benefiting workers, respecting the rights of local communities, and reducing negative environmental impacts. Areas of high social and conservation value should be maintained or enhanced.

Approach. Certification can help ensure that log harvesting and extraction comply with national laws, international treaties. Certification can reduce conversion of natural forests to other land uses, including monoculture plantations of non-native species. Hazardous chemicals should not be used in natural forests.

The Borneo Initiative has promoted cooperation among government agencies, forest companies, and NGOs to encourage compliance with the national forest management certification system and the Forest Stewardship Council's international certification.

It has promoted partnerships among a forest product certifier, government agencies, local NGOs, forest concessionaires, and overseas timber trading companies. It provided forest concessionaires in Kalimantan with expertise, market links, and grants to cover part of the costs of forest product certification. Grants were available for up to \$150,000 for certification of 35,000-75,000 ha and \$300,000 for certification for more than 75,000 hectares. Forest management and controlled wood harvesting certificates provided incentives for sustainable management of concessions that served as buffer zones for protected areas and conservation and expansion of orangutan habitat. The Borneo Initiative has also worked with companies in the supply chain to expand the market for certified wood products.

Expected results. The Borneo Initiative aimed to increase the area of certified natural forest in Indonesia to 5 million ha by 2021. It also planned to expand operations to Malaysia and Papua New Guinea.

Source: <https://theborneoinitiative.org/about-us/vision-and-mission/>

Development assistance organizations can help farmers, farmer associations and cooperatives, forest concession holders, and community forest management organizations understand the costs and benefits of certification. TA can help producers improve production practices and obtain financing to meet sustainability standards and obtain funding for certification costs. Development assistance organizations can reduce the costs of certification inspections by developing local capacity for inspections. Commercial banks and development banks can promote sustainability standards and certification systems by including them in conditions for loan disbursements or offering more favorable loan terms for borrowers who adopt them.

Development assistance organizations can provide incentives for producers to adopt more sustainable and climate-resilient management practices. Development assistance organizations can promote more sustainable production practices by 1) supporting technology research and development (R&D) and dissemination; 2) convening stakeholders to identify problems and solutions; 3) assessing the benefits and costs of improved practices; 4) facilitating commercial support systems within value chains; 5) helping producers develop new market linkages to reach more profitable or larger markets; 6) providing, leveraging, or financing; and 7) providing risk mitigants or credit enhancements.

Option SL-2. Improve Policies and Incentives for Sustainable Landscapes Investments

National, subnational, and local government policies, plans, laws, regulations, tax laws, and expenditures can have a major effect on the profitability of SL investments (O’Mealy *et al.* 2017; Tulyasuwan *et al.* 2018). Examples include geographic or sectoral development plans, land use plans, land tenure and registration systems, forest and other natural resource codes, conservation plans, environmental and social impact assessment procedures, government procurement arrangements, and corporate social responsibility requirements. Some developing countries have strong laws and regulations on paper, but insufficient political will or resources to enforce laws and prosecute violations effectively, especially in remote or conflict-prone areas.

Secure, long-term land or resource tenure rights can encourage longer natural forest rotations and more investment in agroforestry. In some cases, government delegation of use rights and management decisions for common-property public forest land to community forest management groups has improved forest management in some countries, but this approach can be unsuccessful where local political, economic, or social conflicts or illegal activity are prevalent. The transaction costs and risks of providing technical or financial assistance to farmers and other small-scale producers can be reduced by working through existing producer groups, associations, or cooperatives. However, it can be costly and difficult to organize new formal sector associations or cooperatives. Fiscal policies such as tax credits, deductions, or exemptions; input subsidies; and price supports can create incentives or disincentives for sustainable forestry, climate-smart agriculture, and conservation of environmental services. Fiscal policies can be linked to sustainability or environmental and social impact standards and certifications. However, fiscal policies also have the potential to distort input and output markets, reduce transparency, and increase economic and political inequalities.

Development assistance organizations can help national and subnational governments understand the impacts of the existing policy and regulatory environment and propose changes on SL management and investment. TA can be helpful in estimating costs and benefits of policy and regulatory changes to guide reform priorities. Transnational corporations that buy products linked to deforestation can increase the sustainability of their supply chains and help reduce child labor and worker safety problems (Box 3-2).

BOX 3-2. Tropical Forest Alliance (TFA)

Background. Many major transnational companies are interested in reducing deforestation, child labor, and worker safety problems in their supply chains for tropical products.

Challenges. Improvements in the policy and regulatory environment in producing and consuming countries and local stakeholder engagement may be needed to increase the effectiveness of private sector efforts to “green the supply chain”. It can be difficult to monitor the production and labor practices of small-scale producers in rural areas and enforce existing laws and agreements. Producers who do not follow good practices for environmental sustainability or labor use can conceal their violations or easily sell to other buyers only motivated by low product prices. Stakeholders struggle to share lessons learned from design and implementation, despite the coordination that is needed between investors, producers, policymakers, and donors.

Approach. The Tropical Forest Alliance (formerly TFA 2020) is a collaborative effort of private companies, governments, and civil society organizations to achieve zero net deforestation in key product supply chains. TFA focuses on beef, cacao, palm oil, pulp and paper and soybean production in the tropics. It promotes dialogues on policies and management practices and supports financing and technical assistance to reduce deforestation and loss of peatlands

Expected results. Reduced deforestation and peatland conversion in the supply chains for key commodities and improved land stewardship.

Source: TFA 2020 (2018)

Option SL-3. Foster Sustainable Landscapes Public-Private Partnerships (PPPs)

Public-private partnerships can increase tree planting, improve natural regeneration of forest concessions and deforested or degraded forest land, and improve the management of parks and protected areas. Conservation Capital is a for-profit company that provides business consulting and finance for conservation landscapes and associated commercial enterprises. It has worked with non-governmental organization (NGO) and government partners managing protected areas affected by degradation of the environment and infrastructure. Conservation Capital has raised \$220 million for conservation projects in Africa and Europe. It has worked with 75 partners and conserved 2 million acres of natural habitat (<https://www.conservation-capital.com/>). Box 3-3 describes Conservation Capital’s collaboration with the Mara Conservancy PPP in Kenya.

Development assistance organizations can help governments or communities understand the advantages and disadvantages of PPPs, link them to reliable potential partners, and design and operate PPPs effectively. They can also help prepare prequalification documents, model bidding documents, sample contracts and agreements, and fair risk and cost-sharing arrangements. Development assistance organizations can also share lessons learned and good practices on PPPs for SL and conservation enterprises (Boshoven, Hill, and Koontz 2018).

BOX 3-3. The Mara Conservancy PPP

Challenge. The Mara Triangle is an area within the Masai Mara National Reserve in Kenya. The area faced biodiversity losses due to poaching and deteriorating infrastructure for tourist services. The reserve's administration reached out to the surrounding community and new partners to form a PPP to manage the Mara Triangle.

Background. The Mara Conservancy was established as a private, not-for-profit company to manage the Mara Triangle. It began operations in 2001 with initial funding from a \$300,000 conservation bond issued and secured by Conservation Capital.

Approach. The Mara Conservancy was responsible for collecting visitor fees, conducting anti-poaching patrols, and maintaining primary and secondary roads and game tracks. It established a modern information technology system to manage revenue collection and disbursement. The Conservancy retained 40 percent of visitor fees to service the conservation bond and finance road maintenance and other infrastructure investments. The National Reserve received 60 percent.

Expected results. The Mara Conservancy has generated local employment opportunities. It led to the arrest of over 3,500 poachers and confiscation of 45,000 snares. It vaccinated 100,000 dogs against rabies and canine distemper. It also improved road security services for tourist camps and surrounding communities.

Sources: <http://www.conservation-capital.com/mara-conservancy>; <https://www.maratriangle.org/what-we-do/>

Option SL-4. Develop Investment Strategies and Financing Plans

Development assistance organizations can help governments develop forest and agricultural sector investment strategies and financing plans that meet national targets for GHG reductions. Investment strategies and financing plans can be helpful in communicating opportunities for investments in SL and identifying potential sources of international, public, and private sector financing. This assistance could include

- Developing pipelines of SL investments ready for financing;
- Identifying financing priorities, sources, and structures specific for SL investments;
- Supporting financial and economic analyses and environmental and social impact assessments needed to meet the requirements of various financing sources; and
- Developing action plans for the various steps in the financing and investment process.

3.5 ENHANCING CAPACITY AND INFORMATION

The public sector, private companies, and producers of crops, livestock, forestry, and fishery products in developing countries may need more information on better production practices and the costs, benefits, financial returns and environmental and social impacts of SL investments (Ahammad *et al.* 2014). SL financing is often hindered by insufficient capacity of public and private sector proponents to design, finance, implement, monitor, and report on investments. Many developing country governments have limited experience in setting up or managing SL management and conservation funds and leveraging additional financing.

Misperceptions about the need for technology R&D, adaptability to the local context, and technology transfer and commercialization issues can be barriers to bank lending and other SL investments. Banks and investors may be unfamiliar with commercially viable business models for conservation investments

(Dalberg 2015). Banks may need to increase their capacity to assess the market for SL lending and to design and market appropriate loan products that meet the diverse requirements of small-, medium-, and large-scale producers. Many potential loan clients may have insufficient credit histories or collateral of types and amounts normally required by banks.

Option SL-5. Support REDD+

Pay-for-results financing ties payments to successful achievement of outcome targets. In some cases, no payments are made to cover the costs of unsuccessful efforts. However, there are also mixed models that include partial payment for achievement of intermediate milestones or a mix of cost- and performance-based reimbursement. Pay-for-results models are often less prescriptive on what approaches may be used to get results to encourage innovation and efficiency. Pay-for-results financing can attract new funding sources, such as impact investors and private companies, because it promotes the interests of funders. Annex A contains more information on various pay-for-results approaches.

However, pay-for-results financing can be risky for implementers since they might not be able to pay or recover the upfront costs, keeping smaller implementers and those without other core funding or access to financing from participating. This approach can increase the risk of distorting the desired outcomes in setting performance measures and targets. It may result in higher costs to funders since

BOX 3-4. Green Climate Fund's REDD+ Project in Brazil

The Green Climate Fund (GCF) supported its first REDD+ project in Brazil. It paid the Government of Brazil (GoB) \$96.5 million for maintaining an additional standing forest cover in the Amazon in 2014 and 2015. The project required the GoB to reinvest the proceeds in other REDD+ activities in the country.

Source: <https://www.greenclimate.fund/news/gcf-s-first-redd-results-based-payment-boosts-financial-incentive-to-protect-forests>

implementers are likely to require a price premium to cover their greater risks and funders may incur higher monitoring and verification costs to document successful achievement of the targets that trigger payments. It might also decrease incentives for implementers to share their learning with others.

Reducing Emissions from Deforestation and Forest Degradation (REDD+) financing is a type of pay-for-results financing that provides payments for documented increases in carbon sequestration in in developing country forests. REDD+ focuses on

conserving forest carbon stocks, ensuring sustainable forest management, and enhancing forest carbon stocks. Initially, developing countries had high expectations for the funding that could be obtained from REDD+, but the pace of progress has been slow. Although REDD+ was negotiated in 2005 under the United Nations Framework Convention on Climate Change, the REDD+ rulebook was not completed until 2015.

Initially, many development assistance organizations promoted REDD+ projects for individual forests, concessions, or protected areas. USAID previously supported project-based REDD+ as pilots for national and jurisdictional programs with linkages to national policy. Under the current international regime, REDD+ has moved away from project-based to national, jurisdictional, or nested approaches. *Jurisdictional approaches* are tied to subnational strategies, references levels, and MRV systems. *Nested approaches* refer to project-based REDD+ embedded in a jurisdictional system.

REDD+ activities can be financed by development assistance organizations or private companies buying carbon credits for required offsets (compliance markets). Box 3-4 describes an example of REDD+ support from an international public sector fund. However, development assistance organizations have limited financial resources to purchase REDD+ credits. More private capital is needed to scale up

REDD+ financing and ensure long-term sustainability. Consequently, it may be more effective for development assistance organizations to support national or jurisdictional programs that sell carbon credits to private buyers for compliance markets. Carbon credits are only saleable on compliance markets if they have met international standards and the emission reductions or removals have been certified by independent organizations—the Climate, Community, & Biodiversity Alliance (www.climate-standards.org/) or Verra, previously operating as the Verified Carbon Standard (<https://verra.org/>).

The first step in obtaining eligibility for REDD+ payments is completion of a national strategy. The national strategy must address carbon rights and ownership, dispute resolution mechanisms, consultation process, funding streams and distribution of payments, and an action plan/roadmap.

Countries also need to complete an assessment of forest reference emission levels. *Forest reference emission levels* are projections of future GHG emissions under counterfactual, business-as-usual scenarios of deforestation and forest degradation). Countries must also establish a strong national MRV system and a safeguards information system that addresses maintenance of the forest cover.

Development assistance organizations have provided extensive capacity development for REDD+ readiness for governments. This assistance has focused on national and jurisdictional strategies and plans, the legal environment for carbon credit ownership and dispute resolution, and social and financial infrastructure for project development and payment distribution.

Additional capacity development assistance may be needed to help:

- Identify projects and areas that could qualify for REDD+ financing;
- Align REDD+ projects with national or jurisdictional strategies;
- Assess financial and economic benefits and costs and social impacts;
- Improve local buy-in, benefit sharing, and agreement enforcement;
- Developing assumptions and gathering data for projecting carbon sequestration benefits from REDD+ activities;
- Identify markets and prices for carbon credits;
- Facilitate REDD+ transactions;
- Reduce risks of leakage and future losses of already credited carbon from unanticipated natural or anthropogenic disturbances; and
- Support MRV and safeguard information systems that meet international standards (Forest Carbon Partnership Facility 2013; Hewson *et al.* 2014; Food and Agriculture Organization (FAO) 2015; and Global Forest Observations Initiative 2016).

Some recent trends may support faster future growth in REDD+ financing:

- New domestic compliance markets for carbon credits (California and Colombia cap-and-trade systems and California's Tropical Forest Standard) and ambitious country targets (Netherlands);
- Higher carbon prices for REDD+ than on voluntary markets (and large variation in voluntary market prices);
- Shareholder pressure on transnational corporations for ambitious mitigation targets;
- Nested REDD+ within a jurisdictional approach (Forest Carbon Partnership Facility's Carbon Fund);
- Countries incorporating projects into national REDD+ and nationally determined contributions (NDCs);

- Connection to sustainable supply chain movement (Tropical Forest Alliance);
- Increasing global commitment to restoration (Norway);
- Increasing developing country interest in reforestation (Ethiopia and India); and
- New funding from CORSIA, the International Civil Aviation Organization’s new sectoral cap-and-trade program for jurisdictional (voluntary in 2021-2026 and mandatory starting in 2027).

BOX 3-5. Stand for Trees

Code REDD, an NGO, established this web platform with funding from USAID. Stand for Trees makes it easy for individuals, organizations, or companies to buy voluntary carbon credits at a uniform price from a small number of forest conservation projects in developing countries. Stand for Trees reduces the transaction costs for both the sellers and buyers. It helps assure buyers of the validity of the forest protection benefits and carbon credits. A list of projects eligible for funding through this platform is at <https://standfortrees.org/en/>.

Forest management and conservation projects may have opportunities to sell carbon credits on voluntary markets, where the requirements may be less stringent, but the prices are often lower. Box 3-5 describes a donor-funded, web-platform for facilitating voluntary carbon credit purchases for small forest conservation projects in developing countries.

Option SL-6. Help Banks and Companies Increase the Pipeline of Bankable Sustainable Landscapes Investments

Development assistance organizations can help banks develop appropriate loan products to facilitate more SL investments. Forestry investments generally require a longer loan tenor than most business loans because it can take years between the planting of trees and the harvesting of saleable products. *Agroforestry*, the interplanting of annual crops with trees, can reduce the need for a long loan tenor by generating product revenues faster. Increasing the number of product revenue streams can also make it easier to repay loans by diversifying risks and mitigating supply or demand fluctuations.

To reduce loan repayment risks, companies generally prefer limited recourse, *project financing* over *asset-based financing* (with full recourse to assets on their balance sheet). However, banks are more reluctant to offer project financing since they cannot make claims against non-project assets if the borrower defaults. Some banks in developing countries state that they have enough capital to expand lending but face a shortage of bankable loan applications.

Development assistance organizations can provide technical or financial assistance to help companies prepare market assessments, business plans, bankable loan applications, and fundable requests for equity capital or grants. Development assistance organizations can establish or expand credit rating agencies to give banks verified information on the credit repayment history of potential borrowers. Development assistance organizations can increase private sector finance readiness by supporting the development, testing, and expansion of profitable SL business models.

Option SL-7. Develop Capacity for Financing, Implementation, and Monitoring of SL Investments

Development assistance organizations can help develop the capacity of governments, companies, producers, banks, and impact investors to expand SL financing and improve implementation and monitoring and reporting. Governments may need to develop sustainable management standards, improve forest codes and enforcement, and provide or support extension services to help smallholders them understand sustainability standards, certification requirements and their benefits and costs, and

financing and marketing options. Governments may also need additional capacity in accessing global finance and measurement, reporting, and verification of programs investments.

Companies, producers, and resource users may need information on government policies, regulations, and incentives; more sustainable production and land management technologies, the costs and benefits of improved practices; and financing sources and their requirements. Companies may need assistance in preparing market assessments, feasibility studies, business plans, financing applications, and helping small-scale suppliers adopt more productive and sustainable practices.

Banks may need more information on the market, requirements, profitability, and risks of lending for SL investments. They may also benefit from technical assistance in appraisal of loan applications and ways to reduce the transaction costs of financing smallholders. Banks may also need a better understanding of options for managing lending risks by screening potential investments for environment, social, and governance criteria. Impact investors may need help in assessing whether small-scale producers can meet their expectations for financial returns, risks, and environmental and social benefits and due diligence on partner organizations.

Option SL-8. Support Sustainable Landscapes Innovation Labs and Financial Technologies (FinTech)

Innovation labs provide opportunities to increase competitiveness, promote sustainable production methods, develop or test new financing approaches, or facilitate policy advocacy. Development assistance organizations can support to new or existing innovation labs. The Global Innovation Lab for Climate Finance has piloted an Agricultural Supply Chain Adaptation Facility that will work with private agribusinesses to deliver technical and financial support to small-scale farmers in developing countries. Development assistance organizations can support innovation labs through development challenges, prizes, and collaborative co-design approaches. Examples include the USAID Global Development Alliances, Development Innovation Ventures (DIV) Program, and collaborative design and procurement approaches, such as Broad Agency Announcements.

The USAID DIV Program encourages innovation through open competition to test and scale up creative solutions to development challenges. USAID accepts DIV proposals throughout the year from any type of organization in countries where the Agency operates.

DIV awards have three stages:

- Stage 1: Proof of concept—up to \$200,000 and three years;
- Stage 2: Testing and positioning for scale—\$200,000 to \$1,500,000, up to three years; and
- Stage 3: Scaling—\$1,500,000 to \$5,000,000, up to five years (<https://www.usaid.gov/div>).

FinTech refers to digital technologies for enabling or delivering financial services for any clients, but particularly for underserved or hard-to-reach clients. Digital technologies can reduce transaction costs and information asymmetries that limit access to finance. FinTech can help banks and insurance companies evaluate client risks and move money more efficiently. Development assistance organizations can support SL applications of FinTech in such areas as:

- Client identification;
- Digital finance or mobile money;
- Trade finance based on asset or commodity tracking; and
- Land tenure or resource use rights registries.

USAID published a FinTech Partnerships Playbook to help donors increase private sector engagement in strengthening digital finance. This report lists the steps in defining market gaps in financial services; setting development priorities for FinTech; identifying market actors, dynamics, and roles; and models for donor engagement with the private sector. Within each of these topics, it addresses the enabling environment and key issues for mobile connectivity and digital inclusion; financial service providers; investors, intermediaries, and innovators; and consumers, businesses, and government. It includes a checklist for assessing the readiness of financial service providers for FinTech. It provides examples of donor support for FinTech. It also includes links to other tools and resources for financial service providers and network organizations, government policy makers and regulators, investors, and NGOs (Nelson 2019).

3.6 IMPROVING FINANCING INSTRUMENTS AND MARKETS

SL investments are often hindered by perceptions of relatively low financial returns, relatively high risks, and a long time period before returns can be obtained from reforestation, agroforestry, or natural forest restoration (Clarvis, Kissinger, and Shames 2014). Banks and impact investors interested in financing SLs often report an inadequate pipeline of potential investments that meet their financing criteria. NatureVest and EKO Asset Management Partners (2014) estimated that an additional \$1.5 billion of private capital could have been invested in sustainable land use management if they had knowledge of more opportunities meeting their risk-reward expectations. Some potential investments do not attract financing because they are too small to attract institutional investors or private equity firms or have relatively high due diligence or transaction costs.

Small-scale farmers and forest product producers have difficulty obtaining bank loans because they often lack a credit history, the ability to provide 100 percent or more collateral in acceptable forms, documented land or resource use rights and the ability to scale up their operations. Small-scale producers often face high risks from weather and climate stressors, high transportation cost and reliability problems, input supply bottlenecks, long chains of intermediary purchasers, and changing world market conditions. Production of forest products requires financing with a long grace period and repayment schedule. It is costly for banks to serve small-scale clients, especially in rural areas. Banks can reduce their transaction costs by partnering with a microfinance institution, producer association, cooperative, or NGO (Munden Project 2014).

Option SL-9. Support Insurance and Other Risk Mitigants

SL investments face multiple risks: 1) physical (fire, pests, disease, and theft); 2) economic (volatility in prices or the quantity demanded); and 3) institutional (regulations, land tenure and resource use conflicts, illegal activity, and corruption). *Risk mitigants* reduce or shift risks to increase bank willingness to provide loans for SL investments and private sector interest in making equity investments. Reducing the likelihood or impact of loan default risks on lenders may enable banks to increase access to credit or improve the terms for the borrowers. Common examples include loan guarantees, political risk insurance, standard business insurance, weather-indexed insurance, and financial hedging instruments (Box 3-6). Development assistance organizations can support the development, structuring, and deployment of risk mitigants.

Insurance can increase the willingness and ability of farmers to accept the risks of making new investments or changing their production practices. It can reduce the risks of bank loan defaults or failure to meet contractual obligations as a result of severely unfavorable weather. However, conventional damage-based insurance is costly due to the individual claim adjustment process for estimating damages. *Parametric insurance* can be less costly because clients receive payments are based on specified weather or hydrological triggers. However, parametric insurance is often unaffordable for low-income farmers in the absence of subsidies or inclusion in bank loans. Section 4 contains more information on parametric insurance for climate adaptation.

BOX 3-6. Examples of Risk Mitigants

The USAID Development Credit Authority (DCA) program provided loan guarantees, portfolio guarantees, portable guarantees, and bond guarantees to commercial banks and private equity funds. DCA guarantees are intended to generate additional lending in underserved markets and sectors and demonstrate the long-term commercial viability of lending in developing markets. DCA charges an origination fee based on the maximum total guarantee amount and an annual fee based on the active portfolio under the guarantee.

In 2019, a new U.S. Development Finance Corporation (DFC) was authorized to merge the DCA with OPIC's political risk insurance and direct loan programs. The DFC was also given new authority to make equity investments. The World Bank's Multilateral Investment Guarantee Authority also offers loan guarantees and political risk insurance.

The Nordic Development Fund administers a ProClimate Facility that can extend partial loan guarantees, technical and operation guarantees, and technical assistance for small and medium investments in climate change mitigation and adaptation (Nordic Environment Finance Corporation 2010). Some government development banks in developing countries also issue loan guarantees for commercial banks, usually for specific types of loans or borrowers. These guarantees are typically purchased at a commercial rate in exchange for a specified maximum level of coverage in the case of default (Frisari *et al.* 2013).

Development assistance organizations can support feasibility studies and market assessments for weather-indexed insurance to estimate customer willingness-to-pay and risks for both insurers and reinsurers. They can test and demonstrate weather-indexed insurance products and marketing approaches in remote or rural areas. They can also work with banks, major product buyers, and insurers to include weather-indexed insurance in loan agreements and contract farming arrangements. Development assistance organizations can also support local hydrological and meteorological (hydromet) information services needed to document payment triggers for parametric insurance.

Forward purchase or sales contracts and put and call options can be used to hedge against price volatility, but they are costly. Hedging instruments are often used by large corporations, but are generally not feasible for small-scale, informal sector producers. Development assistance organizations could help producer associations, cooperatives, and processors assess, test, and use contracts or options to reduce price risks.

Option SL-10. Support Funds for SL Investments

SL-focused funds can finance public or private investments through debt and/or equity. Many SL funds have a specific geographic focus. Some address a wide range of SL investments while others are sector specific. Some funds provide financing tied to compliance with environmental, social, or governance (ESG) conditions, sustainability standards or certifications.

Open-ended funds continue to accept new capital from investors after they have been established. *Closed-ended funds* accept investments for a limited time period or fund size. Successful closed-ended funds return the invested capital at a specified date along with investment returns along the way. The Althelia Climate Fund was a closed-ended fund that accepted international public and private capital (Box 3-7). It demonstrated that SL business models can be based on product sales as well as carbon credits.

Development assistance organizations have helped some countries establish national trust funds for climate change mitigation by providing TA on the design, establishment, and management of the funds; capital; and assistance in leveraging funds from other sources. Trust funds may provide grants or concessional or market-rate loans for pre-investment work and investments.

EXAMPLE

BOX 3-7. Althelia Climate Funds

Challenge. Deforestation, forest degradation, and unsustainable agricultural practices contribute to GHG emissions.

Background. Althelia Ecosphere was a private capital management company that collaborated with development assistance organizations and private investors. It sought moderate financial returns on investments while reducing GHG emissions, improving livelihoods and sustainable enterprises, and protecting ecosystems and biodiversity in developing countries. Althelia was subsequently purchased by Mirova Natural Capital Ltd.

Approach. In 2014, Althelia developed its first closed-end Climate Fund for SL investments in Africa and Latin America. USAID provided this fund with a DCA partial loan guarantee for up to \$133.8 million to mitigate the risk of its investments. The company raised \$118 million capital from international public and private investors. In 2017, the Althelia Climate Fund was fully committed to 12 projects in a limited number of countries.

The Althelia Climate Fund earned investment returns from sales of carbon emission reduction credits, payments for ecosystem services (PES), and revenues from certified or sustainably sourced products. Althelia identified projects in Brazil, Guatemala, Kenya, Peru, and Rwanda through a network of global and local NGOs, public sector entities, and developers. The investments included efficient cookstoves, silvopasture for beef cattle, agroforestry for coffee and cacao, natural forest conservation, native palm oil production, and peatland restoration.

Althelia subsequently launched the Climate II Fund, without any need for USAID support. It also established a \$100 million Sustainable Ocean Fund in collaboration with Conservation International and the Environmental Defense Fund. USAID provided a \$50 million DCA partial loan guarantee for the Sustainable Ocean Fund, which has invested in aquaculture, coastal infrastructure and protection, and payments for ecosystem services projects.

Expected results. The Althelia Climate Fund expected to obtain financial returns of 8 percent per year on its investments plus environmental benefits. Through 2017, the Althelia Climate Fund had reduced 22.4 million tCO₂e and brought 2.1 million ha under improved management for conservation.

Source: Althelia Ecosphere (2017); (<https://althelia.com/althelia-climate-fund/>)

Option SL-1 I. Expand Bank Access to Capital and Support Loan Intermediation

There are two major challenges in mobilizing SL financing. First, a large amount of capital is needed to address the magnitude of the deforestation, forest degradation, and unsustainable agriculture and land use problems in developing countries. Second, some of this capital is needed by farmers and other small-scale producers.

Government development banks, commercial banks, and private companies can obtain large amounts of additional loan capital by issuing green bonds. Typically, the minimum size of a green bond is \$80-\$100 million due to the high transaction costs of accessing tradeable debt markets (Laird *et al.* 2015).

A *climate bond* is a type of green bond that meets more rigorous climate qualification criteria. Climate bond standards allow issuers to demonstrate good environmental due diligence to investors. The standards can also help in diversifying investors, increasing investor engagement, and building reputations for delivering low-carbon infrastructure.

The Climate Bonds Initiative has issued criteria for certification of climate bonds for some key SL-related sectors (Box 3-8). In 2019, it was still in the process of developing certification criteria for other sectors (Figure 3-1). Laird and Hyman (2019) presented a road map for a government development bank issuance of a climate bond for SL investments.

A corporate sustainability bond is similar to a green bond, but the proceeds are more for economic and social development than environmental purposes. Starbucks issued the first bond of this type on the U.S. market in 2016 (\$500 million with a 10-year maturity) and another on the Japanese market in 2017 (the equivalent of nearly \$800 million with a 7-year maturity). The purpose of these two bonds was to enable Starbucks to increase its purchases of ethically grown coffee meeting certification standards. They funded farmer support centers and Coffee and Farmer Equity (CAFÉ) Practices verification (Morgan Stanley 2017; 2018).

BOX 3-8. Climate Bonds Initiative Standards

The Climate Bonds Initiative promotes large-scale climate mitigation and adaptation investments through green bonds and other debt instruments. It developed the eligibility requirements for climate bond certifications.

The Climate Bonds Initiative has set climate bond criteria for forestry, including plantations and natural forest conservation or restoration. It is still in the process of issuing climate bond criteria for agriculture.

FIGURE 3-1. CLIMATE BONDS INITIATIVE CERTIFICATION CRITERIA FOR CLIMATE BONDS

Climate Bonds INITIATIVE

Sector Criteria development

	Can be certified now	Criteria in development	TWGs launching soon
Energy	WIND, SOLAR, GEOTHERMAL, MARINE	HYDROPOWER, BIOENERGY	ELECTRICAL GRID
Transport	RAIL, VEHICLES, BUS/RAPID TRANSIT	WATER TRANSPORT	
Utilities	WATER	RECYCLING & REUSE, DISPOSAL	IT, COMMUNICATIONS
Buildings	RESIDENTIAL, COMMERCIAL		
Natural Resources	FORESTRY	AGRICULTURE, FISHERIES	
Industry			CEMENT, STEEL, MANUFACTURING & PROCESSING

Banks may also be able to access new sources of loan capital from institutional or impact investors if they hold them until a sufficient volume is available for resale or securitization on privately traded markets. A multilateral development bank or government development bank can speed up this process by purchasing and warehousing loan portfolios from one or more bank companies. Development assistance organizations can also facilitate loan aggregation and securitization by sharing information on legal requirements; the costs and benefits of selling or securitizing loan portfolios; and prior experiences and lessons learned from other locations or types of loan products.

It is generally difficult for farmers and other small-scale producers in developing countries to obtain commercial bank loans due to the perceived risks and high transaction costs of marketing, screening, processing, and collecting a large number of small loans. These perceived risks and transaction costs can be reduced by providing loans to intermediaries, such as cooperatives, producer associations, NGOs, and large processing or trading companies buying from independent suppliers or contract farmers. The intermediaries provide aggregation services to banks by administering the on-lending to farmers or other small-scale producers. Often, the intermediaries provide other support services such as input supply, transportation, and product marketing and sales. It can be efficient for intermediaries that sell products for farmers to deduct the loan repayments from the revenues remitted to the farmers. Box 3-9 describes three types of models for aggregating finance and other services for small-scale producers in agricultural and forest product value chains.

Development assistance organizations can provide training, technical assistance, and tools to help banks conduct market assessments for SL lending, risk assessments, and appraisal of loan applications. Banks can reduce their transaction costs and help their members develop capacity to obtain, use, and repay loans effectively by aggregating small loans through cooperatives or farmer associations, (O’Mealy *et al.* 2019). Development assistance organizations can also share examples and good practices for serving small-scale producers by types of products, geographic location, development stage, financial requirements, and potential cost savings.

BOX 3-9. Aggregator Models for Agricultural and Forest Product Value Chains

Producer-led aggregator models – Farmers and other small-scale producers often join informal or formal sector associations or cooperatives that provide members with a limited or comprehensive range of services. These services may include input supply, cash or in-kind loans for inputs, training and extension services, access to irrigation, and product marketing. Typically, farmer associations or cooperatives focus initially on a single crop, but some expand to cover additional crops over time. It can be costly and difficult to establish a new farmer association or cooperative and the prospects vary with the local cultural and political factors.

The success of farmer associations and cooperatives often depends on the economic, social, and cultural cohesiveness of the members; local management capacity, integrity, and transparency; and international and domestic market conditions. The effectiveness and efficiency of these organizations can vary across and within countries and types of products. Farmer associations and cooperatives can fail when the leadership does not reflect the interests of the majority of the members. Cooperatives are often set up as not-for-profit organizations that distribute profits back to the members after maintaining financial reserves and set-asides for reinvestment. There are often several levels of cooperatives—secondary or tertiary (apex) cooperatives provide services to smaller, primary cooperatives in exchange for fees or commissions.

Intermediary-driven aggregator models – For-profit companies, government parastatals, and NGOs can supply production or post-harvest services to small-scale producers. These services may include warehousing and inventory credit, input supply, product transportation, and marketing. The costs may be recovered directly through user fees or indirectly through commissions or profits from transactions.

Offtaker-owned aggregator models – Offtakers are private, for-profit companies that buy processed or unprocessed products for sell to foreign buyers. In some cases, offtakers promote sustainability standards or certifications. Some transnational companies that buy from offtakers have supported efforts to improve the quantity and quality of their raw material supplies. For example, the Mars Corporation has established research farms in Brazil, Ecuador, and Indonesia. It also funded Cocoa Development Centers to demonstrate sustainable, high-yield production methods to farmers, local companies and staff of government agencies and NGOs.

Source: GrowAfrica (2015)

Option SL-12. Support Payments for Ecosystem (Environmental) Services (PES)

Forests, agriculture, and other land uses yield marketable goods (e.g., food, fiber, and wood and other forest products) and generate important environmental services that are not valued in commercial markets (e.g., hydrological flows, air and water quality maintenance, and habitat for biodiversity). Failure to adequately account for the value of the environmental services in private or public decision making will lead to a sub-optimal level of conservation and sustainable landscape investments.

Private developers and investors do not normally have a financial incentive for considering the positive or negative environmental impacts of their decisions on others (*externalities*). *Payments for ecosystem services* (also known as payments for environmental services) create financial incentives to reduce negative externalities or increase positive externalities. Under a PES agreement, the users or beneficiaries of environmental services make upfront or periodic cash payments to give private developers or investors a greater incentive to ensure sustainable practices or reduce harmful impacts. These payments may be voluntary or formalized under an enforceable contract to maintain or enhance the environmental services.

Salzman *et al.* (2018) estimated that there were 550 active PES examples worldwide with annual transactions totaling \$36-43 billion. One example, Mexico's national PES program, provided five years of payments to individual or common-property landholders for maintaining and managing the natural land cover. Recipients were required to use part of the payments for improving land management and the rest was retained by communities or households for any purpose (Alix-Garcia *et al.* 2019).

The PES approach has been shown to reduce conversion or degradation of forests, wetlands, and other environmentally critical lands or protected areas. It can also cover some or all the costs of expanding protected areas, reforestation, land or water resource conservation or improvement, or adoption of sustainability standards or improved practices. Audy *et al.* (2017) found that a pilot project that paid farmers in Uganda to reduce tree cutting on their farms reduced deforestation by 54 percent compared to control groups and continued to show positive benefits after the payments ended.

The success of a PES depends on the value of the environmental services to buyers and resource tenure or use rights that are sufficient to encourage better long-term management decisions that benefit to the buyers. Greiber (2009) discussed the importance of the legal framework for PES, understanding of the property rights, enabling institutions, contract design (including the structure of payments, risks, and

process for disputes and remedies), and governance (broad-based public participation, transparency, and access to information).

BOX 3-10. Resources for PES Agreements

Pagiola and Platais (2007) provided guidance on designing and implementing payments for environmental services, including how to set the prices for maximum efficiency and effectiveness.

The Katoomba Group is an international working group that promotes payments for ecosystem services. Its website offers extensive resources on negotiating, structuring, and implementing PES agreements and access to experts.

http://www.katoombagroup.org/learning_tools.php

Source: GrowAfrica (2015).

Salzman *et al.* (2018) identified four key features for scaling up PES: 1) motivated buyers, 2) motivated sellers, 3) good metrics, and 4) institutions that reduced transaction costs. Proland (2019) described PES case studies from Colombia and Uganda and identified the need for a supportive policy and regulatory environment, stakeholder consultations and participation, design of effective payments, and rigorous monitoring and evaluation.

However, the costs of developing, implementing, monitoring, and enforcing a PES can be high. An evaluation of a PES for the Atlantic Forest in Brazil estimated that the cost was \$19,000/ha of additional forest cover, which was much higher than other alternatives for maintaining or restoring forest cover (Putz 2018).

The transaction costs of dealing with many individual buyers are high and the motivations for their participation can be low due to the free rider problem. The *free rider problem* is a market failure that results when people take advantage of using a common resource, or collective good, without providing payment for that resource. A PES is often more likely to succeed if there is a large single buyer (such as a water utility or hydropower generation company).

Development assistance organization funding may be needed to create a legal framework for PES and to design and negotiate the agreements. Development assistance organizations can support data collection, analysis, and stakeholder consultations to set up PES arrangements and develop the capacity of suppliers to implement their agreements. Development assistance organizations can analyze the types and magnitudes of the ecosystem services and their monetary benefits, identify potential buyers and suppliers, and assess land tenure and resource use rights. They can also support comparisons of the PES approach to other options for financing SL investments before and after implementation (*ex ante and ex post*). Development assistance organizations can also provide information on how to design, monitor, and evaluate a PES and share successful and unsuccessful examples and lessons learned (Box 3-10).

The sustainability of PES depends on the continuing willingness of buyers to pay for the services and sellers to accept the agreed payments and generate the expected environmental benefits. The sustainability may also depend on the legal and institutional framework and capacity to monitor the benefits to the buyers and the costs to the suppliers. Box 3-11 describes an example from Vietnam.

EXAMPLE

BOX 3-11. Payments for Forest Environmental Services (PFES) in Vietnam

Challenge. Improve the livelihoods of forest dwellers by encouraging them to undertake management practices that safeguard forest resources and provide ecosystem services benefits in the forests and downstream watersheds.

Background. In 2006, the Government of the Republic of Vietnam (GoV) began exploring options to protect its forests in partnership with USAID-funded Asian Regional Biodiversity Conservation Project. USAID funded Winrock International to help the GoV 1) draft authorizing legislation for PES, 2) estimate the monetary value of forest services for hydropower and clean water supply, and 3) set prices for the services. The GoV set up the PFES system in 2010 and payments began in 2012.

Approach. Hydropower facilities paid the local currency equivalent of \$0.001/kilowatt-hour of power generated to the National Forest Protection and Development Fund. Private companies downstream from the forests made the voluntary payments. This fund distributed revenues quarterly to households or community forest management groups that committed to deforestation-free land use. The funds were used for consumption expenditures or community savings and loan funds.

Results. Winrock analyzed the effectiveness of the PFES and encouraged additional companies to support it under the subsequent USAID-funded Vietnam Forests and Deltas Activity. Between 2012 and 2017, National Forest Protection and Development Fund raised \$300 million. It distributed a share of the revenues to 37 provincial funds that paid 100,000 forest participating resource user and farm households an average of \$82 per year. Approximately 25,000 households received grants or loans for sustainable livelihoods or improved forest management practices. The Forests and Deltas Activity also helped establish village forest protection and patrol groups in Thanh Hoa Province.

Sources: EC-LEDS (2016); Vietnam Forests and Deltas Program (2017); USAID (2018)

The Climate Finance Lab was working to scale up the PES approach by developing and piloting the Cloud Forest Blue Energy Mechanism. This fund will mobilize blended public international and domestic private financing to cover the costs of reforestation and conserving cloud forests in Latin America. The financing would be repaid through payments from hydropower generators for the value of the benefits they receive from reduced sedimentation, increased water flows, and improved regulation due to the maintenance and restoration of the upstream forest cover (<https://www.climatefinancelab.org/project/cloud-forest-blue-energy-mechanism/>).

4. CLIMATE ADAPTATION INVESTMENTS

4.1 OVERVIEW

This chapter describes challenges and opportunities for mobilizing public and private sector investment for climate adaptation (AD), focusing on leveraging technical and financial assistance; increasing public and private sector investment; strengthening the resilience of people, places, and systems; and delivering co-benefits. Incentives for the public and private sector are critical for increasing AD investments.

Private sector investment mobilization for AD is challenging, because financial returns depend on a) whether climate risks materialize and b) magnitude of impact. Although net benefits of AD investments can be large in some cases, uncertainty is high. The business model for a private investor may be less clear for AD than for clean energy (CE) or sustainable landscapes. Many types of AD investments are more appropriate for the public sector, such as infrastructure, human settlements, and health and safety.

Nevertheless, Bandyopadhyay *et al.* (2019) concluded that the scale of investment required for climate adaptation makes greater private sector participation in financing necessary, though the private sector may have difficulty obtaining external financing for AD due to uncertainty about profitability, bank staff's insufficient ability to appraise adaptation projects, inadequate capacity and information on designing adaptation investments with inclusive business models, and political economy constraints.

Section 4.2 reports on AD financing flows. Section 4.3 summarizes the range of options for development assistance organizations to scale up public and private sector AD financing. Sections 4.4 to 4.6 provide more detailed information and examples on these options within the three building blocks of finance: 1) enabling environment; 2) capacity and information; and 3) financing instruments and markets.

4.2 ADAPTATION FINANCING FLOWS

Buchner *et al.* (2019) estimated that global financing for AD (climate resilience) was \$30 billion in 2017/2018. This included \$13 billion for water and waste systems, \$7 billion for disaster risk reduction, and \$6 billion for industry and infrastructure. Most public funding for AD has come from national and subnational governments, development finance institutions, and climate funds. Private investments for AD are difficult to track either because information is proprietary or unreported, definitions are inconsistent, or investments are context- and location-specific (Atteridge and Dzebo 2015; Dougherty-Choux 2015). AD investments may be components of larger investments without being identified as specifically for AD (United Nations Environment Programme 2017). Financing requirements for improving AD in developing countries are growing as the likelihood and potential impacts of climate variability and change increase. Dougherty-Choux (2015) estimated that \$140-300 billion will be needed for AD by 2050. Although estimates are uncertain, the gap between financing and requirements is large.

4.3 OPTIONS FOR SCALING UP CLIMATE ADAPTATION INVESTMENT IN DEVELOPING COUNTRIES

Table 4-1 lists options for scaling up AD investment. Some of these have already been tested or applied and are ready to be replicated or scaled up. Others may need further development or piloting.

TABLE 4-1. Options to Scale Up Climate Adaptation Investment

Building Block	Options	Types of Assistance
Enabling Environment	AD-1: Improve policies and incentives for adaptation investments	<ul style="list-style-type: none"> • Conduct analyses of market incentives for private investment • Support analyses of the policy and regulatory environment • Share knowledge of good practices to improve the enabling environment • Help governments improve incentives for private and public investments
	AD-2: Support public-private partnerships (PPPs) for climate-resilient infrastructure	<ul style="list-style-type: none"> • Help governments improve the legal framework for PPPs • Analyze the pricing of public services and infrastructure and the potential benefits and costs of AD investments • Provide technical assistance (TA) to help design, negotiate, and implement PPPs
	AD-3: Align adaptation investments with national or subnational strategies and plans	<ul style="list-style-type: none"> • Increase the capacity for climate-resilient development and mainstreaming AD in development and sector plans • Develop the capacity to assess and reduce climate risks in public budget and expenditures processes • Help governments understand priorities for adaptation investments and implement appropriate financing strategies
Information and Capacity Development	AD-4: Increase readiness for adaptation climate finance	<ul style="list-style-type: none"> • Help governments strengthen institutions and mechanisms for receiving and managing international funding • Increase the capacity of government agencies to design, review, and prepare proposals for adaptation investments • Increase the capacity for designing, implementing, monitoring, and reporting of government and non-governmental organization (NGO) adaptation investments
	AD-5: Increase the capacity of financial institutions to provide adaptation financing	<ul style="list-style-type: none"> • Support analysis of market opportunities and barriers for climate adaptation financing • Provide training, technical assistance, and tools to help banks assess markets, technologies, business models, and risks for adaptation investments

TABLE 4-1. Options to Scale Up Climate Adaptation Investment (Continued)

Building Block	Options	Types of Assistance
<p style="text-align: center;">Information and Capacity Development</p>	<p>AD-6: Improve the quality, accessibility, and use of climate, weather, and hydrological information for adaptation investments</p>	<ul style="list-style-type: none"> • Identify public and private sector needs for weather and climate information • Improve weather and climate information, forecasts, and early warning systems • Improve communication and access to weather and climate information and products • Help the public and private sectors improve use of weather and climate information in decision making
<p style="text-align: center;">Improve Financial Markets and Mechanisms</p>	<p>AD-7: Sponsor a grant facility to support pre-investment work for adaptation</p>	<ul style="list-style-type: none"> • Provide grants to cover costs of preparing design and assessment documents, and legal or permitting fees • Provide training and TA to help developers navigate the pre-investment stage
	<p>AD-8: Support funds and credit lines for adaptation investments</p>	<ul style="list-style-type: none"> • Improve the organizational structure and procedures for management of trust funds, commercial funds, and credit lines • Analyze and share good practices on trust funds, commercial revolving funds, and credit lines • Help national governments set up intergovernmental transfer mechanisms to support provincial and local adaptation • Increase the capacity for investment appraisal, selection, and financial management
	<p>AD-9: Support weather-indexed insurance</p>	<ul style="list-style-type: none"> • Provide TA or funding for development, piloting, and expansion of weather-indexed insurance and other innovative insurance pilots • Develop partnerships with insurance and reinsurance companies to test and scale-up weather-indexed insurance and test other new types of insurance products • Support market assessments and analyses of subsidy requirements and funding sources for insurance

TABLE 4-1. Options to Scale Up Climate Adaptation Investment (Continued)

Building Block	Options	Types of Assistance
<p>Improve Financial Markets and Mechanisms</p>	<p>AD-10: Promote financial mechanisms for natural disaster response s and recovery</p>	<ul style="list-style-type: none"> • Scale-up financial mechanisms for disaster response and recovery at the subnational, national, and regional levels • Provide assistance to develop or capitalize financial instruments, such as catastrophe risk insurance or catastrophe bonds • Help countries develop disaster budget reserves and access contingent credit or emergency loans

4.4 STRENGTHENING THE ENABLING ENVIRONMENT

Public and private investments in climate adaptation can be impeded by unfavorable policies, or weak planning or coordination at the national, subnational, or local levels. Government or donor support for adaptation has often been project-based, rather than being integrated into development activities (*mainstreamed*). The private sector often faces considerable uncertainty about whether their adaptation (AD) investments will meet government requirements (Oxfam 2013; Donor Committee for Enterprise Development 2016). For example, building codes, construction regulations, zoning, and development rights may be unclear or arbitrarily enforced and markets for insurance may be underdeveloped (Organisation for Economic Cooperation and Development and the Climate Policy Initiative 2015).

Weather and climate forecasts are an important factor in decision making for adaptation investments. In some developing countries, weather and climate information is incomplete, unreliable, or difficult to access in a timely manner (Biagini and Miller 2013). The incentives for private sector research and development to spur adaptation innovations are often weak. Uncertainty about the optimal amount and types of adaptation investment can hinder technological progress, demonstration, and scaling up (PricewaterhouseCoopers 2013). As a result, international or domestic public sector support may be needed for improving adaptation to the existing climate variability and climate change.

Option AD-1. Improve Policies and Incentives for Adaptation Investment

Policies, regulations, and laws can encourage or discourage adaptation investments. Development assistance agencies can help governments to identify, assess, and implement policies, regulations, and laws that foster private and public sector adaptation investments, as described below:

- Fiscal policies (tax deductions or credits, subsidies, and tariffs) can encourage or discourage AD investments.
- Regulations (building codes, construction standards, land use controls and guidance systems, zoning, and building setback requirements) can influence development decisions, technical specifications for equipment, and management practices. Regulations can help ensure that 1) buildings can withstand more intense storms; 2) roads, bridges, and railways can tolerate extreme temperatures and storm surges; and 3) construction is avoided in areas with high climate risks. Stronger regulations may be needed or more effective enforcement and larger penalties for noncompliance.
- Social policies can also increase incentives for adaptation investment. For example, policies could encourage employers to protect employees from health impacts caused by extreme heat by changing working hours, dress codes, and health insurance coverage.

Development assistance organizations can support analyses of policies and regulations and government enforcement capacity. They can also share experiences from other countries to help governments design better policies and regulations, advocate for change, communicate changes to the private sector, and improve implementation and enforcement capacity. The appropriateness of particular policies will vary depending on the vulnerabilities and contexts of different locations.

Option AD-2. Support Public-Private Partnerships (PPPs) for Climate-Resilient Infrastructure

PPPs can bring private sector finance, expertise, and efficiencies to the development and operation of climate-resilient infrastructure and public service investments. They can help governments scale up investment in climate-resilient infrastructure PPPs can also encourage innovation; improve the reliability, quality, and sustainability of infrastructure and services; and reduce vulnerability to weather and climate risks, including disasters (Box 4-1).

BOX 4-1. Examples of Public-Private Partnerships for Adaptation

Public-private partnerships are widely used for water and wastewater services. They can tap private sector financial resources and management expertise through concessions or design, build, operate, and transfer contracts.

Other examples of PPPs for adaptation:

- The \$715 million Chamimochic Irrigation Project in Peru used a PPP to construct infrastructure for expanding and improving irrigation.
- Since 2009, the Government of the Cayman Islands has partnered with the private sector and NGOs to improve disaster risk preparation, response, and recovery from hurricane damage.

Sources: InfraPPP (2013); Hurlston and Tomkins (2010)

Governments may need to draw on a wide range of expertise, including meteorologists, hydrologists, engineers, environmental scientists, lawyers, and the insurance industry to advise on technical, financial, policy, and legal issues for PPPs. Development assistance organizations can help governments improve the enabling environment for adaptation PPPs and support planning and development of these agreements. Development assistance organizations can help ensure that PPPs include competitive and transparent procurement arrangements that encourage private firms to innovate and reduce costs.

Option AD-3: Align Adaptation Investments with National or Subnational Strategies and Plans

Development assistance organizations have helped many countries to prepare National Adaptation Plans (NAPs), resilience strategies, and adaptation action plans. More detailed planning may still be needed at subnational and local levels. Further support may be needed for plan implementation and AD project design, implementation, and financing.

Development assistance organizations can help countries align adaptation financing with national and sectoral or subnational strategies and plans (Box 4-2). Governments may need training and TA to set priorities for adaptation investments develop proposals and match them with potential sources of public or private financing, and manage expenditures and procurements. They may also benefit from financial, economic, environmental, and social impact analyses.

4.5 ENHANCING CAPACITY AND INFORMATION

The ability of the public and private sectors to obtain adaptation financing may be constrained by insufficient understanding of climate risks, uncertainty, and the costs and benefits of climate risk management strategies. There may be limited awareness of the potential sources and requirements for adaptation financing at the national and subnational levels (PriceWaterhouseCoopers 2013; DCED 2016). There may also be insufficient understanding of how to access, manage, deliver, track, and report on different types of finance. The pipeline of adaptation investments ready for financing is often limited and there is insufficient information sharing on adaptation investment and financing opportunities (Patel 2011; PriceWaterhouseCoopers 2013). It is often difficult to transfer or scale up measures from other locations because adaptation investments need to be tailored to the specific context (Biagini and Miller 2013).

BOX 4-2. Donor Support for Aligning Adaptation Plans and Investments

USAID and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) helped the Government of Cambodia integrate climate adaptation into the national budget process and prepare a financing strategy aligned with its NAP.

Option AD-4. Increase Readiness for Climate Adaptation Finance

Public and private sector entities may need to improve their capacity to design, finance, implement, and manage adaptation investments. Development assistance organizations can increase the pipeline of feasible proposals, reduce pre-investment costs, increase the likelihood and speed of obtaining financing, and improve the quality of investments and their potential for successful implementation. The Green Climate Fund has strict requirements for access to its funding, including the demonstrated ability to prepare, implement, and monitor and evaluate projects. Adaptation finance readiness support may include preparation of financing strategies and investment plans and increasing the capacity to design, finance, and implement investments (Box 4-3). USAID and the International Climate Initiative of the Government of Germany have supported National Adaptation Plan preparation and ecosystem-based adaptation investments.

Identification of Adaptation Measures

The public and private sectors often need more information on potential adaptation investments and their benefits and costs. More information may be needed on technology alternatives (including nature-based solutions), costs the effectiveness of the measures in reducing the likelihood or impacts of the risks, potential investments, and potential sources of financing. Development assistance organizations could also share information on the performance and lessons learned from AD investments.

Preparation of Adaptation Investments

Banks and investment funds often cite gaps in the pipeline of adaptation projects ready for financing due to the limited ability to prepare effective loan applications and project proposals. Development assistance agencies can increase the capacity of public and private sector project developers to prepare, finance and implement AD investments. Box 4-4 describes the Adapt Asia-Pacific Project Preparation Facility's multiple services to project developers.

Another example is the Seed Capital Assistance Facility, which provided financial and technical assistance for low-carbon projects in low and middle-income countries in Africa and Asia (<https://www.scaf-energy.org/>). It assisted private equity funds, venture capital (VC) funds, and project development companies (*devcos*) on a cost-sharing and co-financing basis. The Global Environment Facility and the United Nations Environment Programme (UNEP) funded the initial phase 2014-2021.

BOX 4-3. GiZ's Climate Finance Readiness Program

GiZ's Climate Finance Readiness Program (CF Ready) helps developing countries increase institutional capacity to access funding from the GCF and other international funds. This program is funded by the Government of Germany, German Development Bank, and USAID. It helps countries establish National Designated Authorities and set up national accredited entities that can access GCF financing.

CF Ready also provides strategic advice and TA. It has developed a GCF accreditation assessment tool and an interactive climate finance readiness training program.

Bandyopadhyay *et al.* (2019) also prepared a report for GiZ on tools and methods for developing bankable adaptation projects and identifying alternate funding sources and investment models for the private sector.

Source: <https://www.giz.de/en/worldwide/57059.html>

BOX 4-4. Adapt Asia-Pacific Project Preparation Facility

Challenge. Many governments in the Asia-Pacific Region needed greater capacity to develop climate adaptation investments that can meet the funding standards of multilateral development banks and international donors and funds.

Background. The USAID-funded Adapt Asia-Pacific Program (<http://www.adaptasiapacific.org/>) provided capacity development support for climate adaptation project preparation facilities in many countries in the region. The facility helped government agencies prepare proposals for external funding, connect with potential sources of financing, and strengthen their ability to manage climate finance.

Approach. The facility helped clients design potential investments and obtain financing. It worked closely with funders and government agencies to establish 1) a regional knowledge sharing platform; 2) an annual forum to bring together adaptation funding sources and project proponents; 3) an adaptation project financing program; and 4) TA on how to prepare funding proposals. It also promoted regional networking, gender equality, and social equity.

Expected results. Adapt Asia-Pacific supported preparation of 36 adaptation projects in 14 countries, leveraging over \$576 million and benefiting almost 1 million people.

Sources: weADAPT (2017); <https://www.climatelinks.org/project/adapt-asia-pacific>

Management of Adaptation Projects

Adaptation projects need to be designed and managed flexibly to respond to climate and non-climate stressors. Box 4-5 lists areas where development assistance organizations can support AD project preparation and management.

BOX 4-5. Areas of Potential Support for Adaptation Project Preparation and Management

Project Preparation

- Project or investment design and analysis
- Legal assistance
- Pre-project economic, social, and environmental screening and impact assessments
- Market and technology assessments
- Loan or grant applications
- Identification of external financing
- Proposal review

Project Management

- Business plans or growth strategies
- Financial and administrative management systems and fiduciary standards
- Financial reporting
- Design of strategies for implementation
- Monitoring and evaluation (M&E) and reporting
- Collaborating, learning, and adapting approaches

Option AD-5. Increase the Capacity of Financial Institutions to Provide Adaptation Financing

Commercial banks may be reluctant to provide financing for climate adaptation products and services due to uncertainty about the market, the costs and benefits for the products and services, and the business models and profitability of the investments. Staff training, TA, and diagnostic tools have been useful in helping banks increase lending for clean energy. However, the profitability and marketability is much better established for CE goods and services than for climate adaptation. Banks may be more

willing to offer financial products and services for adaptation if they gain a better understanding of how the market and how adaptation measures may reduce investment risks in the long-term.

Development assistance organizations can develop the capacity of national development banks, commercial banks, and other financial institutions by conducting market diagnostics and readiness assessments, including: 1) analysis of repayment experiences and reasons for arrears and defaults; 2) cost-benefit analyses for new lending products or markets; 3) assessment of market opportunities and barriers; and 4) institutional readiness assessment. Development assistance organizations can also help banks gain a better understanding of the importance of screening and reducing climate risks in their loan portfolios, financing adaptation components in their loans, and designing loan products for businesses offering climate adaptation goods and services (such as appropriate lending, risk mitigation, or credit enhancement products that fit within the local context and meet the needs of financial institutions and borrowers).

Option AD-6. Improve the Quality, Accessibility, and Use of Weather, Climate, and Hydrological Information for Adaptation Investments

Reliable weather and climate information are essential for short-term and long-term decision making. Farmers who receive projected drought information early in the season can change their planting times and switch to more drought-resistant crops or varieties. However, this information can be difficult to obtain, understand, and use. In many countries, systems for communicating weather forecasts and climate trends are weak and do not meet the needs of farmers and other producers. More reliable, accessible, and useful information on weather and climate risks could increase incentives for AD investments to improve the design and operations of infrastructure and services. This could reduce risks to household savings and government financial reserves and help prevent business loan defaults or bankruptcies from extreme weather events. Development assistance organizations can improve the reliability, distribution, and interpretation of climate information for AD investments by:

- Helping the public and private sectors communicate their weather, climate, and hydrological information requirements;
- Improving communication systems for weather and hydrological forecasts, as appropriate for various stakeholders;
- Improving seasonal temperature and precipitation forecasts and early warnings of droughts and floods;
- Improving instrumentation, methods, and processes for local weather and hydrology data collection by government entities, private companies, and/or crowd sourcing;
- Improving the timeliness, reliability, and ease of understanding downscaled remote sensing data on local climate, weather, and hydrology;
- Encouraging advocacy to increase budgets for free climate, weather, and hydrological information services;
- Supporting online platforms, mobile phone apps, or other innovative technologies to share, climate, weather, and hydrological information;
- Packaging climate, weather, and hydrological information to communicate climate and weather risks more effectively to various stakeholders (needed to estimate the benefits of adaptation investments); and
- Helping decision makers use climate information to make decisions on infrastructure and other investments (may include development or dissemination of tools for screening climate risks and investments for climate risks, and integrating climate risk analysis in decision processes).

4.6 IMPROVING FINANCING INSTRUMENTS AND MARKETS

Markets are limited or nonexistent for many types of adaptation measures that support environmental and social goods and services. Market limitations reduce incentives for private investments in climate adaptation. This often poses particular problems for low-income people in developing countries due to high transaction costs, low effective demand, perceived risks. These market challenges make it difficult to provide incentives for sufficient private sector investment in adaptation (Patel 2011; Oxfam 2013). Transaction costs and institutional barriers are often high for adaptation measures that are small-scale, complex, or location-specific, as well as for those that require capacity development. This is particularly true for adaptation measures that need to be adopted by low-income households (Patel 2011; Oxfam 2013).

The benefits of adaptation investments stem from reduced future costs from adverse climate risks. Consequently, adaptation investments only generate financial and economic returns if and when the impacts occur at some time in the future (Biagini and Miller 2013; Donor Committee for Enterprise Development (DCED) 2016). The long-term nature and uncertainty of global climate changes and their impacts at the local level make it difficult to estimate the benefits of adaptation investments. The costs of adaptation to climate change can often be far lower than the damage caused by failure to adapt.

Climate-resilient infrastructure has higher capital costs than infrastructure built to less stringent standards (Oxfam 2013). However, the cost difference for greater climate resilience can be relatively small when adaptation is included in the design of infrastructure from the beginning, often only 1-2 percent of the total cost. The annual costs of climate adaptation in many countries may be even less than 0.25 percent of gross domestic product (GDP) (Margulis *et al.* 2010). Many developing countries are growing rapidly and already plan substantial, new infrastructure investments

Yet, many developing countries are poorly adapted to current climate variability, let alone climate change. Much of the existing infrastructure in developing countries cannot withstand extreme weather events that are already likely to occur. Developing countries also face many immediate needs for financing in addition to adaptation. Estimated financing needs for adaptation in developing countries range from \$140–300 billion by 2050 (Dougherty-Choux 2015). Current AD financing for developing countries for adaptation is insufficient to meet these requirements. Development assistance funds are needed to reduce the gap between currently available and needed finance for adaptation

The private sector can also play a critical role in closing adaptation financing gap. Private investment typically requires firm projected financial returns over the short or medium term. Public investment in infrastructure that has a long potential life should consider the costs and benefits of addressing long-term climate risks (Oxfam 2013). As a result, some adaptation investments require public sector coverage, co-financing, or fiscal incentives. Businesses, farmers, and households do make changes in response to perceived climate risks, especially if the incremental costs are not large, but there is little information on these expenditures.

Option AD-7. Sponsor a Grant Facility to Support Pre-Investment Work for Adaptation

Developers may have insufficient capital or may consider it too risky to fund the pre-investment work for adaptation investments. Reducing the barriers to financing pre-investment activities can increase private sector interest in AD investments and provide secondary benefits, such as faster demonstration and commercialization of improved technologies. It can also boost the confidence of financing sources that developers can repay loans or provide sufficient returns on equity investments.

Development assistance organizations can establish or expand a grant facility to support pre-investment work. This may include preparation of design and assessment documents, such as vulnerability or risk

assessments, feasibility studies, market studies, climate-resilient engineering designs, and lifecycle cost assessments. Grants could also cover project application costs, such as legal costs or permitting fees. Pre-investment grants could be combined with TA for completing required assessments, identifying financing sources, and developing financing applications.

Option AD-8. Support Funds and Credit Lines for Adaptation Investments

Trust funds, intergovernmental transfers, and concessional or commercial revolving funds or credit lines can finance adaptation investments. Funds and credit lines vary in their sources of capital, institutional setup, period of operation, types of investments financed, applicant eligibility requirements, and the instruments used to disburse funds. Most grant or loan funds make awards on a competitive basis and require applicants to submit a technical and financial proposal. Some only accept applications during specified funding windows, while others have continuous review processes.

A *trust fund* is an endowment set up to provide funding for specific purposes over a defined or indefinite period of time (Box 4-6).

BOX 4-6. National Climate Funds

The three examples of national climate funds in developing countries discussed below illustrate the variety of structures, capital sources, and investment portfolios for these vehicles:

Indonesia Climate Change Trust Fund – This fund blended multilateral and bilateral grants with domestic financing to support climate mitigation and adaptation investments under three priority funding windows: 1) energy and energy efficiency, 2) sustainable forest and peat land management, and 3) climate resilience. The organizational structure includes a steering committee with broad representation, a technical committee to review proposals, and a secretariat to manage operations.

Source: Flynn (2011)

Bangladesh Climate Change Resilience Fund – This fund operated between 2010 and 2017 and obtained \$130 million in development assistance grant funding for government and NGO projects aligned with the priorities in the Bangladesh Climate Change Strategy and Action Plan. The organizational structure included a governing council and management committee, an expert panel, and a secretariat with the World Bank serving as the trustee. Key challenges for this fund included insufficient high-level commitment in setting priorities and improving governance, accountability, and transparency in operations.

Source: Flynn (2011); Anderson et al. (2017)

Brazil National Fund on Climate Change – This governmental fund provided loans and grants for climate mitigation and adaptation and received a share of tax revenues from petroleum production, approximately \$100 million per year. This fund also attracted additional international public and private finance. Between 2011 and 2014, 8 percent of the fund's disbursements were for grants administered by the Ministry of Environment and 92 percent for loans administered by the National Social and Economic Development Bank.

Source: Flynn (2011); [https://energypedia.info/wiki/Brazilian_National_Fund_on_Climate_Change_\(Fundo_Clima\)](https://energypedia.info/wiki/Brazilian_National_Fund_on_Climate_Change_(Fundo_Clima))

The initial capital may come from direct contributions by donors, governments, foundations, or impact investors. A trust fund can also be funded through foreign debt swaps or annual or periodic contributions from national or subnational government budgets mobilized from taxes, fees, or other domestic revenue sources. Trust funds can support public or private sector adaptation investments through grants or loans. They can be operated as sinking funds with a limited lifetime for committing all of the capital.

Alternatively, they can be set up as or revolving funds that can be sustained in various ways:

- Annual contributions to the trust fund's working capital that are disbursed each year, limiting the rate of expenditures to the earnings obtained from investing the fund's capital. This was the model adopted by countries that established trust funds with USG support under the Tropical Forest Conservation Act of 1998 (<https://www.usaid.gov/biodiversity/TFCA/tropical-forest-conservation-act-of-1998>).
- Issuing loans rather than grants and using the principal and interest repayments to cover operating costs and replenish or increase the capital; and
- Making program-related equity investments that provide dividends and a return of capital and potential for capital gains on the sale of shares (exiting from investments).

Development assistance organizations can play a catalytic role in establishing trust funds, leveraging capital from other sources, and improving the efficiency and effectiveness of operations throughout the project cycle. This nonfinancial support may include TA on institutional and governance structures, policies and procedures for reviewing applications, disbursement, and monitoring and evaluation of funding agreements. Development assistance organizations can share good practices and help develop the technical and managerial capacity of fund staff.

Subnational governments are often responsible for providing important public services, but may not have sufficient financial resources to meet service quantity and quality expectations. In some countries, municipal governments lack the legal authority or an adequate credit rating to borrow money from banks or bond markets. *Intergovernmental transfers* are financial resources that the national government provides to state (provincial) or local governments or states provide to municipal or district governments. Intergovernmental transfers can help smaller administrative areas address funding shortfalls for public investments or co-financing requirements for development assistance organization projects or public-private partnerships. They can also capitalize revolving funds for public services, provision of incentives for preparation and implementation of adaptation strategies, or responses to natural disasters. Intergovernmental transfers can also be designed as pay-for-performance mechanisms. There are three main types of intergovernmental transfers:

- *General revenues*: Tax revenue sharing and general grants provide recipient governments with the most flexibility in using these funds for their own budget priorities; and
- *Conditioned support*: Restricted funding requires recipient governments to use the funds for purposes specified by the government entities providing the funds. These transfers usually take the form of specific purpose, mandated, capital, or special grants (Spahn 2012).
- *Block grants*: Funding for broadly defined purposes that allow the recipients more discretion in determining how to use the funds to meet the objectives.

Development assistance organizations can encourage governments to establish or expand intergovernmental transfers or improve their operations. This assistance could include designing conditionality requirements or flexibility terms; testing pay-for-performance approaches; adopting responsible and transparent budgeting, expenditure, and accountability processes; and monitoring and evaluating adaptation investments and impacts.

Intergovernmental transfers can be tied to preparation or implementation of subnational adaptation plans sectoral development or capital investment plans that mainstream adaptation. Development assistance organizations can assess and share experiences on the use of intergovernmental transfers for climate adaptation and their effectiveness in leveraging additional international or private investment.

A *revolving loan fund* is a continuing source of capital for relending for specified purposes that is maintained by principal and interest repayments from prior loans.

A *credit line* allows clients to borrow up to a maximum amount of money for specified or unspecified purposes as needed, without obligating them to borrow anything. The clients can be other financial institutions or retail customers. Commercial banks or government development banks can set up credit lines for domestic banks and other financial intermediaries that on-lend to other clients.

Revolving loan funds and credit lines can be targeted for specific types of clients, sectors, or uses. They can improve public and private sector ability to adapt to weather and climate risks and demonstrate the bankability of adaptation loans. Box 4-7 contains some examples of revolving loan funds and credit lines for adaptation.

BOX 4-7. Adaptation Loan Funds and Credit Lines

The ***Climate Action Framework Loan II***. The European Investment Bank established this fund in 2017 to provide concessional loans through the Caribbean Development Bank. The line of credit can finance up to 50 percent of the cost of climate mitigation or adaptation investments in member countries.

The ***Investment Facility for the Pacific*** (IFP). The European Development Fund established this blended finance facility in 2012. The IFP provided grants, TA, and risk capital, or other risk mitigants to catalyze financing in the Pacific Region. It aimed to fill capital market gaps in the availability or affordability of financing for climate adaptation green infrastructure, sustainable energy, environmental protection, private sector development, and improved delivery of social services.

Sources: <https://www.climatefinancelab.org/project/climate-resilience-adaptation-financetransfer-facility-craft/>

Capital for a revolving fund or credit line can come from development assistance organizations, commercial loans, equity funds, pension funds, or a bank's own equity. Some development assistance organizations contribute capital to allow concessional loan terms for borrowers while others require market rate lending for sustainability. Loan guarantees can also reduce lender risks. Development assistance organizations can also provide technical assistance to help government development or commercial banks establish revolving funds or credit lines for climate and weather adaptation. They may also help banks leverage public or private capital for adaptation investments.

Crowdfunding is a potential source of financing for the adaptation investments

of local communities, small- and microenterprises, and NGOs. *Crowdfunding* mobilizes direct person-to-person (P2P) funds through a web-based platform for use in direct loans or grants or pooling into funds. Bandyopadhyay *et al.* (2019) cited the example of an innovator who received \$125,000 from Indiegogo to build ice pyramids to provide water for crops during the dry season as a substitute for shrinking glaciers. The success of the initial crowdfunding helped the entrepreneur obtain a Rolex Innovation Grant.

Option AD-9. Support Weather-Indexed Insurance

Standard life, health, property, or business insurance policies cover a portion of the actual, assessed damage to human lives, human health, household assets, or business assets or revenues from specified types of losses. Some weather-related risks, such as floods, may be specifically excluded from standard coverage and require special-risk policies. Standard and special risk policies require insurance adjuster estimates of the value of the actual losses. Insurance adjustment is administratively costly and often leads to conflicts with policyholders over the cost estimates.

Parametric insurance differs from standard damage-based insurance because pre-specified payouts are tied to the occurrence of certain events, rather the actual damage incurred. For example, weather-indexed insurance provides payouts when specified thresholds of unusually severe weather occur. The events that lead to payouts are identified through hydrometeorological records at specified locations. Parametric insurance triggers can also be based on natural resource availability for renewable energy generation or industrial production. The policies may cover one or more of the following risks: severe

storms, floods, droughts, low river flows, abnormally high temperatures, or excessive or insufficient winds or insufficient solar radiation.

The transaction costs of marketing, selling, and administering weather-indexed insurance can be relatively high, especially if there are a large number of clients with low-value policies. These transaction costs can be reduced if the policies are offered by local insurance companies or if reinsurance companies are involved. Box 4-8 describes the R4 weather-indexed insurance pilots in five African countries. USAID and the International Climate Initiative of the Government of Germany have also supported weather-indexed insurance.

EXAMPLE

BOX 4-8. R4 Weather-Indexed Insurance Pilots in Five African Countries

Challenge. Low-income farmers in Ethiopia are highly vulnerable to severe weather and climate risks.

Background. In 2009, Oxfam America, the Swiss Re reinsurance company, and the Relief Society of Tigray started a weather-indexed insurance pilot for Ethiopian farmers under the Horn of Africa Risk Transfer for Adaptation (HARITA) Project. In 2011, the World Food Program and Oxfam America replicated the pilot through the R4 Rural Resilience Initiative. The replication made weather-indexed insurance available to some farmers in Kenya, Malawi, Senegal, and Zambia.

Approach. R4 insurance provides payouts when unusually severe weather occurs, enabling farmers to avoid selling off productive assets to repay loans and cover living costs. Farmer payments for the insurance premiums were collected soon after major harvests, when they have more money available.

Expected results. In 2017, approximately 57,000 farmers in the five countries paid total insurance premiums of \$1.1 million to cover \$6.1 million in productive assets. Between 2011 and 2017, farmers received insurance payouts of \$1.46 million.

Sources: World Food Programme and Oxfam America (2017).

The Munich Climate Risk Insurance Initiative identified seven principles for climate-risk insurance in developing countries (Kreft, Schafer, and Waters 2016):

- Solutions should be tailored to local needs and conditions;
- Coverage must be reliable and valuable to the insured;
- Measures to ensure affordability (subsidized premiums) are paramount for uptake and to address equity concerns;
- Efficient and cost-effective delivery mechanisms for payment and disbursement are essential;
- The design of insurance schemes should be participatory and inclusive;
- Insurance schemes must safeguard economic, social, and ecological sustainability; and
- Attention must be focused on ensuring a supportive enabling environment and building capacity to design and implement the insurance program.

Development assistance organizations have subsidized the costs of weather-indexed insurance pilots for low-income farmers and herders in developing countries and helped to reduce the transaction costs. To scale up the pilots, they will need to work more closely with the insurance and reinsurance industries. However, private companies may be reluctant to take on the risks and transaction costs without continuing donor support, especially if the climate risks are increasing over time.

Development assistance organizations can support market research on weather-indexed insurance to identify the minimum subsidization needed to enable low-income people to participate while charging higher income people the full actuarial costs of climate risks. Development assistance organizations can also assess ways to reduce moral hazard and incentives for maladaptive responses associated with weather-indexed insurance. They can also help governments improve domestic revenue mobilization and management to cover long-term subsidy costs of public weather-indexed insurance programs.

Option AD-10. Promote Financial Mechanisms for Natural Disaster Response and Recovery

Development assistance organizations can help countries identify and set up financial mechanisms for natural disaster response and recovery at the subnational, national, and regional levels, provide financial assistance, or capacity development support to create tailored products for country or regional needs.

- *Disaster budget reserves.* Governments can develop disaster funds or budget reserves to enable them to respond to natural disasters and promote faster recovery. The appropriate size of disaster funds or reserves will depend on the expected magnitude and frequency of the costs.
- *Contingent credit and emergency loans.* Development assistance organizations can set up loan or grant agreements to governments in advance of natural disasters with disbursements based on pre-specified disaster thresholds.
- *Catastrophe bonds.* Governments can use risk or insurance-linked securities to shift specific risks from the issuer to investors. Catastrophe bonds can give governments the ability to respond to disasters more quickly than they would be able to if they depended solely on foreign aid or domestic revenues. One example is the World Bank's MultiCatProgram, which helped develop a four-tranche catastrophe bond with a three-year maturity for Mexico. A special-purpose vehicle, CATMEX Ltd., issued a bond that insured Mexico's Natural Disaster Fund (FONDEN) against major earthquakes in three areas around Mexico City and major hurricanes on the Atlantic and Pacific coasts. The insurer purchased reinsurance from another company. The investors will receive the principal repayments on the bond unless a triggering earthquake or hurricane makes it obligatory to transfer the funds to FONDEN (Bandyopadhyay *et al.* 2019).
- *Catastrophe risk pools.* Country governments can pool risks through diversified risk portfolios, joint reserves, and reinsurance to access rapid financing for post disaster response. Box 4-9 describes the example of the Caribbean Catastrophe Risk Insurance Facility.

BOX 4-9. Caribbean Catastrophe Risk Insurance Facility

Challenge. Caribbean countries have trouble accessing finance rapidly to respond to high-risk catastrophic events.

Background. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) was established in 2007. It was the first multi-country risk pool in the world to help governments in the region with hurricane and earthquake response and recovery.

Approach. The CCRIF offered parametric insurance for earthquakes, hurricanes, and extreme rainfall events, with the involvement of insurance and reinsurance companies and the capital markets. It provided funds to country governments quickly after specified triggers have occurred. It was also expanding its offerings to include a new product that provided payments for smaller disasters below its standard trigger size.

Results. Since its inception, the CCRIF has made 38 payouts totaling almost \$139 million to its 13 members.

Source: <https://www.ccrif.org/content/about-us>

EXAMPLE

ANNEX A: FINANCING TERMINOLOGY AND FINANCIAL INSTRUMENTS

Annex A contains definitions of common financing terminology. It also discusses the advantages and disadvantages of various types of financial instruments including loans, bonds and other publicly traded debt securities, equity investments, mixed debt and equity financing, investment funds, risk mitigants, and credit enhancements. It describes what recipients typically want from debt or equity financing and what sources of the financing want. It also covers pay-for-performance financing, a relatively new approach for development assistance organizations.

DEBT INSTRUMENTS

Debt instruments include loans and publicly tradeable bonds and notes. Both types of debt provide upfront capital in return for repayment of the principal borrowed on a specified time schedule, plus interest, at a stated rate. Debt financing allows borrowers to retain more of their own capital or ownership shares in a company.

Loan Instruments

Loans are the simplest type of debt financing. A borrower receives a specified amount of capital with an obligation to repay the principal and interest on a specified time schedule. Borrowers may also have to pay application or loan origination fees to cover administrative costs or increase the effective interest rate. Commercial bank borrowers usually pay **declining balance interest** (the interest rate is only applied to the unpaid principal remaining on the loan when each repayment is due). Many microfinance institutions charge **flat rate interest** (the interest rate is applied to the total amount borrowed initially for the entire duration of the loan).

Secured loans are backed by assets that can offset the bank's losses from a default. **Collateral** refers to the assets that a borrower pledges as security for the issuance of a loan. Commercial banks often require borrowers to pledge financial assets, property or land as collateral. The collateral is forfeited in the event of a **loan default** (failure to repay the principal and interest due). However, it can be difficult and costly to collect and sell pledged collateral in developing countries. Government regulatory agencies generally require banks that accept savings deposits to obtain collateral to protect their depositors. Unregulated microfinance institutions are not required to demand collateral.

Project financing only provides recourse to the assets of a specific investment, rather than the balance sheet of the company. It may be more costly for borrowers due to the higher risk and banks may be less interested in providing this type of loan.

There are different types of loans with varying degrees of risk and expected returns. Commercial banks tend to be risk averse because they must meet national and international standards for capital adequacy ratios. Borrowers have to repay loans before equity investors receive their returns. Lenders receive the financial returns specified in the loan agreement, with no additional upside potential. Government development banks often have additional national or subnational economic development, social, and environmental objectives and may be willing to accept higher risks than commercial banks.

Commercial loans are offered on unsubsidized market terms (interest rates and fees, collateral requirements, and repayment period) based on the type, size, and risks of the loans.

Concessional loans (flexible or soft loans) carry subsidized terms due to subsidies or low-cost capital from development assistance organizations or governments or lower lender expectations for net returns. Concessional terms may include lower interest rates or fees; a longer repayment period (**loan tenor**); a **grace period** (before payments are due to begin); and reduced or waived requirements for collateral. Some concessional financing blends loans with grants that do not have to be repaid.

Loans can also be issued with different **repayment priorities** (risks) and potential returns. The availability of loan products with different risk and return profiles can attract more lending capital into the financial system and provide more flexibility for borrowers.

- **Senior loans** are the first type of debt that a borrower is required to repay before other lenders.
- **Subordinated loans** have a right to repayment after the senior debt holders are repaid.
- **Junior (first-loss) loans** are loans with the lowest right to repayment that may be subject to default first.
- **Amortized loans** include accrued interest for the loan time period and part of the principal.

BOX A-I. GOALS OF LENDERS AND BORROWERS

What Do Lenders Want?

- Low transaction costs
- Low risk, or a high probability of prompt principal and interest repayment
- Moderate returns
- Continuity of investment and expected returns
- Good company governance
- Rule of law

What Do Loan Borrowers Want?

- Ability to get financing despite limited credit history
- Off-balance sheet financing (project financing)
- Large loans, as it can be difficult to get another concurrent loan
- Long repayment periods to achieve target returns
- Loans with low, fixed interest rates and fees or variable interest rates
- No or low collateral requirements
- Tax advantages, such as loan interest deductions

- Loans with low, fixed interest rates and fees or variable interest rates
- No or low collateral requirements
- Tax advantages, such as loan interest deductions

LENDERS TYPICALLY CHARGE HIGHER INTEREST RATES ON LOANS WITH LOWER REPAYMENT PRIORITY BECAUSE THEY EXPECT TO BE REWARDED FOR TAKING MORE DEFAULT RISK. (BOX A-I. GOALS OF LENDERS AND BORROWERS)

What Do Lenders Want?

- Low transaction costs
- Low risk, or a high probability of prompt principal and interest repayment
- Moderate returns
- Continuity of investment and expected returns
- Good company governance
- Rule of law

What Do Loan Borrowers Want?

- Ability to get financing despite limited credit history
- Off-balance sheet financing (project financing)
- Large loans, as it can be difficult to get another concurrent loan
- Long repayment periods to achieve target returns

Box A-1 presents highlights of additional expectations and goals for both lenders and borrowers.)

Collateral requirements may differ for loans with different payment priorities.

A **credit line** provides flexible loan financing that can be drawn upon as needed by the borrower. **Contingent credit lines** are advance agreements that enable companies or governments to access financing quickly and on more favorable terms if major economic or business disruptions or a natural disaster occur.

Green credit windows are dedicated loan funds for environmentally beneficial purposes. For example, a bank may offer a green credit window to allow a RE company to provide supplier credit to its customers. The company can generally obtain bank credit more easily than its customers or on more favorable terms.

Revolving loan funds use borrower repayments of principal and interest to provide new loans for similar purposes or client groups. Revolving loan funds may be designed to continue for a limited period or indefinitely. They can be a sustainable source of financing if the interest rates and fees are high enough to cover the cost of capital, administrative costs, repayment risks, and inflation.

Credit enhancements are methods for borrowers to improve their creditworthiness for loans or tradable debt securities. Credit enhancements can increase access to financing or allow financing on more favorable terms.

In **off-balance sheet financing (project financing or limited liability debt)**, debt holders incur losses before equity owners because there is no recourse to the non-project assets of owners in the event of a default.

Commercial banks are motivated by their ability to earn profits while managing their risks to meet regulatory requirements and sustain their operations. Banks typically loan out multiples of their equity capital on the expectation that they will receive future loan repayments and not have to pay out all of their obligations to their depositors and creditors immediately.

Gearing ratios measure a bank's financial leverage – how much of its operations are funded by equity capital versus debt financing.

The **capital adequacy ratio (capital-to-risk weighted assets ratio)** measures a bank's available capital as a percentage of its risk-weighted credit exposures. The capital adequacy ratio is regulated to protect the bank's depositors and the stability and efficiency of the broader financial system. The numerator of the ratio includes both Tier-1 and Tier-2 capital.

Tier-1 capital is the core capital of a bank, including equity capital and disclosed reserves that can be used to absorb losses without requiring the bank to cease operations.

Tier-2 capital is the amount needed to absorb losses if the bank is liquidated. In 2017, the Basel III international regulatory agreement increased the capital adequacy requirements for banks. Under this agreement, a commercial bank's Tier 1 and Tier 2 capital must be at least 8 percent of its risk-weighted assets and the minimum capital adequacy ratio (including a capital conservation buffer) is 10.5 percent. The Basel III agreement also included a standard method for estimating the riskiness of a bank's assets that will be required starting in 2022. Additional requirements will be phased in through 2027. The more stringent requirements will affect commercial bank lending policies.

A bank can package its loans into portfolios for sale to another bank or investor in a private transaction. Benefits to banks from selling part of their loan portfolios include

- Greater liquidity;
- Ability to meet international capital standards and domestic regulatory requirements;
- Additional capital for new lending; and

- Lower portfolio risks by diversifying loan sizes and types of activities financed and types and locations of clients.

Tradable Debt Security Instruments

Tradable debt securities are borrowed from investors on public markets through initial issuances. Their repayment terms can be similar to loans, but the principal (**par value**) is generally repaid at the end period (**maturity**), rather than throughout the life of the debt. They typically have regular, fixed interest payments (**coupon yield**). Some tradable securities are **callable** (the borrower can repay the debt before maturity to reduce total interest payments). As a result, the **continuity of investment** (ability to continue receiving expected returns from a tradable debt security over the desired period) may vary. In some cases, tradable securities may be **inflation-adjusted** (mostly for government bonds) or **zero coupon** (no interest is paid during the bond period, but the final payment exceeds the par value). Tradable debt securities can also be resold on a secondary market before the maturity date, providing the advantage of greater **liquidity** (ability to cash out of an investment quickly and easily at any time).

Bonds enable companies and national or subnational governments to raise a large amount of capital at relatively low cost. Bonds can be used for medium-term or long-term financing. The coupon rate for a bond depends on the capital market and the risks evaluated by an independent rating firm prior to bond issuance. High-grade bonds are less risky and have a lower yield than low-grade bonds. Box A-2 shows several examples of key bondholder objectives.

BOX A-3. What Bondholders Want

- **Low risk, moderate returns.** Most bondholders want a high probability that coupon payments and par value will be repaid in full on time.
- **High returns.** Some bondholders buy high-risk junk bonds because they expect that risk taking will be rewarded.
- **Liquidity.** Ability to get money back sooner than the bond maturation date, if desired. They may also be able to get a price premium by reselling bonds with higher perceived quality. They may also want to avoid a price discount in reselling bonds with lower perceived quality.
- **Continuity of investment and expected returns**
- **Good company governance**
- **Rule of law**

Owners can resell bonds on public capital markets at any time before their maturity, providing liquidity and potential capital gains (or losses). Bond prices fall when interest rates increase and vice versa. If a bond is held to maturity, changes in market interest rates have no impact on returns from the bond.

Bonds can be issued in foreign currency or domestic currency. The coupon yield may be lower on international currency bonds, but they can be risky if the domestic currency exchange rate falls since the interest and principal are paid in foreign currency.

A large bank may be able to sell part of its loan portfolio through a publicly traded debt security. Multilateral development banks, government development banks, and investment banking companies can buy and warehouse loans from

multiple banks until they have a large enough volume to issue a bond. Bond financing offers the same advantages as sale of a bank's loan portfolio. It may also allow the bank to obtain lower cost capital because bond buyers are interested in relatively low risk, moderate return investments.

Securitization pools less liquid financial assets into tradable securities backed by future cash flows. Asset-backed securities include mortgages, loans, or other debt or revenue streams with consistent cash flows. A common approach to securitization is to sell assets to a special-purpose vehicle that pools them into asset-backed securities, such as bonds. The security's underlying risk comes from its asset pool and is separate from the risk of the financial entity. For example, clean energy financing can be scaled up by securitizing the cash flows from Energy Service Companies (ESCOs) or green mortgages for energy-efficient housing that reduces utility bills.

Bonds are classified by the borrower and purpose:

- **Corporate bonds** are issued by a private company.
- **National government bonds (sovereign bonds)** are issued by a central government. In some countries, bond-issuing authority is reserved for a single agency, such as the Ministry of Finance or Treasury. Some countries allow other national government entities to issue agency bonds that might not carry the same guarantees as a sovereign bond.
- **Subnational government bonds (subsovereign bonds)** are issued by a state (province), county, district, or municipality.
- **Supranational bonds** are issued by international organizations or multilateral development banks.
- **Project bonds** finance a specific investment and are linked to its expected revenue stream. Project bonds provide no recourse to other assets of the project developer or operator. Project bonds are often used to finance the capital costs of new infrastructure, energy, transportation, or telecommunications investments. They can also be used to refinance the debt of an existing project.
- **Green bonds** finance activities that are expected to have a positive environmental impact and are consistent with the Green Bond Principles of the International Capital Market Association. Green bonds can be issued by national or subnational governments, international agencies, or corporations. They can be repaid either from project revenues or general revenues of the borrower. They are similar to regular bonds, but address an issue that may be valued by investors (“theme bonds”). Because the market is still nascent, lower interest rates are not yet available. These may be easier to sell to impact investors and international financial institutions.
- **Climate bonds** are a type of green bond that supports climate change mitigation or adaptation (Nelson and Pierpont 2013). They are currently being finalized for sustainable landscapes. Table A-1 compares different types of green bonds.
- **Catastrophe bonds (CAT bonds)** differ from debt securities. They are risk or insurance-linked securities that shift specific risks from the issuer to investors. Insurance companies and multilateral or government development banks are the most common issuers of CAT bonds. These bonds mitigate the damage costs from specified extreme weather events. If the specified catastrophe occurs, the borrower does not have to make subsequent payments of the principal and interest. If the covered catastrophe does not occur, the issuer pays the investors the agreed principal and interest (World Bank 2011). Catastrophe bonds can enable governments to respond to natural disasters more quickly than they could with foreign aid or domestic budget allocations.

TABLE A-1. TYPES OF BONDS AND OTHER DEBT INSTRUMENTS

Type	Use of Proceeds	Debt Recourse	Examples
Use of Proceeds Bond	Earmarked for green projects	Recourse to the issuer; same credit rating applies to issuer’s other bonds	EIB Climate Awareness Bond; Barclays Green Bond
Use of Proceeds Revenue Bond (Asset-Backed Security)	Earmarked for financing or refinancing green projects	Revenue streams from the issuer’s receivables of fees or taxes	Hawaii State Bond (backed by a fee on electric utility bills)
Project Bond	Ring-fenced for the specific underlying green project(s)	Recourse only to the project assets and balance sheet	Invenergy Campo Palomas Wind Farm Bond
Securitization Bond (Asset-Backed Security)	Earmarked for green projects (refinance	Recourse to a group of projects (e.g., solar leases or green mortgages)	Tesla Energy (backed by residential solar leases);

	portfolios of green projects or proceeds)		Obvion (backed by green mortgages)
Green Covered Bond	Earmarked for eligible projects or secured in the covered pool	Recourse to the issuer and a covered pool if unable to repay	Berlin Hyp green Pfandbrief; Sparebank 1 Bolligkredit green covered bond
Loan	Earmarked for eligible projects or secured by eligible assets	Full recourse to the borrower for unsecured loans. Recourse to the collateral for secured loans and may also involve limited recourse to the borrower	MEP Werke, Ivanhoe Cambridge and Natixis Assurances (DUO), OVG
Other Debt Instruments	Earmarked for eligible projects		Convertible bonds or notes, commercial paper, debentures

Source: Adapted from <https://www.climatebonds.net/market/explaining-green-bonds>

Asset-backed securities are tradable debt securities that are collateralized by a pool of assets (such as loans, leases, credit card debt, royalties, or receivables). The assets may be illiquid and difficult to sell individually. Pooling these assets together and creating a financial security makes them more marketable by diversifying risks. The revenue generated from the pooled assets is used for repayment. Asset-backed securities allow issuers to generate cash for more lending or other business activities. FlexiGroup Ltd. issued a green asset-backed security based on revenues from leasing residential rooftop PV systems.

Covered bonds are similar to asset-backed securities, but have a dual recourse structure that gives investors a preferential claim over specific financial assets (**cover**) as well as an unsecured claim against the issuer in a default. The cover assets remain on the issuer’s balance sheet for a covered bond, unlike asset-backed securities (Clenaghan, Damerow, and Kidney 2012).

Structured finance products are complex, customized transactions that can help companies with special financing needs that go beyond conventional financial products. Assets are first pooled and then split to create new securities that suit the risk-return preferences of various investors. Examples of structured finance products include.

- Bonds, mortgages, or debt repackaged into separate tranches with different risks and types or levels of financial returns: **collateralized bond obligations (CBOs)**, **collateralized debt obligations (CDOs)**, and **collateralized mortgage obligations (CMOs)**.
- **Syndicated loans:** Two or more lenders jointly provide credit on the same terms through one loan agreement. Usually, one **agency bank** manages the loan on behalf of all of the lenders.
- **Derivatives:** Financial securities with a price that varies with the value of the underlying assets. A derivative is typically arranged as a contract between two or more parties. Most derivatives are customized and traded over-the-counter. **Over-the-counter (OTC)** derivatives are not traded on a formal exchange and typically involve greater counterparty risk of default. Derivatives traded on an exchange are more standardized and regulated.
- **Synthetic financial instruments:** Investment opportunities that are structured to meet the desired cash flows of particular investors. These are arranged through contracts that simulate other financial instruments with different cash flow patterns.
- **Warrants:** A type of derivative that gives the right, but not the obligation, to buy or sell equity

shares at a specified exercise price (**strike price**) before the stated expiration date. **Call warrants** provide the right to buy a security. **Put warrants** provide the right to sell a security. An American warrant can be exercised any time before the expiration date. A European warrant can only be exercised on the expiration date.

Equity Investments

Equity financing is the capital that investors provide in return for an ownership share in a company. In accounting terms, it is defined as the company’s assets minus its liabilities. Equity owners receive distributed profits based on their ownership shares that might be monthly, quarterly, annually, or on an irregular basis. Equity owners may also receive **capital gains** from sale of some or all of a company assets. An **exit** refers to the sale of all equity ownership shares. The term **equity investment** is also used more narrowly to refer to publicly or privately traded shares of a company’s stock.

Since debt payments must be made before distribution to owners, equity investors face higher risks than lenders or bond investors. Equity investments have the potential for much higher returns than debt investments because there can be unlimited upside potential. However, equity investors only have a **residual claim** on profits after payment of bills and debts. The term **leverage** typically refers to the ability to earn higher returns on investment when business owners invest less of their own equity by obtaining more debt financing.

Companies with a large share of their own equity or external equity financing generally find it easier to obtain loans because banks loans are less risky when a company has a low debt-to-equity ratio. However, new equity investments are potentially more costly to a company’s owners than debt financing because the higher upside returns are shared by the equity investors. Equity can be split into various categories to attract investors with different risk tolerances and return expectations.

TABLE A-2. PROS AND CONS OF EQUITY FINANCING

Pros	Cons
<ul style="list-style-type: none"> • Primary source of funding for start-ups and early-stage companies (seed financing) • High expected returns on own equity • External equity may be hard to obtain • May be easier to obtain external equity with some grant or loan financing or risk mitigants 	<ul style="list-style-type: none"> • High risks on own equity • External equity may be more costly for companies than loans and risks loss of managerial control • May be hard to sell equity shares of nonpublic companies • Well-developed equity markets are needed for companies with publicly-listed stock

Private equity financing (unlisted shares) is raised outside of public stock exchanges either through direct investments by individuals or companies or indirectly through a **private equity fund**. The risks and potential returns are usually higher for unlisted shares than publicly traded stocks. Unlisted shares are subject to less regulation than listed shares and may be unable to meet market listing standards. Angel investments, venture capital, and private equity capital are types of private equity financing.

- **Angel investors.** Individuals or informal groups that invest their own capital, often in early-stage companies or risky projects.
- **Venture capital.** Equity provided by companies that have a board, managers, and professional staff to make investments. Venture capital generally involves larger investment amounts than angel capital. Venture capital companies may raise money from external investors interested in

professional management of a private equity stake in startups and other businesses with high growth potential. Venture capital is risky, but diversification of the investments can reduce the risks.

Private equity capital. Similar to venture capital, but may be provided to more mature companies. Private equity often comes from pooled investment funds. In some cases, private equity capital can be less risky than angel investing or venture capital since it does not support startups, but the potential returns may be lower. Private equity capital can be risky for companies in financial distress or in need of restructuring or management changes.

Angel investors and venture capital providers often invest in the early stages of a company when risks and potential returns are very high. Private equity investors often help companies by providing technical or business management expertise and contacts along with capital.

A **stock (listed share)** is a publicly tradable equity ownership portion in a company. The company that issues stock only receives financing from an **initial public offering (IPO)** or a subsequent issuance of additional shares. Companies do not receive any additional capital when stock shares are resold on a public stock exchange. However, companies that have retained some of their own stock can earn capital gains by selling shares that have increased in price or use the shares as collateral for other financing. Conversely, stock prices may also decline from the IPO price. Company managers and workers who own listed shares may also have capital gains or losses when they sell stock.

Stock issuances are subject to where they are sold, and regular financial reporting requirements. Publicly traded stock is typically riskier than a loan because the lender has to be repaid before stock investors receive dividends or other distributions. **Preferred stock** has a higher priority claim on dividends than ordinary stock shares, but might not provide equal voting rights on major management issues.

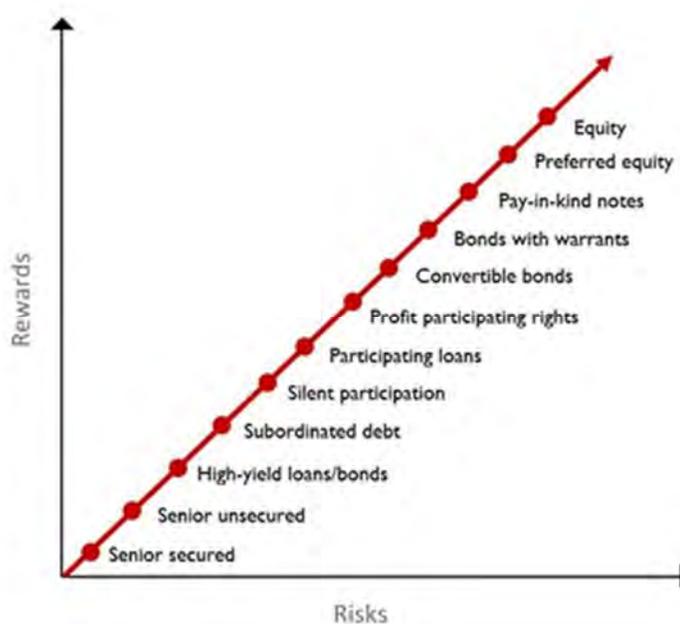
MIXED FINANCE

Mixed finance combines features of debt and equity financing and includes mezzanine financing, convertible debt, and preferred equity stock. Investors in mixed finance instruments are willing to accept higher risks than bank lenders in exchange for higher potential returns. However, mixed finance investors typically accept less risk and have lower return expectations than those who only make equity investors. Different types of mixed finance vary in how asset claims and ownership are handled. Some hybrid securities are more similar to fixed-income securities, while others are more like equity investments.

Convertible loans can be used when both the company and the lender intend to convert the debt to equity at a specified future date. The equity shares may be purchased at the future market price, a discounted price, or a price capped in the loan agreement.

Convertible loans are typically for early-stage financing of a company. This may be more advantageous to the company

FIGURE A-2. Risk and Reward Profiles of Different Types of Financing



Source: Nijs (2013).

than an earlier sale of equity shares because its shares may be worth more in the future and its ownership will be diluted less during the early growth period. In addition, legal fees and other transaction costs may be lower for convertible loans than private or public equity shares. **Warrants** are a type of convertible loan that includes options to purchase shares in a future stock issuance.

A **convertible bond** is a tradable security that gives the holder the right to convert the bond to equity shares at certain times during the bond's life, usually at the discretion of the bond owner. Convertible bonds are a flexible financing option for companies with high risks and high potential rewards for investors.

MEZZANINE FINANCING IS A TYPE OF MIXED FINANCE THAT GIVES THE LENDER THE RIGHT TO CONVERT A LOAN TO AN EQUITY INTEREST IN THE COMPANY IF THE LOAN IS IN DEFAULT. MEZZANINE LOANS HAVE A LOWER REPAYMENT PRIORITY THAN SENIOR LOANS, BUT A HIGHER REPAYMENT PRIORITY THAN EQUITY INVESTMENTS. **FIGURE A-1. Risk and Reward Profiles of Different Types of Financing**

Figure A-2. Global Impact Investing Network in Mid-2017
Figure A-1 compares the typical risk and reward profiles of different financing instruments ranging from senior secured debt to equity. The **Global Climate Partnership Fund** is a closed-end fund that provides mezzanine debt financing for clean energy investments (<https://www.gcpf.lu/governance.html>). It also operates a Green Lending Forum and published a green lending guide for financial institutions (Franson et al. 2018).

INVESTMENT FUNDS

Investment funds pool capital from multiple investors for a portfolio of debt and/or equity investments. These funds can reduce transaction costs and diversify risks compared to individual investments. Investment funds may make it easier for small projects to access finance. Professional managers often administer investment funds. Investment decisions are often based on established criteria such as sector, location, size, risks, projected returns, and fees. Individuals, companies, impact investors, governments, and development assistance organizations may participate in investment funds.

The public sector can take a first-loss position in a debt or equity fund to help **leverage** capital from other sources (United Nations Environment Programme 2011; Srivastava and Venugopal 2012).

Fixed income funds generally invest in tradable debt securities. **Bond funds** are often classified by their maturity (short-, medium-, or long-term), geographic location of investments, and the type of bond (e.g., corporate, municipal, or project). Some fixed income funds only invest in green bonds. **Junk bond funds** seek higher returns by investing in higher risk tradable debt securities. **Private debt funds** invest in unlisted debt securities.

Equity funds pool capital to buy shares in a portfolio of companies. Equity funds seek dividends and capital gains and aim to achieve higher returns than debt funds to compensate for the higher risks (Srivastava and Venugopal 2012). Public sector entities may be allowed to invest in equity funds even where there are restrictions on direct public investment in the equity of a private company. Some funds invest in a mix of debt and equity or hybrid instruments such as mezzanine financing.

A **private equity fund** invests in a portfolio of unlisted equity shares of companies. Due to the relatively high risk and regulatory restrictions, private equity funds usually have high capital requirements that limit investors to institutions and high net worth individuals. The public sector can invest in these funds to provide equity capital to a portfolio of green investments to help attract private sector investors by reducing risks (Patel 2011; Frisari et al. 2013).

Specialized funds focus on a specific sector, type of investment, or geographic area. There are specialized investment funds for infrastructure, energy, and developing markets, regions, and countries.

Socially responsible investment (SRI) funds invest in businesses that have adopted social and environmental standards or are not involved in production or sale of harmful products (such as tobacco or alcohol).

Yieldcos are companies with publicly traded stock that is structured to provide predictable cash flows through consistent dividends to shareholders. Yieldcos are often spun off by a parent company that may retain majority ownership. The parent companies obtain additional capital by selling the minority shares. They are similar to real estate investment trusts. Yieldcos have been issued for renewable energy and other infrastructure assets.

A **fund of funds** invests in multiple investment funds for greater diversification. The Global Energy Efficiency and Renewable Energy Fund is an example of a fund of funds that blends public and private sector investments. It invests in private equity funds that specialize in CE investments in emerging markets (<https://geeref.com/>).

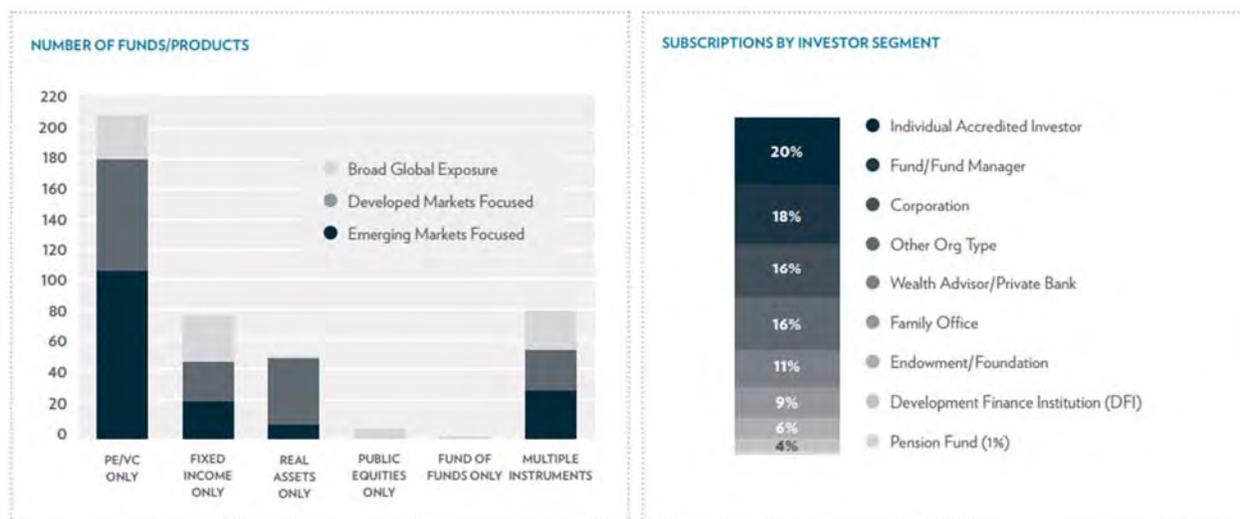
Impact investment refers to financing intended to generate positive social and environmental impacts along with a financial return. Impact investors vary in their interest in different asset classes and locations of investments and expectations for social and environmental impacts, financial returns, and requirements for impact measurement and reporting.

The **Global Impact Investing Network (GIIN)** convenes impact investors to exchange knowledge, highlight innovative approaches, build an evidence base, and provide tools and resources. It maintains an ImpactBase databased for impact investors and funds and regularly surveys interest investors.

IMPACT INVESTORS HAVE PROVIDED CAPITAL FOR SUSTAINABLE AGRICULTURE, RENEWABLE ENERGY, CONSERVATION AND PROVIDE AFFORDABLE AND ACCESSIBLE SERVICES FOR HOUSING, HEALTHCARE AND EDUCATION. FIGURE A-2. Global Impact Investing Network in Mid-2017

Figure A-2 shows the number and type of funds or products for impact investors and the types of countries they exposure financed in mid-2017 and the share of financing by type of impact investor.

FIGURE A-5. Global Impact Investing Network in Mid-2017



Source: <https://thegiin.org/impact-investing/need-to-know/#who-is-making-impact-investments>

Risk Mitigants

Risk mitigants (de-risking instruments) reduce or share investment risks to improve the risk-reward profile for investors or providers of external financing. Risk mitigants can help convince

companies, banks and investment funds to provide capital for clean energy, sustainable landscapes, or climate adaptation. Some of these investments might not have been made without risk mitigants. In other cases, risk mitigants may have allowed financing available on more favorable terms.

Risk mitigants can reduce the exposure of a business to currency fluctuations, political or weather risks, or delays associated with construction or operations. Private companies provide risk mitigants on a for-profit basis. Public institutions offer risk mitigants to achieve their development objectives and may charge a fee that covers some or all of the costs or no fee at all.

Loan guarantees are third-party arrangements that cover part of a financial institution's risk that borrowers will default. To reduce the risks to the guarantor, **portfolio guarantees** are based on the overall losses from a specific lending program. Most loan guarantees only cover only part of the losses in a loan portfolio, typically no more than 50-80 percent. A 100 percent guarantee would provide the lenders with no incentive to conduct careful due diligence or expend financial resources on good loan collection practices (a problem economists call **moral hazard**). Some loan guarantees are limited to the incremental risks that a bank incurs in lending to a particular sector or client group above its average loan loss rate. Guarantees may also be available to help protect private lenders against government defaults on commercial debt. Banks may have to pay fees for guarantees. Development assistance organizations can subsidize guarantee fees but, even unsubsidized guarantees benefit banks by smoothing out the impacts on their cash flows.

Political risk guarantees and insurance can provide some protection to businesses. Political risk guarantees can protect investors against repayment defaults associated with governmental breach of contract, currency inconvertibility, wars, and major regulatory actions with macroeconomic impacts. Political risk guarantees are particularly important in increasing private sector investment in developing countries. The United States Development Finance Corporation, the successor to the Overseas Private Investment Corporation (OPIC), offers political risk guarantees on a fee basis to businesses in developing countries, whether or not they have any U.S. ownership. The World Bank's Multilateral Investment Guarantee Agency (MIGA) offers political risk guarantees with partner government approval.

Insurance protects purchasers against specific risks listed in the policy. Insurance is highly customizable, but can be costly. Common policies exclude some risks to keep the costs lower. To reduce costs and moral hazard, insurers usually cover only a portion of the potential losses and impose payout ceilings and deductibles. Insurance companies diversify risks across their various types of policyholders in different locations and invest the premiums to earn additional returns. Insurance may be provided by for-profit companies or government programs. Private insurance premiums reflect full actuarial risks, administrative costs and a profit margin. Governments or development assistance organizations may subsidize insurance providers or customers. Governments often self-insure to avoid the costs of buying insurance because they are large enough to pool the risks and cover the damage themselves without paying the administrative costs and profit margins of insurance companies.

- **Reinsurance.** Insurance companies frequently reduce their maximum risk exposure by contracting with other companies for insurance on the insurance policies they have issued. Reinsurance policies allow the risks to be diversified further and pooled at a larger scale. Reinsurance reduces the probability that an insurer will have to pay out a large share of its assets as a result of catastrophic events. By distributing the risk, an individual insurance company can provide coverage for clients that would be too risky for one company to cover (World Bank 2011; Cummins and Mahul 2009).
- **Standard insurance for weather-related losses** covers actual damage costs from specified weather events. It can be customized to meet specific needs, but, it may not be available or affordable for many companies or households in developing countries. Insurance premiums are based on historical experience and models of future changes. It can be difficult to set viable insurance premiums for climate risks with a high and increasing probability of occurrence. Standard insurance is based on the insurer's verification of damage claims damage (*adjustment process*). The

administrative costs of the adjustment process can be high and there are often disputes between the insurer and its clients (World Bank 2011; Poole 2014).

Parametric insurance provides specified payments when agreed triggers are breached. Weather-indexed insurance is a type of parametric insurance based on available local weather records. Parametric insurance payouts are not based on estimates of the actual damages incurred by each policyholder. This eliminates the costly insurance adjustment process and allows faster payments to the policyholders. Parametric insurance can reduce the losses that farmers face from severe floods, droughts, and extreme temperatures. It can also reduce the cashflow shortfalls of renewable electric power producers from insufficient hydropower, wind power, or solar energy resources.

- **Micro-insurance (inclusive insurance)** provides low-income populations in developing countries with limited protection against specific hazards. The premium costs are kept low for affordability, but depend on the types of hazards covered and their likelihood. The payouts are also relatively low. Microinsurance can cover various risks such as illness, death, and property or crop loss (Mills 2013; World Bank 2011). It may be a feasible add-on service for microfinance institutions to offer to their clients. Development assistance organizations may subsidize the cost.

Swaps are financial contracts that can be bought or sold to protect against specific price risks or profit from correct anticipation of future market conditions. Swaps are commonly used to hedge against changes in currency exchange rates, interest rates, or prices of key inputs or products. Swaps can also protect companies of financial institutions from credit defaults. Swaps can be customized based on perceived risk and risk-tolerance preferences and combined with other financing instruments. However, swaps may not be readily available in some developing countries or may be too costly or risky for many potential users.

- **Currency swaps (foreign exchange swaps)** Buyers and sellers contract to convert one currency to another at an agreed exchange rate on a specific date regardless of changes in the market rate. Currency swaps can protect against changes in the costs of imported inputs, the revenues from exported products, or foreign-currency denominated loans.
- **Interest rate swaps** can sometimes help an existing borrower with a variable interest rate loan or a continuing need to borrow money over an agreed time period. Interest rate swaps can be denominated in domestic or a foreign currency.
- **Commodity swaps** are contracts that hedge against fluctuations in market prices by setting a fixed price at a specified, future time irrespective of the market value. Puts provide the right to sell something at a specific price and time. **Calls** offer the right to buy something at a specific price and time.
- **Credit default swaps (CDSs)** are the most common types of derivatives. They are designed to transfer the credit risk of a bond or structured financial product from the seller to the buyer until the maturity date of the contract. If the debt issuer defaults, the swap seller will pay the buyer the value of the security plus accumulated interest payments until the security's maturity date.

TRANSACTION ENHANCEMENTS

Transaction enhancements create a more attractive investment environment for public or private sector investments. They reduce the risks of specific transactions through financial or technical assistance. Development assistance organizations or developing country governments generally bear the costs of the various types of transaction investments.

- **Seed capital** is a relatively small equity contribution to start or expand a business or investment fund. Seed capital can be helpful in raising larger amounts of capital from other sources.
- **Cornerstone stakes** are relatively large capital positions in an early-stage company or investment

fund. Since a cornerstone stake demonstrates investor confidence, it can help the company or fund attract additional financing.

- **Grants** are cash or in-kind contributions for a specific activity or entity that has potential development or environmental benefits. Most grants are non-reimbursable, but they often carry conditions on how the funds are managed and used. Common grant conditions include financial or managerial certifications, progress and financial reports, performance monitoring, audits, and sometimes evaluations. Grants can be disbursed in full upfront or in installments over a fixed time schedule or upon completion of specific milestones or performance criteria.
- **Reimbursable (contingent) grants only** require repayment if the activity achieves specified conditions of success, such as obtaining external financing. Reimbursable grants are less risky for recipients than loans since repayment is not expected if the intended results are not achieved. They may also be less costly than loans because interest is often not charged on the unpaid balances.
- **Cooperative agreements** are similar to grants, but include substantial involvement by the grant-making organization to help achieve mutually agreed objectives.
- **Nonfinancial assistance** includes policy and regulatory advocacy and capacity development services such as training; technical and managerial assistance for market studies, business plans, identification of financing sources, and preparation of financing applications; and effective implementation, monitoring, reporting, and information dissemination.

PAY-FOR-RESULTS FINANCING

Camp and Fernandez (2017) described various types of **pay-for-results financing** (also called **payment by results**, **results-based financing**, and **cash-on-delivery aid**) and the advantages and disadvantages of this approach in development assistance. Under this approach, development assistance organizations only make payments after outcome targets are achieved. There may be no payments for efforts or the cost of inputs, full payment for achievement of all outcomes, partial payment for achievement of some outcomes, or a mix of cost- and performance-based reimbursement (**incentive payments**). The World Bank, U.K. Department for International Development (DFID), Swedish International Development Agency, the Millennium Challenge Corporation, and impact investors have experimented with this approach. Pay-for-results financing can be implemented through contracts, grants, prizes, bonds, advance market commitments, or conditional cash transfers, and social impact bonds:

- **Performance-based contracts or grants** offer specified payments for predetermined results. **Pure performance-based awards** provide no payment if the intended results are not achieved. A **hybrid model** includes a mix of cost and performance payments.
- **Prizes** are financial rewards given for innovative approaches or desired results. They may be offered through an open competitive process or a limited competition after an initial, competitive round. The implementer bears the initial costs and risks.
- **Social impact bonds** allow governments, development assistance organizations, or private impact investors to only repay the capital provider and/or implementers bear the performance risks.
- **Advance market commitments** are agreements to purchase a specified volume of a product or service over a stated period at a specified price, guaranteed minimum price, or price formula. This model reduces market risks and uncertainty for suppliers.
- **Conditional cash transfers (social payments)** are cash payments given to households or communities that meet performance metrics.

- **Social impact bonds (development impact bonds)** are issued by the public sector or development assistance organizations to promote activities that are expected to produce specific social development benefits. They provide implementers with a greater incentive for success and can reduce the costs to governments or development assistance organizations. (International Finance Corporation and Kellogg 2014). This approach relies on upfront capital providers and/or service providers who are only repaid their costs plus success premiums if the expected impacts or cost savings are achieved.

OTHER TERMS

- **Additionality:** Increase in the amount of financing over what would have been available from other sources.
- **Blended finance:** The use of international or public sector financing to leverage private sector financing.
- **Capital stack:** A mix of different financing types or sources.
- **Transaction costs** are the costs that recipients and providers have to cover to arrange and administer debt or equity financing.
- **Deal facilitation** refers to various approaches to reducing the transaction costs of financing.

ANNEX B. ADVANTAGES AND DISADVANTAGES OF VARIOUS FINANCIAL INSTRUMENTS

Annex B contains a series of tables that present the advantages and disadvantages of various financial instruments: 1) loans, 2) tradable debt securities, 3) equity investments, 4) mixed finance, 5) investment funds, 6) risk mitigants, and 7) transaction enhancements.

TABLE B-1. ADVANTAGES AND DISADVANTAGES OF VARIOUS LOAN INSTRUMENTS

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Loans	X	X	X	<ul style="list-style-type: none"> • Relatively simple, debt financing and less costly than external equity • Diverse loan sizes, tenors (repayment periods), and grace periods may be available, but loan tenor may not be long enough for clean energy, sustainable landscape, and adaptation investments • Loan proceeds can be provided in full upfront, but are often disbursed in a series of payments over time (tranches) that may be tied to meeting loan conditions. • Allows borrowers to retain control of management and business profits for larger upside returns • Primary source of finance for small and micro-enterprises and growth stage companies • Used for fixed capital or working capital or supplier credit to customers 	<ul style="list-style-type: none"> • Borrowers in developing countries may have to pledge recoverable collateral worth more than the loan amount • Repayment schedules may begin soon after proceeds are disbursed (unless there is a grace period), so rapid investment returns may be needed • Commercial banks may be reluctant to lend in countries with high repayment risks or inflation rates • Commercial banks may be reluctant to provide loans for new technologies or business models that lack an extensive credit history • Commercial banks often find consumer lending and credit card operations more profitable than business or farm loans • Commercial banks may be reluctant to provide long-term loans, except for mortgages

TABLE B-1. Advantages and Disadvantages of Various Loan Instruments (Continued)

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Senior Loans	X	X	X	<ul style="list-style-type: none"> • May have lower loan collection costs and risk for lenders because borrowers required to repay before subordinated loans • Can reduce financing barriers for companies or investments that might otherwise be perceived as too risky • Easier for companies to obtain if they have a low debt-to-equity ratio • May have lower loan appraisal and due diligence costs for lenders • Can reduce interest rates for borrowers due to lower lender risks and costs • Can help demonstrate creditworthiness to increase access to subordinated loans 	<ul style="list-style-type: none"> • Can be less profitable for lenders due to lower interest rates • Banks might not offer borrowers better terms for senior loans
Subordinated (Junior) Loans	X	X	X	<ul style="list-style-type: none"> • Can attract investors with different risk and return expectations • Can be more profitable for lenders since higher interest rates can be charged • Important source of finance for companies in scale-up stage • Less costly than external equity 	<ul style="list-style-type: none"> • May have higher loan appraisal and due diligence costs for lenders • Higher risk for lenders since borrowers repay senior loans first • May increase administrative costs for collection of loan repayments • Higher interest rates for borrowers due to greater lender risks and costs • Some banks may be unwilling to provide subordinated loans • May be more difficult for companies to obtain if they have a high debt-to-equity ratio • May increase systemic risks in financial system if ethical standards are low

TABLE B-1. Advantages and Disadvantages of Various Loan Instruments (Continued)

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Concessional Loans	X	X	X	<ul style="list-style-type: none"> • Lower interest rates or fees for borrowers • Loan administration can be tailored to reduce transaction costs for lenders and borrowers • May offer easier access to credit • Longer loan tenors and grace periods may make more CE, SL, and AD investments viable • Can demonstrate the ability of borrowers without sufficient credit history to repay a loan • Can be useful at any stage of company's growth 	<ul style="list-style-type: none"> • More difficult to scale up • Due to limited availability, may be rationed through political or personal favoritism or corruption • Unsustainable after donor or government support stops due to decapitalization from capital costs, administrative costs, defaults, and inflation • May displace commercial lending • Actual or potential availability can deter or delay borrowing on commercial terms (displacement)
Green Credit Windows	X	X	X	<ul style="list-style-type: none"> • Development assistance organizations and impact investors may be willing to provide capital for green loans • May encourage commercial bank lending for specific purposes or types of clients • Can be on market or concessional terms • May be combined with capacity development to help banks begin or expand green lending 	<ul style="list-style-type: none"> • Banks may need capacity development support for understanding green lending markets, business models, selection criteria, and risks • Banks may need to develop new standard or customized loan products • Development assistance organizations or banks may have to carry out special outreach efforts to reach green lending goals
Contingent Credit Lines		X		<ul style="list-style-type: none"> • Can help governments or companies access capital quickly or on more favorable terms in the event of natural disasters or economic or business disruptions • Development assistance organizations or government development banks may provide lending capital • Can increase the efficiency and effectiveness of planning and implementation for responses to disasters and economic or business disruptions • Banks have a financial interest in reducing default and arrears rates from existing loan clients • Can help banks maintain good relationships for future clients 	<ul style="list-style-type: none"> • Governments and companies may rely on contingent credit lines instead of less costly alternatives, such as budget reserves or insurance • May be difficult for governments and companies to repay contingent loans if disasters or economic or business disruptions are severe

TABLE B-2. Advantages and Disadvantages of Various Tradable Debt Securities

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Asset-Backed Securities (Securitization)	X	X	X	<ul style="list-style-type: none"> • Can reduce transaction costs and risks of financing small investments by aggregating them • Can open access to new sources of capital by allowing institutional investors to make investments matching their desired risk and reward profiles • Can increase bank liquidity for re-lending • May allow banks to improve loan terms 	<ul style="list-style-type: none"> • Large volume of asset-backed securities is needed • Mature markets are needed to assess risks and price the securities • May be difficult to arrange in some developing countries Small banks may lack a sufficient volume of green assets for securitization
Bonds	X	X	X	<ul style="list-style-type: none"> • Can attract large amounts of new capital • Suitable for financing long-term infrastructure • Can have risk mitigants or credit enhancements to be more attractive to investors 	<ul style="list-style-type: none"> • Investors require higher yields on higher risk bonds • May only be feasible for approximately \$80-100 million or more • Complex and lengthy issuance process • Some developing countries have limited markets for domestic currency bonds • Foreign currency bonds may have higher risks • Bond issuers may require good credit ratings or external guarantees • Bond portfolio managers and investors may have limited expertise or interest in CE, SL, or AD investments
Catastrophe Bonds		X		<ul style="list-style-type: none"> • Insurance-linked security with specified triggers for natural catastrophes • Helps insurance companies or governments share risks Typically medium term (three years) 	<ul style="list-style-type: none"> • Risky investments may have a high interest rate • Can reduce incentives for investments in disaster risk reduction and climate adaptation
Corporate Bonds	X	X	X	<ul style="list-style-type: none"> • Can be less risky than a government bond in a developing country 	<ul style="list-style-type: none"> • Can be riskier than a government bond in a developing country

TABLE B-2. Advantages and Disadvantages of Various Tradable Debt Securities (Continued)

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Covered Bonds	X	X		<ul style="list-style-type: none"> • Large investor interest, mainly in developed countries • Less risky due to dual recourse structure • Reduced risk may allow lower coupon yields • Government policies can encourage use to increase lending in priority areas • Disclosure standards provide incentives for transparent cover assets 	<ul style="list-style-type: none"> • Not used in many developing countries • Legislation may be needed to allow or encourage • Issuing bank is responsible for paying out the guarantees and any risks in covered asset values
Government Bonds	X	X	X	<ul style="list-style-type: none"> • Allow governments to make large capital investments and smooth expenditures based on future revenues • Can provide medium- or long-term financing • Potential source of foreign exchange for imports • Relatively low risk to investors if issued by a fiscally responsible government with a sovereign credit guarantee • Coupon yield may be lower if there is a sovereign guarantee and good liquidity on secondary markets 	<ul style="list-style-type: none"> • Some developing country governments lack good credit ratings needed for easily marketable bonds • Payments may be costly if denominated in foreign currency
Green Bonds	X	X	X	<ul style="list-style-type: none"> • Can provide substantial capital y • May become more attractive to investors as green bond market matures • Market is growing rapidly, at least for CE bonds 	<ul style="list-style-type: none"> • Market is limited for SL and AD investments • Only feasible for approximately \$80-\$100 million or more • Governments or multilateral development banks may need to aggregate and warehouse loans or equity investments to reach minimum viable volume • Limited pipeline of green investments ready for financing • Market does not generally offer an interest rate advantage • Risk of greenwashing if good environmental guidelines are not followed • Measurement, reporting, and verification of impact of proceeds are complex and costly

TABLE B-2. Advantages and Disadvantages of Various Tradable Debt Securities (Continued)

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Project Bonds	X	X		<ul style="list-style-type: none"> Secured by project assets and cash flows, with no recourse to other borrower assets Can finance development and construction before a project generates positive cash flows 	<ul style="list-style-type: none"> Credit rating reflect supply- and demand-side risks of projects Small share of tradable debt security market Mainly available for large projects of developers with good track record May be harder to obtain in developing countries
Subnational Government Bonds	X	X	X	<ul style="list-style-type: none"> May qualify for lower coupon yields if investors receive tax exemptions for interest income Often issued in domestic currency and purchased by domestic investors 	<ul style="list-style-type: none"> Subnational governments may need a good credit rating Subnational governments may have to offer credible guarantees Some developing countries do not allow municipalities to issue bonds at all or without central government approval
Supranational Bonds	X	X	X	<ul style="list-style-type: none"> Relatively low risk due to e high credit ratings of large international institutions May have a relatively low coupon yield May allow countries to access bond markets more easily 	<ul style="list-style-type: none"> May only allow domestic currency financing

TABLE B-3. Advantages and Disadvantages of Various Equity Investments

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Own Equity	X	X	X	<ul style="list-style-type: none"> • Companies can retain management control and use capital more flexibly • Equity investors have greater upside potential profits • Companies with low debt-to-equity ratio may have easier access to loans • Does not negatively affect balance sheet and cash flows (unlike debt) 	<ul style="list-style-type: none"> • New or small companies may not have sufficient equity to get established and grow • Some owners may want to be long-term equity investors while others want to exit sooner • Owners may lose all their equity investments
Private Equity (Unlisted Stock Shares)	X	X	X	<ul style="list-style-type: none"> • Higher expected returns to investors than debt or listed stock shares • Can tailor to meet investor preferences for risks, potential returns, and involvement • Governments can provide subordinated equity (with a lower rank in claims on assets) to avoid crowding out private investors 	<ul style="list-style-type: none"> • Less liquid than listed stock shares • Often riskier for investors than listed stock shares or debt • Early-stage companies have high rates of business failure • Higher transaction costs in buying or selling unlisted shares than listed shares • Most equity investors are not interested in lower returns on green investments • May be difficult to obtain in developing countries with high political or macroeconomic risks • May be legal restrictions on public sector equity investments • Potential for conflicts of interest from public sector role in private company management
Listed Stock Shares	X	X	X	<ul style="list-style-type: none"> • Lower transaction costs in buying listed stock shares than unlisted shares • More liquid than unlisted shares since they can be sold on public markets • Can offer higher, longer-term returns than loans or bonds • Markets provide useful information about a company to other potential investors 	<ul style="list-style-type: none"> • Transparency requirements for companies in listing and reporting • Listed stock shares are riskier for investors than debt since dividends and capital gain distributions only provided after debt repayments • Value may vary a lot with general stock market and macroeconomic and political conditions

TABLE B-4. Advantages and Disadvantages of Various Mixed Financing

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Mezzanine Financing	X	X	X	<ul style="list-style-type: none"> • Can increase the amount of financing available to a company • May be less costly for companies than pure equity financing if business is successful • Equity owners can maintain control of their companies • Unsecured financing that does not require liquid collateral 	<ul style="list-style-type: none"> • Rarely used in CE, SL, or AD financing • May carry a higher interest rate than senior debt • May have a shorter loan tenor than senior debt
Convertible Debt	X	X	X	<ul style="list-style-type: none"> • May be less costly for companies than pure equity financing if business is successful • May allow companies to obtain a loan at a lower interest rate due to the convertibility • Can allow companies to reduce dilution of their shares by deferring issuance of new shares until value increases 	<ul style="list-style-type: none"> • Lower initial borrowing costs disappear as debt is converted to equity

TABLE B-5. Advantages and Disadvantages of Types of Various Investment Funds

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Debt Funds	X	X	X	<ul style="list-style-type: none"> • Can attract additional capital from new and existing sources • Can diversify risks and reduce transaction costs for investors • Can increase liquidity if publicly tradable securities • Potential for capital gains if market interest rates fall • Green bond funds have been successful in scaling up CE financing 	<ul style="list-style-type: none"> • Regulatory restrictions • Limited international and domestic markets for debt funds in some countries, especially if weak domestic currency, high inflation, or political instability • Risk of capital losses if market interest rates rise • Few examples of green bonds for SL and AD investments
Equity Funds	X	X	X	<ul style="list-style-type: none"> • Can attract additional capital from new and existing sources • Can diversify risks and reduce transaction costs for investors • Can increase liquidity if listed stock shares • May allow public sector entities to make equity investments in private companies 	<ul style="list-style-type: none"> • Typically higher management fees and risks than debt funds • Difficult to finance activities that do not generate revenues
Private Equity Funds	X	X	X	<ul style="list-style-type: none"> • Can finance startups, early-stage companies, small companies, new products, and turnarounds (special situations) • Potential for high returns • Can diversify risks 	<ul style="list-style-type: none"> • High-risk investments • May have large minimum investment amounts • May not be a prudent investment for institutional investors with strict fiduciary responsibilities
Venture Capital Funds	X	X	X	<ul style="list-style-type: none"> • Can finance startups, early-stage companies, small companies, new products, and turnarounds (special situations) • Potential for high returns • Can finance proof-of-concept operations 	<ul style="list-style-type: none"> • High-risk investments • May have large minimum investment amounts • May not be a prudent investment for institutional investors with strict fiduciary responsibilities

TABLE B-5. Advantages and Disadvantages of Types of Various Investment Funds (Continued)

Type	Applicability			Advantages	Disadvantages
	CE	AD	SL		
Socially Responsible Investment Funds	X	X	X	<ul style="list-style-type: none"> • Some investors are willing to accept lower financial returns on socially responsible investments • Companies that meeting social responsibility standards may be more profitable over the long run 	<ul style="list-style-type: none"> • Many investors unwilling to accept substantially lower returns for socially responsible investments
Yieldcos	X	X	X	<ul style="list-style-type: none"> • Have been successful in scaling up RE financing • Can provide a steady dividend yield • Potential for moderate capital gains 	<ul style="list-style-type: none"> • Lower expected returns than equity investments • Risks of capital losses as interest rates rise or concerns grow about the sector • Concerns about self-dealing by parent company can affect market prices • Portfolio quality may decline as scale of financing increases
Fund of Funds	X	X	X	<ul style="list-style-type: none"> • Can diversify equity investments to reduce risks • Can focus on a particular sector or geographic location • Can attract new sources of financing to scale up investment 	<ul style="list-style-type: none"> • Too much diversification can reduce investment returns • Additional layer of administrative costs • Transaction costs and profits extracted

TABLE B-6. Advantages and Disadvantages of Various Types of Risk Mitigants

Type	Applicable for			Advantages	Disadvantages
	CE	AD	SL		
Loan Guarantees and Political or Economic Risk Guarantees	X	X	X	<ul style="list-style-type: none"> • Can expand capital for private investments by increasing willingness of lenders and equity investors to finance high-risk investments • Can target specific risks that deter private sector investment, including political and macroeconomic risks 	<ul style="list-style-type: none"> • Loan guarantors and banks or funds participating have to conduct proper due diligence • Guarantors may be taking on large risks that they cannot manage • Borrowers may be more inclined to default if loans are guaranteed by a development assistance organization • Development assistance organization or partner government support generally needed for loan guarantees • Bilateral aid or trade promotion agencies or multilateral development bank support is generally needed • Might not be available in high risk countries or sectors • Relatively few climate-related investments have benefited from guarantees
Standard Insurance and Reinsurance	X	X	X	<ul style="list-style-type: none"> • Market-based approach to sharing risks • If premiums are based on actuarial risks, insurance does not reduce incentives for investments to decrease climate risks • Reinsurance allows insurance companies to diversify and share risks 	<ul style="list-style-type: none"> • Insurance may be unavailable or too costly for many potential market segments in developing countries • Subsidized insurance reduces incentives for investments to decrease disaster or climate risks Insurers may lack sufficient data on climate risk probabilities and impacts
Index-based Insurance	X	X		<ul style="list-style-type: none"> • Eliminates costly and contentious process for estimating actual damages (insurance adjustment) • May allow faster payouts to policyholders than damage-based insurance • May have lower premium costs than damage-based insurance 	<ul style="list-style-type: none"> • Detailed data and complex modelling e needed to design and price policies in a changing climate • Index-based insurance payouts may cover a smaller proportion of actual damages than damage-based insurance • Transparent payment triggers needed to reduce adverse selection and moral hazard

TABLE B-6. Advantages and Disadvantages of Various Types of Risk Mitigants (Continued)

Type	Applicable for			Advantages	Disadvantages
	CE	AD	SL		
Swaps	X	X	X	<ul style="list-style-type: none"> • Can have relatively low transaction costs • Can reduce risks and improve liquidity • Can address specific risks that would deter private investment • Can limit or smooth exposure to changing external conditions and credit risks that a company cannot control 	<ul style="list-style-type: none"> • Can be costly and risky for buyers and sellers • Losses may exceed expected value of the benefits • Might not be available in some developing countries

TABLE B-7. Advantages and Disadvantages of Various Transaction Enhancements

Type	Applicability			Advantages	Disadvantages
	CE	SL	AD		
Seed Capital and Cornerstone Stakes	X	X	X	<ul style="list-style-type: none"> • Equity investors can support early business or project development before banks will provide loans • Outside investors often bring expertise and contacts 	<ul style="list-style-type: none"> • May bring in a relatively small amount of money • Initial proponents and developers may lose some managerial control to providers of cornerstone financing
Grants and Cooperative Agreements	X	X	X	<ul style="list-style-type: none"> • Can cover development and capital investment costs without imposing a requirement for reimbursement 	<ul style="list-style-type: none"> • Grant recipients might not achieve the desired development or environmental objectives • May displace commercial bank financing • Not a sustainable source of long-term funding
Reimbursable (Contingent) Grants				<ul style="list-style-type: none"> • Less risky than loans because repayment only required if specified conditions for success are achieved • Less costly than loans since interest is not usually charged 	<ul style="list-style-type: none"> • May displace commercial bank financing
Nonfinancial Assistance				<ul style="list-style-type: none"> • May be critical to successful development, financing, and implementation • Effectiveness may depend on ability to provide customized and sustained assistance 	<ul style="list-style-type: none"> • Can be difficult to demonstrate tangible, short-term impacts • Capacity gains can be reversed by staff turnover • Policy and regulatory reforms can take a long time • Free or subsidized services can displace development of sustainable, commercially viable services

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