



THE ASIAN DEVELOPMENT BANK AND THE CLIMATE INVESTMENT FUNDS Country Fact Sheets

ADB Climate Change and Disaster Risk Management Division
Second Edition

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FOREWORD

Asia and the Pacific is home to two-thirds of the world's poor and is exceptionally vulnerable to the negative impacts of climate change. At the same time, there has been a disturbing increase in the region's greenhouse gas emissions, to almost 40% of worldwide figures.

Evidently, to attain its overarching goals of reducing poverty and sustaining economic growth, we at the Asian Development Bank (ADB) must enable our developing member countries (DMCs) to mitigate climate change and assist the vulnerable population in the region in adapting to its adverse impact.

In view of this preeminent challenge facing Asia and the Pacific, the midterm review of ADB's Strategy 2020 accorded renewed emphasis to addressing environment and climate change issues and nine other major priorities that will shape ADB's operations and response leading up to the year 2020. We reaffirmed our commitment to scale up funding for climate change adaptation, and to sustain our support for clean energy, energy efficiency, and sustainable transport projects.

In our operations, we endeavor to address climate change while achieving economic growth. Recognizing the need for massive financing to spur the kind of low-carbon, climate-resilient growth to which we aspire, we have mobilized over \$3 billion for climate finance yearly. Additional innovative climate financing has come through our access to funds of the Global Environment Facility and our administration of financing from the Climate Investment Funds (CIFs). ADB's recent accreditation as an implementing entity of the Green Climate Fund should benefit climate financing for our DMCs.

Our involvement with the CIFs, our largest source of external finance (over \$1.5 billion so far), has amplified our investments in the necessary mitigation and adaptation measures for our DMCs. We administer over \$1.1 billion for 17 projects and programs under the Clean Technology Fund, \$281 million for 19 projects under the Pilot Program for Climate Resilience, \$121 million for 9 projects under the Scaling Up Renewable Energy in Low-Income Countries Program, and \$31 million for 2 projects under the Forest Investment Program. CIF resources have enabled us to sharpen our institutional knowledge and understanding of how large-scale climate financing can help developing countries adapt to, and mitigate, the impact of climate change.

In this publication, we document the steps that we have taken to provide climate financing through the CIFs, and we describe development initiatives under the various windows administered by ADB. This publication also contains highlights of projects that have been approved for our DMCs, as well as those in the pipeline. Each of these projects involves strategies for addressing the climate change-related challenges specific to the individual countries in the region.

In sum, this publication showcases ADB's commitment to a low-carbon, climate-resilient, green-growth trajectory for Asia and the Pacific, as our contribution to a better future for this planet.



Ma. Carmela D. Locsin
Director General
Sustainable Development and Climate Change Department

Total CIF FUNDING for ADB DMCs

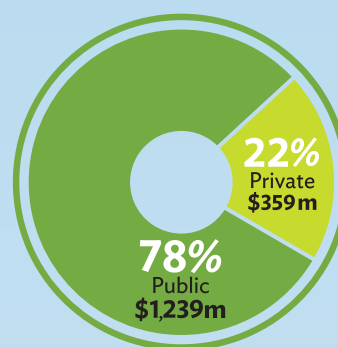
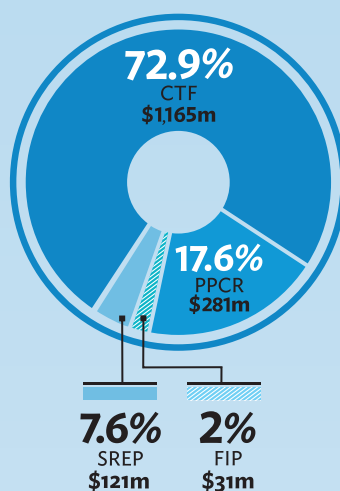
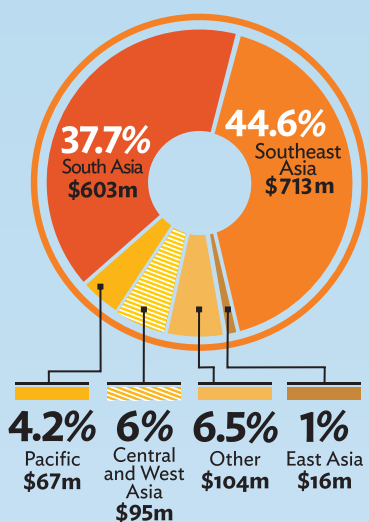
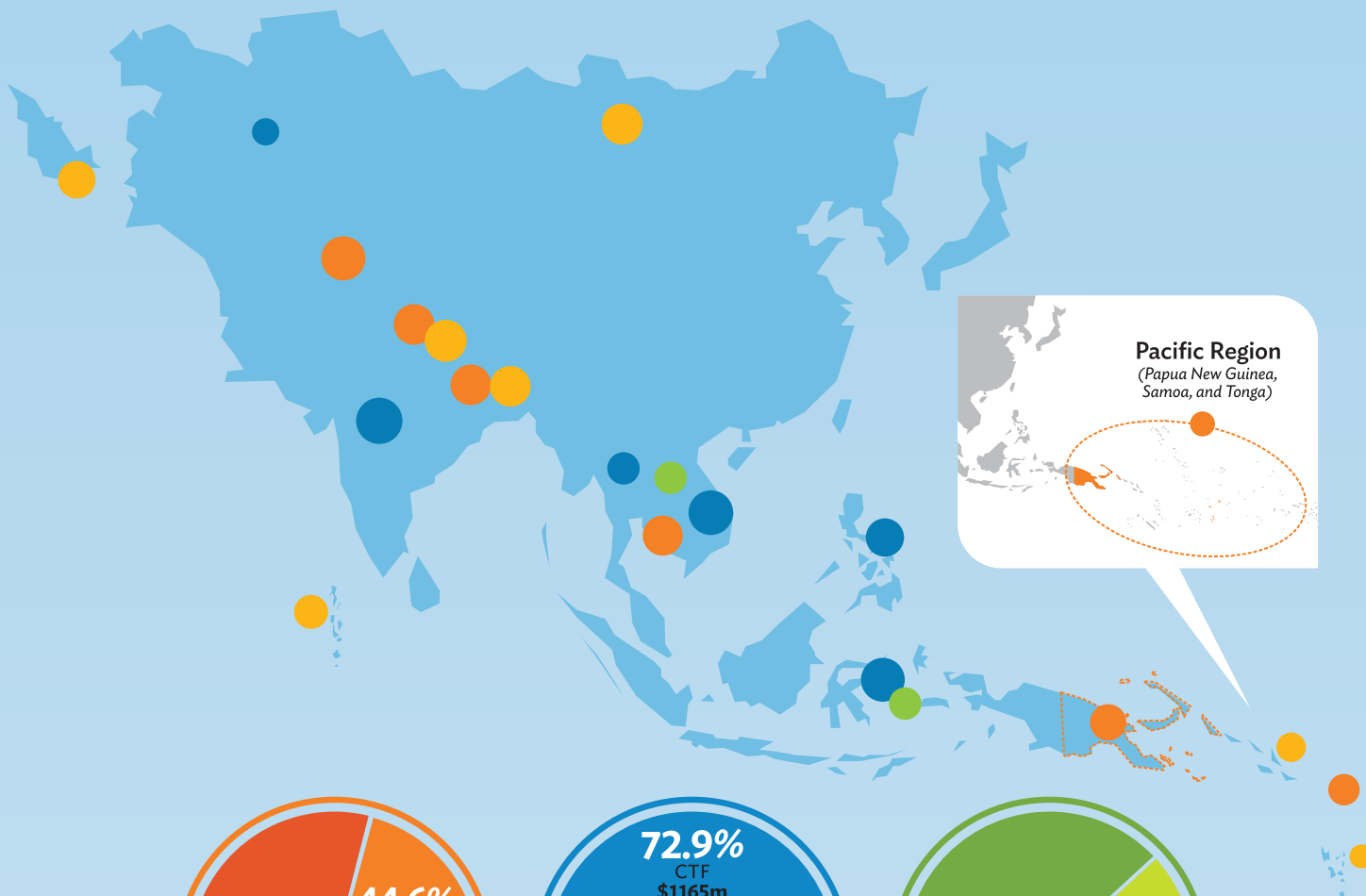
\$3.3 billion

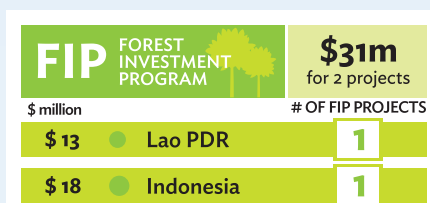
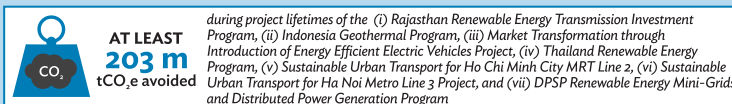
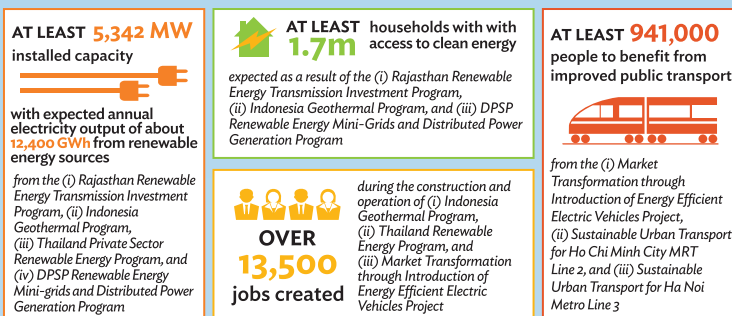
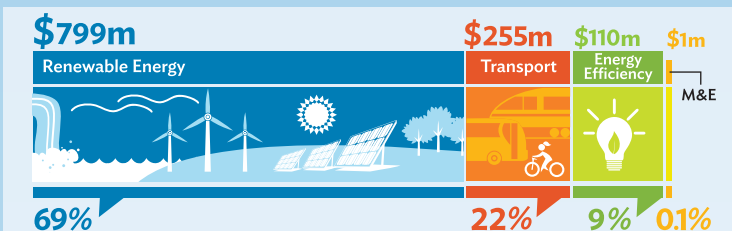
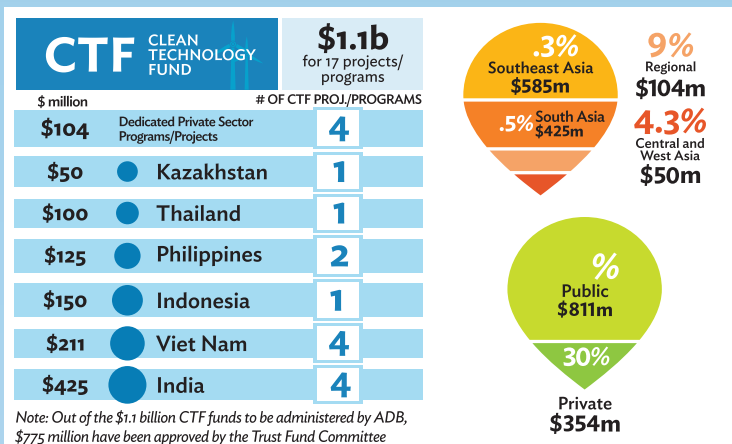
\$1.5 billion

48%

Total CIF
FUNDING
administered
by ADB

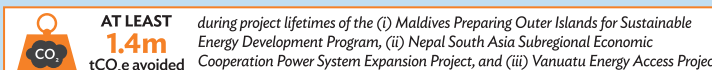
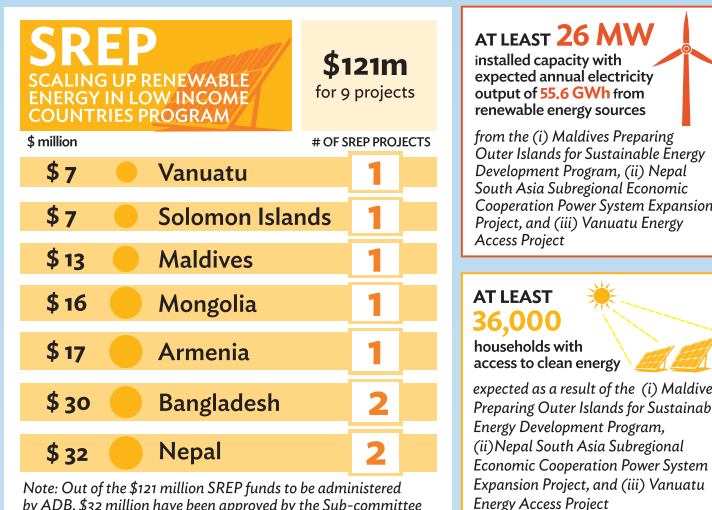
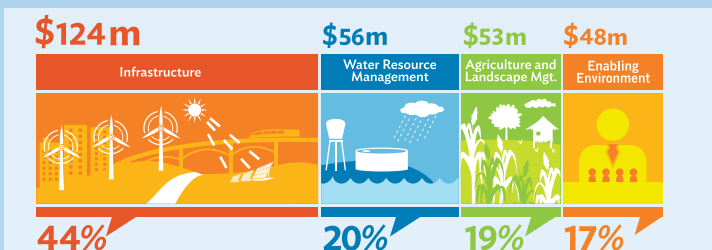
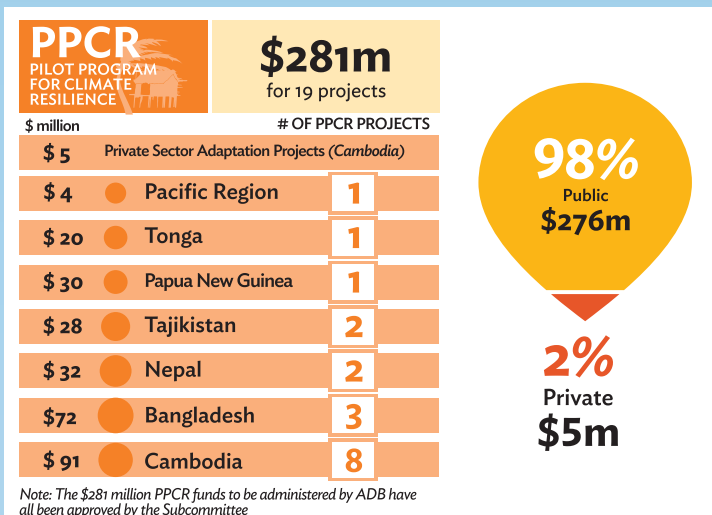
Note: Out of the \$1.5 billion ADB CIF Portfolio, total project funds approved to date amount to \$1.08 billion (68%)





FOREST INVESTMENT PROGRAM

FIP supports developing country efforts to reduce deforestation and forest degradation and promote sustainable forest management that leads to emissions reductions and enhancement of forest carbon stocks (REDD+). Two of the eight FIP pilot countries are Indonesia and the Lao PDR, where ADB will administer projects under the approved investment plans.



ABBREVIATIONS

ACP	Asia Climate Partners
ADB	Asian Development Bank
CIF	Climate Investment Fund
CTF	Clean Technology Fund
DMC	developing member country
DPSP	Dedicated Private Sector Program (under the Clean Technology Fund)
EBRD	European Bank for Reconstruction and Development
EEEV	energy-efficient electric vehicle
FIP	Forest Investment Program
GHG	greenhouse gas
GMS	Greater Mekong Subregion
IBRD	International Bank for Reconstruction and Development
IEE	initial environmental examination
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IKM	information and knowledge management
KfW	(Originally) Kreditanstalt für Wiederaufbau (the German government-owned development bank)
Lao PDR	Lao People's Democratic Republic
MDB	multilateral development bank
MRT	mass rapid transit
MtCO ₂ e	million metric tons of carbon dioxide equivalent
NGO	nongovernment organization
PLN	Perusahaan Listrik Negara (Indonesian state-owned power company)
PNG	Papua New Guinea
PPA	power purchase agreement
PPCR	Pilot Program for Climate Resilience
PV	photovoltaic
REDD	reducing emissions from deforestation and forest degradation

REDD+	REDD plus conservation and sustainable management of forests, and enhancement of forest carbon stocks
SCF	Strategic Climate Fund
SPCR	Strategic Program for Climate Resilience
SREP	Scaling Up Renewable Energy Program in Low-Income Countries
TA	technical assistance

WEIGHTS AND MEASURES

GW	gigawatt
GWh	gigawatt-hour
km	kilometer
MtCO ₂ e	million metric tons of carbon dioxide equivalent
MW	megawatt
MWh	megawatt-hour
tCO ₂ e	metric tons of carbon dioxide equivalent

BACKGROUND

The Climate Investment Funds (CIFs) were established in 2008 to support developing countries in their transition onto a low-carbon, climate-resilient economic growth path. The CIFs are pools of financial resources that enable developing countries to invest in initiatives that (i) reduce greenhouse gas (GHG) emissions, (ii) mitigate the negative impact of climate change, or (iii) allow the countries to adapt to that impact. Funds sourced from government, multilateral development banks (MDBs), and the private sector augment and leverage the financial resources pledged to the CIFs by donors.

The CIFs comprise two distinct pools of financial resources that are held in trust until they are deployed: (i) the Clean Technology Fund (CTF), and (ii) the Strategic Climate Fund (SCF).

The CTF finances pilot-testing initiatives that demonstrate, deploy, or transfer low-carbon technologies to recipient developing countries. The SCF, on the other hand, finances country development initiatives that meet the funding criteria for one or more of three separate but related subprograms: (i) the Pilot Program for Climate Resilience (PPCR), (ii) the Scaling Up Renewable Energy Program in Low-Income Countries (SREP), and (iii) the Forest Investment Program (FIP).

The Asian Development Bank (ADB) is participating in 22 investment plans for 18 developing member countries (DMCs), a regional investment plan for the Pacific (PPCR) and a regional mini-grid program under the CTF Dedicated Private Sector Program (DPSP), and other projects in Cambodia under the PPCR Private Sector Set-Asides. ADB is administering over \$1.5 billion in funding for 47 projects and programs now operating across Asia and the Pacific.

Investment plans and projects in Southeast Asia receive 44.6% of ADB-administered CIF funding; South Asia, 37.7%; Central and West Asia, 6%; the Pacific, 4.2%; and East Asia, 1%. The remaining 6.5% goes to regional programs. Over three-quarters of CIF projects (78%) are in the public sector, and 22% are in the private sector.

CTF initiatives account for 73% (\$1.2 billion) of ADB's total CIF portfolio. A majority of these CTF projects (69% of all ADB-administered CTF projects) are in renewable energy—mostly solar, some geothermal, and one involving a mix of renewables. The rest of the projects are in the energy efficiency and sustainable transport categories.

Southeast Asia receives about 50% (\$585 million) of ADB's CTF funding; South Asia, 36.5% (\$425 million); Central and West Asia, 4.3% (\$50 million); and regional programs, 9% (\$104 million). India is on top of the list of recipient countries, followed by Viet Nam, Indonesia, the Philippines, Thailand, and Kazakhstan.

Among the SCF initiatives, PPCR projects make up 18% (\$281 million) of ADB-administered CIF funding. Most of the PPCR funding (44%) is for infrastructure; the rest are intended for countries that need help with water resources management, environmental conservation (through institutional capacity building and policy and regulatory improvements), and agriculture and land management.

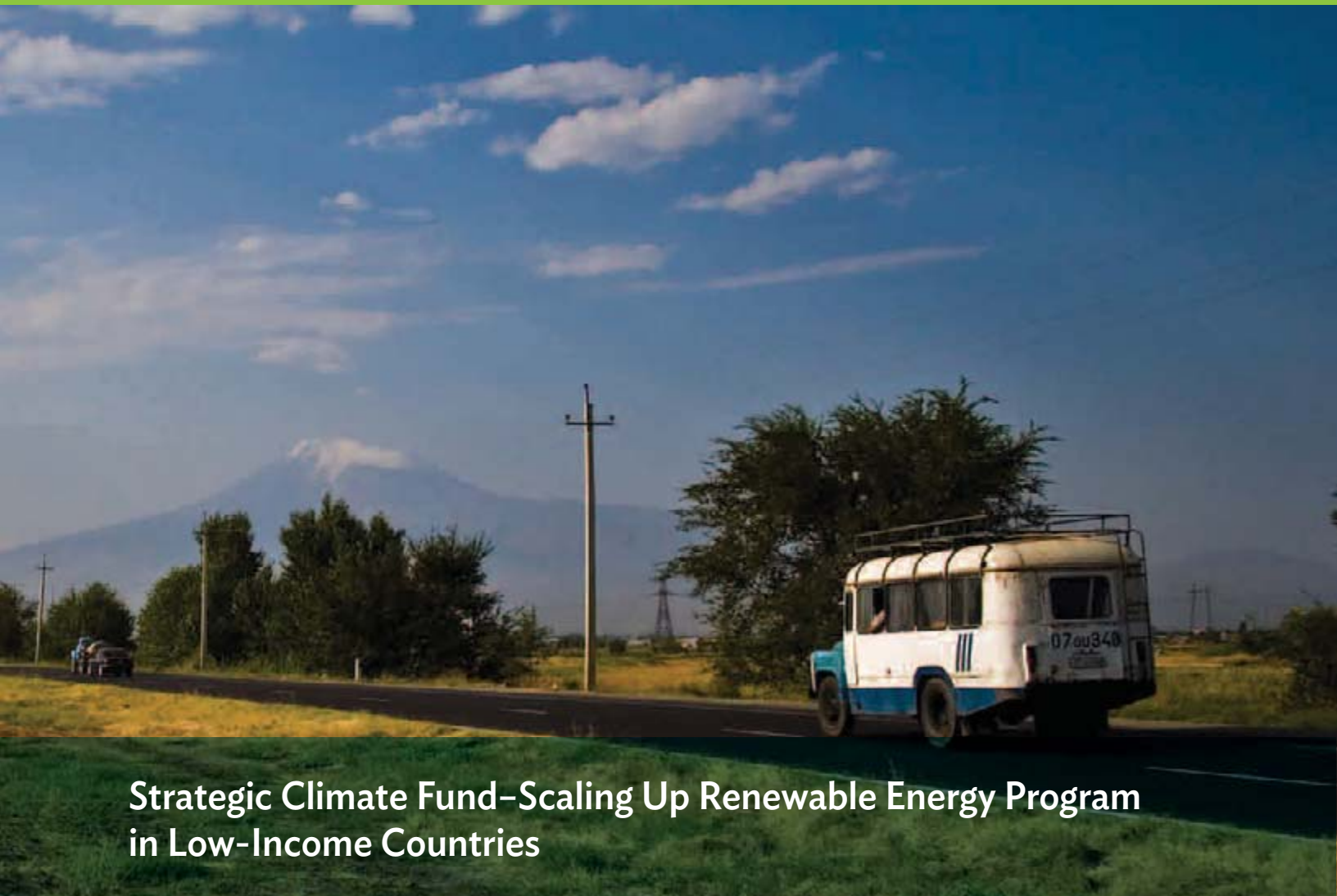
Geographically, countries in South Asia receive 37% of all the PPCR funding from ADB; Southeast Asia, 34%; the Pacific region, 19%; and Central and West Asia, 10%. ADB has ongoing PPCR projects in Bangladesh, Cambodia, Nepal, Papua New Guinea, Tajikistan, Tonga, and the Pacific region, as well as a project under the PPCR Private Sector Set-Asides.

The participation of seven ADB DMCs— Armenia, Bangladesh, the Maldives, Mongolia, Nepal, Solomon Islands, and Vanuatu—in the SREP has been approved. Their combined SREP funding is set at \$121 million, or about 7% of all ADB-administered CIF funds.

The Maldives has a renewable energy systems project linked to an approved ADB electrification project. Nepal's two projects, involving solar development facilities and mini and microhydro off-grid initiatives adds to the country's investments in power expansion projects. The two Pacific island countries—Solomon Islands and Vanuatu have solar and small hydro projects in the pipeline, while Armenia is working on utility-scale solar development. Bangladesh has tapped on SREP funds for off-grid solar mini-grids and solar-powered irrigation while Mongolia submitted plans to upscale renewable energy in rural parts of the country

Two ADB-sponsored FIP projects together compose about 2% (\$31 million) of ADB's CIF allocation. One of these is a community-based project in Indonesia that addresses deforestation and forest degradation. The other is aimed at maintaining ecosystem services in the Lao People's Democratic Republic (Lao PDR), as part of an existing ADB initiative in the Greater Mekong Subregion (GMS).

ADB PORTFOLIO



Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Armenia in the South Caucasus region of Eurasia is one of the most densely populated countries in the area, its 3 million people living mostly in the urban areas, particularly in the capital city of Yerevan. Construction, retail services, mining, manufacturing, and agriculture contributed to strong growth in 2002–2008 until the onset of the global financial crisis. Poverty started rising in the late 2000s, and by 2011, 35% of the population was living below the poverty line.

Almost 30% of Armenian households spend more than 10% of their budget on energy. This means that about a third of all Armenians are energy poor. A social assistance program is helping to reduce energy poverty, and in 2011, a lifeline tariff for natural gas consumption was set for family beneficiaries of the program.

The government understands that the country's economic growth depends on affordable, secure, and sustainable supply of energy, and that its dependence on imported energy makes the economy vulnerable to fluctuations in energy prices. Acknowledging the importance of indigenous renewable resources to energy security and climate change mitigation, the government intends to build domestic renewable energy industries and thus create jobs. But

a number of barriers stand in its way. Among these are the high cost of investment relative to the currently low-cost electricity generation mix in the country, low affordability, and lack of experience with renewable energy technologies. With SREP funding, the government believes, these barriers can be lowered or completely removed.

SREP support would enable Armenia to scale up certain renewable energy technologies consistent with its investment plan and identified through stakeholder consultations and extensive studies as those having potential for scale-up and cost-effective development and use. The support would help reduce the cost of these renewable energy technologies.

For geothermal and utility-scale solar photovoltaic (PV) power generation, initial projects are expected to reduce resource and performance risks, develop local technical expertise and markets, and push the government to set up policies such as tariffs to support renewables. All these in turn would spur the development of electricity service providers and manufacturers of equipment using technologies based on sustainable and renewable energy. SREP is also foreseen to create a demonstration effect for renewable technologies that are relatively unknown in the country, through direct investments or donor funding for capacity development.

The SREP investment plan was developed with the help of technical experts provided by the World Bank, the European Bank for Reconstruction and Development (EBRD), and ADB.

PIPELINE: Utility-Scale Solar Photovoltaic Project

Impact: Lower solar installation costs as domestic industry develops, and lower financing costs as lenders become more comfortable with the technology.

Outcome: Utility-scale commercial solar PV power plants developed, leading to increased private investments in renewable energy power plants in the country.

The project will finance the development of 40–50 megawatts (MW) of utility-scale solar PV power plants, the technology for which has become less costly in recent years and is expected to become cost competitive with other technologies. As the first step in putting up one solar plant (or several plants), it is foreseen to encourage private investments in these technologies, showing their commercial potential.

The SREP funds would be used in much the same way that MDB funds were used to successfully jump-start the small hydropower industry in Armenia nearly a decade ago. The government would onlend the SREP funds at concessional rates to private operators who bid for the solar projects. The private operators would contribute equity and also source loans from commercial banks and from the commercial lending arms of the MDBs.

Project activities include feasibility studies on solar potential and grid interconnection and on economic and financial viability, as well as the provision of transactional advice to the government. The project may involve a single plant or several plants, as multisite solar power development in areas with different solar profiles is often more effective.

Source	Amount (\$ million)
SREP grant, via ADB	2.00
SREP loan via ADB	17.00
SREP loan via IBRD	9.00
Government counterpart funds	7.50
ADB	20.00
World Bank	10.00
Private sector (equity, commercial banks/IFC/EBRD)	63.50
Total	129.00

ADB = Asian Development Bank, EBRD = European Bank for Reconstruction and Development, IBRD = International Bank for Reconstruction and Development, IFC = International Finance Corporation, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

BANGLADESH



Strategic Climate Fund–Pilot Program for Climate Resilience and Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Situated at the northern end of the Bay of Bengal, Bangladesh is acutely vulnerable to flooding and damage caused by typhoons. An increase in average temperature would accelerate glacial melting in the Himalayas and in turn induce more runoff into the Ganges and Brahmaputra rivers, which feed the country's floodplain. On the other hand, increased precipitation would hasten runoff into these rivers, as well as the Meghna River, worsening the damage from flooding. Sea-level rise also threatens to intensify coastal flooding in Bangladesh, as river waters would be further backed up into the country's extensive floodplain.

The country's agriculture sector already experiences flooding nearly every year, while droughts have affected nearly half of the country's population over the past 50 years. With climate change, these extreme weather events are forecast to intensify, reducing the country's rice output by as much as 17%–28%, and the wheat output by 31%–68%. Tropical cyclones are also expected to increase in strength and, as the sea level rises, would worsen the negative effects of storm surges and coastal flooding. The high mortality rate in coastal and low-lying areas is mostly due to tropical cyclones. According to recent estimates, by 2050, 87% of the road infrastructure of Bangladesh will have been substantially inundated as

a result of climate change. Retrofitting the country's railways, road networks, embankments, and drainage infrastructure to forestall this additional inundation due to climate change will cost about \$2.7 billion. Not included here is the additional retrofitting required in urban areas and along unprotected riverbanks.

a. Strategic Climate Fund–Pilot Program for Climate Resilience

After being invited by the PPCR Sub-Committee to participate in the program, Bangladesh requested funds to support its efforts to integrate climate risk and disaster resilience into core development planning and implementation. The funds were to be used for both technical assistance (TA) and investments to further these goals. These same issues were highlighted in the country's Strategic Plan for Climate Resilience (SPCR) of November 2012, which included proposed investments consistent with the National Adaptation Programme of Action (2005), its Climate Change Strategy and Action Plan (2009), and ADB's country partnership strategy (2006–2010) and country operations business Plan (2009–2011) for Bangladesh.

ADB is administering both the capacity-building TA and the Coastal Climate-Resilient Infrastructure Improvement Project.

APPROVED: Climate Change Capacity Building and Knowledge Management (Technical Assistance 1)

Impact: Effective mainstreaming of climate change adaptation into development planning and management.

Outcome: Institutionalized climate change adaptation information and knowledge management (IKM) system linked to development planning and management.

Source	Amount (\$ million)
SCF–PPCR grant, via ADB	0.50
Government counterpart funds	0.10
Total	0.60

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

This TA formulates a climate change adaptation IKM system that is linked to development planning and management for Bangladesh. The country has accumulated a large body of knowledge and experience that relates to climate change–related extreme weather events, resulting in the formulation and implementation of domestic strategies for improving the climate resilience of local communities. However, the information relating to these strategies has yet to be collected, analyzed, systematized, and disseminated in a format that is easily accessible. This deficiency is due in part to the limited capacity to process such information among the institutions in Bangladesh that are involved in climate matters.

Activities under the TA include an analysis of institutional arrangements for addressing climate-related issues, and the design and implementation of the IKM network to serve relevant ministries and government agencies. The network design will identify the arrangements, protocols, and systems needed to efficiently manage all climate change–related knowledge and information generated in Bangladesh, and to coordinate the country's climate change adaptation program. Strengthening the overall institutional capacity of the country to operate and maintain this IKM network is a central feature of this TA, which will incorporate the results of extensive stakeholder consultations.

Project outcomes will consist of generated, systematized, disseminated, and applied information and knowledge relating to climate change. Having this information and

knowledge more readily accessible to policy makers is expected to strengthen the country's overall adaptation by bringing climate change into the development planning and management mainstream and allowing potentially disastrous climate impact to be addressed more efficiently over the long term.

Source	Amount (\$ million)
SCF-PPCR loan, via ADB	20.00
SCF-PPCR grant, via ADB	10.00
Asian Development Fund loan	20.00
IFAD loans	59.00
IFAD grant	1.00
KfW grant	8.80
Government counterpart funds	31.20
Total	150.00

ADB = Asian Development Bank, IFAD = International Fund for Agricultural Development, KfW = Kreditanstalt für Wiederaufbau, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Coastal Climate-Resilient Infrastructure Project (Investment Project 3, Component 2: Climate-Resilient Infrastructure Improvement in Coastal Zone Project)

Impact: Improved livelihoods in rural coastal districts that are vulnerable to climate change.

Outcome: Enhanced climate resilience of coastal infrastructure in 12 rural coastal districts, benefiting the poor and women in particular.

The 12 rural coastal districts of Bangladesh are greatly vulnerable to the impact of climate change and variability. The project will boost the livelihoods of these communities by upgrading rural roads, markets, and disaster shelters to climate-resilient

standards, and increasing the capacity of beneficiary-area residents to adapt to climate change. Road connectivity will be improved through the upgrading of 130 kilometers (km) of subdistrict roads under the project, and an additional 407 km of union and village roads under a complementary initiative funded by the International Fund for Agricultural Development (IFAD).

Market services are expected to improve with the upgrading of 88 growth centers and large markets under the project, and the improvement of 186 community markets under the complementary IFAD initiative. Each of those markets and growth centers will have allotted spaces for the market-related activities of women. In addition, 37 boat landing platforms will be built to climate change-appropriate standards.

Local government capacity to adapt to climate change will improve in two ways: (i) through the strengthening of systems for knowledge capture and sharing, particularly the geographic information systems of the Local Government Engineering Department, and the establishment of a network to serve all local government agencies concerned with climate change; and (ii) through the training of local government staff in climate resilience, disaster risk management, and related activities. In a parallel initiative, the German government-owned development bank KfW will finance the extension of 15 multipurpose cyclone shelters, the improvement of 10 other shelters, and the upgrading of 15 km of tracks that provide access to these shelters, thus improving livelihoods in these beneficiary rural coastal districts.

APPROVED: Coastal Towns Environmental Infrastructure Project (Investment Project 3: Coastal Town Infrastructure Improvement Project)

Impact: Increased climate and disaster resilience in vulnerable coastal towns through urban services and infrastructure, benefiting especially the poor and women.

Outcome: Improved well-being in coastal towns.

This project employs an integrated approach to improving urban services to strengthen climate resilience and disaster preparedness in eight vulnerable coastal *pourashavas* (secondary towns) that lack basic urban services and are extremely vulnerable to the negative impact of climate change, and is aimed in particular at women and poor households as beneficiaries. Its major output is climate-resilient municipal infrastructure, including water supply, sanitation, drainage, and transport facilities, in addition to urban roads and bridges, solid waste management, and slum improvements.

Better access to municipal services that have been made more reliable and climate resilient under the project is seen to promote good health among the residents of coastal towns. Local governance will also be strengthened, with increased local capacity for sustainable service delivery, urban planning, and natural disaster preparedness, on top of an overall improvement in climate and disaster resilience.

Because of their extensive experience in managing urban projects supported by ADB, the Local Government Engineering Department has been working as the executing agency, and the Department of Public Health Engineering, as co-executing agency, for the project.

b. Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Among the challenges faced by the country's energy sector, the most important is electricity access. According to government surveys, areas where poverty is highest have the most number of households with no access to electricity. But electrification rates are improving as the government pursues the goal of universal electricity access by 2021.

The country's natural gas reserves are limited and will begin to deplete by 2020 if no new gas fields are discovered and efficient means of extracting more from existing gas fields are not found. Biomass is also becoming scarcer and more costly; the situation is especially dire for lower-income households that rely on this resource. The decline in indigenous fuel sources, coupled with increasing demand, has made Bangladesh increasingly dependent on imported fuels, and particularly on power generation, for its energy needs. The country is therefore vulnerable to fluctuations in prices and availability during periods of economic and political instability in fuel-exporting countries.

Bangladesh must also contend with climate change and its attendant risks. Higher sea levels and flooding can destroy crops, lead to a higher incidence of waterborne diseases, and

Source	Amount (\$ million)
SCF–PPCR loan, via ADB	30.00
SCF–PPCR grant, via ADB	10.40
Government counterpart funds	23.10
Asian Development Fund loan	52.00
Sanitation Financing Partnership Trust Fund grant (Bill & Melinda Gates Foundation)	1.60
Total	117.10

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

displace large numbers of people. Rising temperatures also shorten the life cycle of rice plants and reduce yield.

However, the country has considerable renewable energy potential, and significant experience in developing off-grid renewable energy projects. The government has set investment targets for grid-connected technologies to supplement existing off-grid solar home systems, solar microgrids, and solar irrigation pumps, although regulatory, financial, and technical barriers remain.

ADB supports the government's efforts toward low-carbon development through public and private sector investments. SREP is seen to play an important role in optimizing low-carbon energy pathways by tapping indigenous renewable potential and kick-starting investments in utility-scale projects and off-grid solar energy. Concessional financing and grants can address investment barriers and risks by encouraging off-taker investments and showing confidence in the new market while keeping costs low and affordable to energy consumers, and then demonstrating the potential for scaling up projects and attracting more investors into the market. The cobenefits of developing and spreading low-carbon technologies, besides reducing GHG emissions and environmental pollution, include promoting climate resilience and helping the country achieve its development priorities of improving rural energy access and energy security and reducing poverty.

Source	Amount (\$ million)
SREP, via ADB	0.5
ADB	120.0
Government counterpart funds	18.8
Total	143.8

ADB = Asian Development Bank, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

PIPELINE: Off-Grid Solar PV–Mini-Grids

Impact: The project could provide 75,000–100,000 new electricity connections in 150 rural areas, and thus help the government meet its mini-grid target and its overall goal of universal electricity access by 2020.

Outcome: PV mini-grids would be installed mainly in remote areas unlikely to be reached by the electrical grid in the next 15–20 years. The government has set an installed capacity target of 25 MW for the PV mini-grids, on the assumption that each mini-grid would have a capacity of 100–250 kilowatts peak.

To finance this project, a grant would be provided to the government and the funds would be on lent to the designated implementing agencies and channeled to sponsors or end users.

PIPELINE: Off-Grid Solar PV–Solar Irrigation

Source	Amount (\$ million)
SREP, via ADB	24.0
ADB	20.0
Government counterpart funds	6.6
Total	50.6

ADB = Asian Development Bank, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

Impact: Through the project, the government would be better able to meet its 150 MW solar pump capacity target by 2021 under the 500 MW Solar Power Development Program.

Outcome: PV pumps would be installed to serve the country's agricultural irrigation needs. Farmers make up around 80% of the population of Bangladesh. Rice accounts for over 90% of the total production of food grains, and about 77% of irrigated

land area depends on groundwater. According to statistics from the Rural Electrification Board, the Bangladesh Power Development Board, and the Sustainable and Renewable Energy Development Agency, local farmers use about 266,000 electric water pumps to irrigate 1.7 million hectares. During the peak growing season, 1.3 million diesel-run pumps are also operated to irrigate another 3.4 million hectares, consuming about 0.9 million tons of diesel per year. The project would help avoid more than 31 million tons of CO₂ and about \$280 million in subsidies.

The project grant provided to the government would be lent to a designated implementing agency using financing structures and models available in the market, before the funds are channeled to end users.



Strategic Climate Fund–Pilot Program for Climate Resilience

Cambodia's vulnerability to the negative impact of climate change is attributed to the economy's reliance on climate-sensitive sectors such as water resources and agriculture, compounded by the country's limited capacity to adapt to climate-related impact. More than three-quarters of the population derives its livelihood from subsistence or rain-fed agriculture, an important source of food and income for 85% of Cambodians. This livelihood depends heavily on the country's road network. While currently 50,900 km in length, the network is deteriorating rapidly because of increased traffic, extreme weather events, lack of financing for operation and maintenance, poor road maintenance standards, inadequate institutional capacity for road maintenance and management, and poor design and construction.

Cambodia established the National Climate Change Committee and completed its National Adaptation Programme of Action to Climate Change in 2006. In 2013, it launched the Strategic National Action Plan for Disaster Risk Reduction (2008–2013) and approved the Cambodia Climate Change Strategic Plan (2014–2023). Various line ministries have approved sectoral climate change strategic and action plans alongside the Cambodia Climate Change Strategic Plan to guide the integration of climate change adaptation into sectoral planning.

Despite the impressive progress made at the policy level, however, Cambodia has limited institutional and technical capacity to mainstream adaptation into development planning. The country was therefore selected, together with 17 other countries, to participate in the PPCR. Cambodia's SPCR was endorsed in June 2011. A revised SPCR, comprising seven investment projects in water resources, agriculture, and infrastructure, as well as one TA initiative, was adopted in February 2014.

The SPCR is fully consistent with the government's Rectangular Strategy, Phase III (RSP III, 2013–2018), which was approved by the Fifth National Assembly on 24 September 2013. Focused on growth, employment, equity, and efficiency, the strategy deals with the rehabilitation and construction of physical infrastructure, and with capacity building and human resources development. The revised SPCR also supports the goals set out in the National Policy on Green Growth (2013–2030), the National Strategic Plan for Green Growth (2013–2030), and the Cambodia Climate Change Strategic Plan (2014–2023), and is aligned with the priorities of the National Adaptation Programme of Action and the Strategic National Action Plan for Disaster Risk Reduction (2008–2013), both of which address numerous issues relating to climate change adaptation.

The SPCR was developed with support from ADB and the World Bank Group. Its priorities are consistent with ADB's country partnership strategy (2011–2013) and country operations business plan (2013–2015) for Cambodia.

APPROVED: Provincial Roads Improvement Project (Component 3, Project 1: Climate Proofing of Roads in Prey Viang, Svay Rieng, Kampong Chhnang and Kampong Speu Provinces)

Impact: Improved access to markets, jobs, and social services in four project provinces (Kampong Chhnang, Kampong Speu, Prey Viang, and Svay Rieng).

Outcome: Safe, climate-resilient, and cost-effective road network providing year-round access to the agricultural areas of the project provinces.

Recent flooding in the provinces around the Tonle Sap Basin, home to a large share of Cambodia's rural poor, and those in the Southeastern region has become much worse and more frequent, making the roads inaccessible during extreme floods. With climate change and other human activities, including inappropriate land use planning, flooding is expected to intensify.

In 2011, ADB approved the Provincial Roads Improvement Project to upgrade flood-vulnerable provincial roads in four provinces—Kampong Chhnang, Kampong Speu, Prey Viang, and Svay Rieng. The project has four outputs: (1) rehabilitation of 157 km of roads in the four provinces and construction of a new Cambodia–Viet Nam border-crossing facility at Prey Var in Svay Rieng province, (2) improved road asset management, (3) enhanced road safety and safeguards through a community-based road safety program in the four provinces, and (4) a climate-resilient road network made less vulnerable to climate change-related damage through adaptation planning and the introduction of ecosystem-based adaptation measures. The climate resilience activities fall under outputs 1 and 4.

Source	Amount (\$ million)
SCF–PPCR loan, via ADB	10.00
SCF–PPCR grant, via ADB	7.00
Asian Development Fund loan	52.00
Technical Assistance Fund	0.50
Government counterpart funds	9.85
Total	79.35

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

With PPCR support, the project will improve the climate resilience of Cambodia's provincial road network in the four project provinces, assist the Ministry of Public Works and Transport in integrating climate risk and resilience into road infrastructure planning at the national and provincial levels, pilot-test adaptation measures to protect the roads against long-term risks posed by climate change, such as bioengineering and water capture and storage systems integrated into road construction features, and introduce a community-based emergency management intervention pilot-tested in Kampong Chhnang. Civil works design will undergo appropriate climate resilience-related adjustments through (i) the design of road embankments and roadside ditches to reduce soil erosion, (ii) the use of less-moisture-susceptible materials or hydraulically stabilized materials within the road structure, and (iii) green engineering to improve water conservation characteristics and divert runoff water away from the road. A community-based emergency management intervention in Kampong Chhnang includes early warning systems, a strengthened ministry database and data collection system to record and monitor infrastructure damage and losses from climate stressors, and training of communities in emergency response and climate change adaptation.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	10.00
Nordic Development Fund	1.00
Total	11.00

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Mainstreaming Climate Resilience into Development Planning (Component 4)

Impact: Enhanced resilience to climate change in Cambodia, leading to improved livelihoods, especially for vulnerable groups such as women and children.

Outcome: Sustained institutional and technical capacity to integrate adaptation concerns into development planning.

This TA is closely linked with ADB projects, as well as with the climate change initiatives of bilateral development partners. The TA, with \$7 million approved in 2012, comprises four outputs.

Output 1 of the TA is aimed at strengthening the capacity of the government to coordinate all SPCR investments, and to mainstream climate change adaptation into national and subnational development planning, including budget preparation. The TA will monitor and report the progress of the SPCR through the PPCR core indicators integrated into the results framework of SPCR projects. Line ministries and government agencies will be equipped with tools for screening development projects for climate change risks and devising appropriate adaptation measures and policies. Output 2 of the TA will support the feasibility assessment of proposed projects under Cambodia's National Adaptation Programme of Action, particularly with regard to securing supplementary funding from sources such as the Adaptation Fund and the Green Climate Fund. Under output 3, the TA will establish a civil society support mechanism to fund community-based adaptation activities and strengthen the capacity of civil society organizations and nongovernment organizations (NGOs) to mainstream climate resilience into their operations. About 20–25 grants will be competitively awarded to local civil society organizations and NGOs to implement community-based projects that directly improve the climate resilience and livelihood diversification of women, children, and marginalized groups in rural and urban areas. Output 4 of the TA is aimed at providing a deeper understanding of climate risks and

adaptation options to all stakeholder groups, including women and disadvantaged groups. Knowledge products will be developed and disseminated through a knowledge management system linked to the web portals of both ADB and its partners, awareness-raising and multi-stakeholder workshops will be held, and the secondary and tertiary education curriculum will be updated through the integration of climate risk and resilience.

In February 2014, the PPCR Sub-Committee endorsed a revised SPCR for Cambodia with an additional allocation of \$5 million in grants, of which \$3 million was allocated to this TA to scale up specific activities under output 1. These activities pertain to (i) mainstreaming climate resilience at subnational levels, in close cooperation with the Secretariat of the National Committee for Subnational Democratic Development and the Ministry of Interior; (ii) integrating gender considerations into climate change adaptation, in close cooperation with the Ministry of Women's Affairs; and (iii) monitoring, reporting on, and evaluating the effectiveness of investments in climate change adaptation, in close cooperation with the Ministry of Planning. These three themes, all part of output 1 of the TA, are expected to accelerate efforts to mainstream climate resilience into development planning at various levels of governance.

APPROVED: Greater Mekong Subregion Southern Economic Corridor Towns Development Project (Component 3, Project 2: Climate Proofing of Infrastructure in the Southern Economic Corridor Towns of Battambang, Bavet, Neak Leung, and Poipet)

Impact: Transformation of Battambang, Bavet, Neak Loeung, and Poipet towns into economic hubs in the GMS Southern Economic Corridor.

Outcome: Improved urban infrastructure and enhanced climate resilience in the towns of Battambang, Bavet, Neak Loeung, and Poipet.

Source	Amount (\$ million)
SCF-PPCR loan, via ADB	5.00
SCF-PPCR grant, via ADB	5.00
Asian Development Fund loan	37.00
Urban Environmental Infrastructure Fund	1.50
Government counterpart funds	6.88
Total	55.38

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

This project is the first phase of a long-term initiative aimed at developing towns along the GMS transport corridors according to the strategic framework of the GMS Economic Cooperation Program (2012–2022) and ADB's country partnership strategy for Cambodia (2011–2013), and in support of ADB's Urban Operational Plan (2012–2020) and Water Operational Plan (2011–2020).

ADB and the GMS countries have made considerable investments in developing transport corridors throughout the countries that border the Mekong River, including Cambodia, thus greatly increasing the mobility of both people and goods. The towns along the Southern Economic Corridor, linking Cambodia and Viet Nam, have enjoyed increased trade and investment, as they have become marketing and transport hubs for agricultural produce grown in outlying areas and centers for the distribution of goods and services to urban areas. However, the rapid growth of the urban population, inadequate infrastructure, and lack of support services now constrain the development of many of these towns. Furthermore, according to Cambodia's National Adaptation Programme of Action, the provinces in which these towns are located are vulnerable to the impact of climate change such as floods. The low carrying capacity of the present storm drainage systems, coupled with projected climatic events such as increased precipitation during the rainy season and the possibility

of cloudbursts in these towns, could lead to severe flooding in the event of sudden heavy rainfall and result in physical and economic losses.

To improve economic productivity in the beneficiary towns, the project will upgrade urban infrastructure in these towns, including their flood mitigation, wastewater treatment, and solid waste management facilities, and thereby reduce the towns' carbon footprint and improve their overall environmental sustainability. Strategic local economic development plans will be drawn up and the institutional capacity of provincial and local government agencies will be strengthened. PPCR financing will support the design and construction of climate-resilient urban infrastructure investments such as flood control and wastewater treatment systems in the project towns, and enhance institutional and technical capacity to mainstream climate resilience into project implementation, operation, and maintenance.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	6.00
SCF-PPCR loan, via ADB	4.00
Asian Development Fund loan	35.00
Government counterpart funds	2.95
Total	47.95

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Greater Mekong Subregion Flood and Drought Risk Management and Mitigation Project (Component 1, Project 2: Enhancement of Flood and Drought Management in Pursat Province)

Impact: Reduced economic losses resulting from flood and droughts.

Outcome: Improved capacity and preparedness to manage and mitigate the effects of flood and drought events.

In Cambodia, recent floods and droughts have resulted in a significant number of deaths and considerable economic losses. The 2011 floods in Pursat, for example, seriously damaged over 17,000 hectares of rice and other agricultural commodities, submerged over 10 km of rural roads, affected 13,000 families, and killed 10 people. Prolonged drought from 2009 to 2012, on the other hand, lowered crop yields and caused production losses, in addition to reducing livestock and fishery yield. Pursat Province, which lies within the Tonle Sap floodplain, is at medium risk of both floods and droughts.

Unfortunately, Cambodia has limited capacity to manage flood- and drought-related disasters. Actions taken are mostly reactive, rather than proactive, and are uncoordinated. To manage and mitigate the potential impact of extreme floods and droughts, countries and communities must be better prepared to respond to disasters. Structural and nonstructural measures are needed.

The project will upgrade water infrastructure and protect it against damage from extreme weather events; strengthen the regional data, information, and knowledge base for flood and drought management; and improve community preparedness to manage disasters such as floods and droughts, and to adapt to climate change. Capacity building for community-based disaster risk management will be integrated into the implementation of water management infrastructure. The intent is to improve the agriculture support program, enable farmer water user communities to manage drought and flood risk, and equip communities and local governments to cooperate in community-based disaster risk management. The project emphasizes risk reduction strategies to prevent flood and drought events from

developing into disasters for the affected population. It builds on existing coping strategies and mechanisms of communities and promotes community-based measures for disaster risk reduction and adaptation.

PPCR financing will support the design and implementation of additional irrigation infrastructure to increase resilience to climate change in Pursat, and strengthen the capacity of government and affected communities to reduce the risks associated with climate extremes such as flood and drought. Key measures are (i) improving early warning systems for floods and droughts; (ii) raising hydraulic design standards in the Mekong Delta; (iii) making communities better able to effectively manage risks associated with increasing climate extremes, through the use of early warning systems and community-based disaster risk reduction and management, among other courses of action; and (iv) promoting adaptation measures.

APPROVED: Climate Resilient Rice Commercialization Sector Development Program (Component 2, Project 2: Climate Proofing of Agricultural Infrastructure and Business-Focused Adaptation)

Impact: Higher net incomes for stakeholders along the rice value chain.

Outcome: Increased production of high-quality rice in Cambodia while preserving the natural resource base.

This project is part of Cambodia's Agriculture Sector Development Program, which is aimed at developing a commercial rice value chain across the country. Program interventions will improve national food security, expand rice exports, and transform the predominantly subsistence rice subsector into a commercially oriented subsector by removing legal and regulatory constraints impeding rice commercialization, improving the productivity of paddy crops, enhancing rice value chain support services, and addressing risks of climate change through adaptation. If successful, the program could be replicated within Cambodia and in other Asian countries.

The program comprises both (i) a policy-based component to facilitate the commercialization of climate-resilient rice through the establishment of an appropriate legal and regulatory environment focused on reforms; and (ii) a project to improve agricultural land-use zoning, develop the infrastructure for climate-resilient rice value chain, enhance rice value chain support services to improve the quality of Cambodian rice, and pilot-test weather-based crop insurance to reduce risks associated with paddy production.

PPCR financing will support the rehabilitation and climate proofing of irrigation infrastructure, land leveling initiatives to improve water use efficiency, development and pilot-testing of a weather-indexed crop insurance scheme in three provinces (Battambang, Kampong Thom, and Prey Veng), and strengthening of the capacity of mill managers and

Source	Amount (\$ million)
SCF-PPCR loan, via ADB	5.00
SCF-PPCR grant, via ADB	5.00
Asian Development Fund loan (investment)	31.00
Asian Development Fund loan (policy-based)	24.00
Global Agriculture and Food Security Program grant	14.60
Government counterpart funds	8.33
Total	87.93

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

operators to accommodate the changing patterns of paddy supply induced by climate change. The resilience of irrigation infrastructure will be enhanced through improved design approaches, construction supervision, and land leveling. Land leveling ensures the even distribution of water for rice production by redistributing topsoil to create a level surface over each paddy field. Once the land is leveled, less water is needed to achieve required levels of inundation for crops. The development of weather-indexed crop insurance will help minimize the risk borne by farmers in the face of climate change and unpredictable weather patterns. The insurance scheme will allow farmers to commit resources to buying better-quality seed yearly to replace seed from flood-affected crops.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	8.00
Asian Development Fund grant	19.00
Beneficiaries	0.50
Government counterpart funds	1.40
Total	28.90

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Greater Mekong Subregion Biodiversity Conservation Corridors Project: (Component 2, Project 1: Promoting Climate-Resilient Agriculture in Koh Kong and Monduliri Provinces)

Impact: Climate-resilient sustainable forest ecosystems benefiting local livelihoods.

Outcome: Sustainably managed biodiversity corridors in Koh Kong and Monduliri provinces.

Biodiversity-rich ecosystems in Koh Kong and Monduliri provinces of Cambodia face several challenges, which account for the persistent poverty of residents, and risks to both agricultural and forest ecosystems and livelihoods of farming and forest-dependent communities. The development of regional hydropower systems, roads, large-scale tourism infrastructure, mining, and plantation agriculture ventures poses challenges to these biodiversity conservation landscapes. Furthermore, increasing weather variability, and extreme weather events and shifts in agroecological zones are likely to increase the vulnerability of ecosystem services and amplify the impact on dependent poor communities.

In Koh Kong and Monduliri, communities and ecosystems are at risk from the adverse impact of climate change on agriculture, the prime source of their livelihood, and on food security. Coastal communities in Koh Kong are threatened by the impact of climate change including (i) seawater intrusion and rising sea level, (ii) storms and storm surges, (iii) heavy rain and flooding, and (iv) drought and water stress. In Monduliri, the major climate risks identified are drought, flooding, and storms.

This project provides additional PPCR resources to support the ongoing GMS Biodiversity Conservation Corridors Project (Cambodia component), with the overall objective of enhancing the climate resilience of communities and reducing the vulnerability of ecosystems in Koh Kong and Monduliri. With PPCR financing, the project will (i) construct bioengineered sea barriers in Koh Kong and introduce salinity-resilient crops in the province to protect rice-growing lands from saltwater intrusion; (ii) construct rainwater harvesting ponds in Koh Kong and Monduliri and promote drip irrigation to increase climate-resilient crop productivity; (iii) design and rehabilitate an irrigation scheme in Monduliri, including construction supervision, and introduce a System of Rice Intensification production techniques; (iv) diversify the income sources of the communities in two pilot catchment areas in Monduliri, in anticipation of climate-induced crop failures, through sustainable

forest management and ecosystem-based adaptation measures; and (v) strengthen the capacity of staff to integrate climate change concerns into national and provincial development planning and budgeting.

APPROVED: Integrated Urban Environmental Improvement in the Tonle Sap Basin Project (Component 3, Project 3: Flood-Resilient Infrastructure Development in Pursat and Kampong Cham Provinces)

Impact: Increased economic activities and environmental protection in towns in the Tonle Sap Basin.

Outcome: Improved urban services and enhanced resilience to climate change in Kampong Chhnang and Pursat provinces.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	5.00
SCF-PPCR loan, via ADB	5.00
Asian Development Fund loan	37.00
Community contributions	0.20
Government counterpart funds	5.40
Total	52.60

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

This project is part of ADB's Sustainable Urban Development in the Tonle Sap Basin Project, with the overall objective of making urban infrastructure in selected towns more resilient to floods. To achieve this objective, the project will mainstream climate resilience measures into urban infrastructure planning in Pursat and Kampong Chhnang provinces, and improve the resilience of urban areas to the negative effects of climate change by fortifying riverbanks, strengthening solid waste disposal, improving other sanitation facilities, and minimizing the impact of floods.

The project will improve urban services and enhance climate change resilience in Kampong Chhnang and Pursat provinces through (i) urban area environmental improvements; (ii) community mobilization and environmental improvements; (iii) strengthened sector coordination and operations; and (iv) strengthened capacity for project implementation, and for operation and maintenance.

PPCR financing will support climate-resilient measures in Kampong Chhnang and Pursat provinces. Embankments and roads will be improved or constructed in Kampong Chhnang, drainage systems in Pursat will be upgraded, and urban village environments will be enhanced to a climate-resilient condition, mainly through efforts to increase awareness of climate change and improve community-resilient small-scale infrastructure in vulnerable areas. The PPCR will also fund capacity-building programs for Ministry of Public Works and Transport staff to mainstream climate resilience into urban infrastructure development at the national, provincial, and local levels, as well as the implementation of the Tonle Sap Urban Areas Development Framework through a consultation program and a plan for climate change adaptation in urban areas around the Tonle Sap. Specifically, implementing the development framework will involve reviewing existing climate change design and urban regulations (particularly building codes) in provincial towns around the Tonle Sap and making suitable recommendations, quantifying and integrating climate change resilience features and measures into urban environmental improvements, revising building codes, and adopting other measures (e.g., appropriately designed household sanitation facilities).

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	9.00
SCF-PPCR loan, via ADB	7.00
Asian Development Fund loan	54.00
Government of Australia	18.52
Export-Import Bank of Korea*	41.00
Nordic Development Fund	5.40
Agence Française de Développement	40.00
Government counterpart funds	17.79
Total	192.71

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

* ADB recognizes "Korea" as the Republic of Korea

APPROVED: Rural Roads Improvement Project II (Component 3, Project 4: Climate-Resilient Rural Infrastructure in Kampong Cham Province)

Impact: Improved access to markets, jobs, and social services in 10 provinces.

Outcome: Safe, climate-resilient, and cost-effective rural road network in 10 project provinces, to provide all-year access to markets, jobs, and social services.

In 2014, ADB approved the Rural Roads Improvement Project II. The project, aimed at increasing the resilience of rural roads in the project area to the negative impact of climate change, has five key outputs: (1) the improvement of about 1,200 km of rural roads to climate-resilient paved

condition, (2) rural road asset management, (3) the implementation of a rural road safety and community awareness program, (4) project management support, and (5) connectivity improvements on the Mekong River islands. The intended resilience will be achieved through improvements in road access to remote rural communities, and through interventions that will reduce the risk of damage from flooding.

PPCR resources will be used to strengthen the climate resilience of highly vulnerable rural roads in Kampong Cham and Tboung Khmum provinces, and to make the Mekong River islands more accessible and connected. In particular, with PPCR financing, the Ministry of Rural Development and other institutions will gain increased capacity to mainstream climate change adaptation into rural infrastructure planning, and priority adaptation measures will be implemented to improve the resilience of rural infrastructure. Adaptation interventions will be both structural and nonstructural measures, and will include the following: (i) the rehabilitation to climate-resilient paved condition of 193.9 km of highly vulnerable rural roads in Tboung Khmum Province (formerly part of Kampong Cham) and 50 km of highly vulnerable rural roads on the five islands of Kampong Cham Province, which become inaccessible during the rainy season; (ii) the improvement of 11 jetties with hand-laid reinforced concrete; (iii) the improvement or construction of small-scale levees or other water management interventions to eliminate the risk of flooding due to heavy rainfall; and (iv) the adoption of bioengineering (green) solutions to strengthen embankments for road sections that are at higher risk of damage due to flooding. A multisectoral climate change adaptation framework will be developed for the Mekong island cluster. It will consist of adaptation measures to make agriculture less vulnerable to climate change through improved access to water, the production of electricity from renewable sources of energy, a community-based emergency management system with early-warning systems installed in key locations, and measures to diversify income and livelihood and improve adaptive capacity (environment-friendly tourism).



Clean Technology Fund

India's long-standing reliance on imported fossil fuel for electricity generation exposes the national economy to unexpected increases in world energy prices and to escalating costs as the population grows. While more than a quarter of the population lacks access to electricity, electrifying the rest of the economy by burning imported fossil fuels would still raise the country's energy import bill by a considerable amount.

Electricity generation in India is mainly based on coal, but growth in hydropower generation capacity in recent years has helped moderate the costs of further electrification. Hydropower generation capacity has not increased fast enough, however, and the country still relies greatly on coal imports for power generation.

The government has responded to these challenges by attempting to hasten the expansion in electricity generation capacity, and changing the mix of fuels used to generate electricity in a way consistent with sustainable economic growth. The Integrated Energy Policy (2006) promotes investment in electricity generation powered by renewable energy sources. Besides slowing down the growth in India's energy import bill, expanded use of renewable energy helps the country fulfill its commitment to reduce GHG emissions by 20%–25% compared with 2005 levels, by 2020.

Invited to apply for CTF funding, the Government of India drafted a CTF investment plan in association with ADB, the International Bank for Reconstruction and Development (IBRD), and key national stakeholders. The plan is fully consistent with India's Integrated Energy Policy (2006), as it emphasizes investments in the expansion and upgrading of the country's hydropower facilities, the development of solar and wind electricity generation capacity, and the improvement of energy efficiency.

The plan, approved in November 2011, was developed to support the country's primary energy requirements by addressing the need to increase renewable energy and energy efficiency investment programs while supporting India's climate and sustainable growth strategies. In August 2015, the government endorsed a revised plan redeploying CTF resources to new projects—solar parks infrastructure, solar parks transmission requirements, rooftop solar PV systems, and incremental generation of 500 MW of solar power by the Solar Energy Corporation of India. This is to support the government's new, ambitious target of adding 100 gigawatts (GW) of solar PV capacity by 2022 to accelerate the pace of growth of the solar sector in India. This scale-up envisions 60 GW of ground-mounted utility-scale solar power projects, and 40 GW in rooftop solar installations.

Source	Amount (\$ million)
CTF loan, via ADB	198.00
CTF grant, via ADB	2.00
ADB loan (ordinary capital resources)	300.00
Government counterpart funds	300.00
Total	800.00

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Rajasthan Renewable Energy Transmission Investment Program—Facility Concept (Rajasthan Solar Park)

Impact: Improved energy security through the avoidance of coal consumption of about 3.1 million tons per year, the accelerated development of gigawatt-scale renewable energy capacity, and support for large private sector investments in new renewable energy capacity.

Outcome: Annual energy savings of 8,000 gigawatt-hours (GWh), equivalent to an annual reduction in GHG emissions of 5.4 million metric tons of carbon dioxide equivalent (tCO₂e), or 135 million tCO₂e over 25 years. The transmission system to be constructed will benefit more than 1 million households and businesses.

India's Rajasthan state has aggressively invested in electricity generation capacity powered by renewable energy sources. By the end of 2011, the state's solar energy generating capacity was 45 MW, and its wind-powered generating capacity had reached 1,767 MW. Given Rajasthan's favorable geographic location for both solar and wind-powered electricity generation, the state government, through its renewable energy plan, looks forward to increasing its electricity generation capacity from these two sources to 8,000 MW by 2018.

The program will support this goal by developing an in-state transmission network that will evacuate and transmit at least 4,300 MW of new renewable energy capacity over a 5-year period. The program will be implemented through a multitranche financing facility, which comprises a series of three project loans with a total investment of \$800 million, including \$200 million from the CTF.

The objective of the first project is the construction of electric power transmission facilities to feed electricity generated from renewable sources in western Rajasthan into the state and national grids. Nearly 600 km of transmission lines will be constructed, and several power

transmission substations will be upgraded. The second project, which was to be implemented in 2014, and the third project, to be implemented in 2015, will further increase transmission capacity. The private sector is expected to step up investments in electricity generation from renewable energy sources in Rajasthan, unconstrained by insufficient transmission capacity.

The TA associated with the first project will improve the project management capacity of government staff, assist in planning for the expansion of the relevant infrastructure, support community development initiatives that benefit households living near the project facilities, fund studies that will look into the integration of renewable energy sources into the overall electric power generation and transmission system, and improve asset accounting.

The TA will also fund the services of experts who will supervise the construction of project-financed facilities, and prepare investments for financing under subsequent initiatives. These experts will demonstrate the ability of public–private partnerships to accelerate the construction of facilities and reduce costs, while addressing all relevant barriers to the application of solar-powered electricity generation technology.

Finally, operational frameworks will be developed for conducting environmental impact assessments, implementing involuntary resettlement programs necessary for project construction, and addressing the concerns of indigenous peoples in relation to project implementation.

PIPELINE: Solar Parks Infrastructure

Impact: Acceleration of solar capacity installations, buy-down of additional costs of solar and smart grid technologies, and delivery of risk coverage to maximize commercial financing. Commercial development of solar energy at the gigawatt scale will enhance India’s energy security, save foreign exchange, and protect against global fuel price fluctuations through the use of nontradable domestic energy sources.

Source	Amount (\$ million)
CTF via ADB	50.00
CTF via World Bank	50.00
MDBs	200.00
Others	1,000.00
Total	1,300.00

ADB = Asian Development Bank, CTF = Clean Technology Fund, MDB = multilateral development bank.

Coverage will be provided for the additional costs and risks associated with the accelerated development of gigawatt-scale capacity in solar parks and the related grid infrastructure, as well as the incremental generation of 500 MW by the newly established Solar Energy Corporation of India.

Outcome: “Plug and play” public sector infrastructure, in an industrial layout that allows the state to attract investments in utility-scale solar power within the solar park.

CTF cofinancing, through a variety of financing options such as project loans, equity, new financing instruments like “green” bonds, results-based financing, and policy-based loans, will address the financing and technology challenges associated with large-scale grid infrastructure including smart grid technology within the park and outside.

The additional electric power capacity will support equitable and sustainable economic growth in India. Achieving grid parity by the end of the decade will facilitate comparable growth in solar deployment worldwide, creating a virtuous cycle of expanded renewable energy deployment at increasingly affordable costs.

Source	Amount (\$ million)
CTF loan via ADB	50.00
CTF loan via World Bank	30.00
MDBs	620.00
Total	700.00

ADB = Asian Development Bank, CTF = Clean Technology Fund, MDB = multilateral development bank.

PIPELINE: Solar Park Transmission

Impact: Support for the achievement of the results of the Solar Parks Infrastructure Project, as indicated by a reduction in GHG emissions of 3.07 million metric tons of carbon dioxide equivalent (MtCO₂e) per year; a leverage factor of 1:12 for CTF finance to increase financing for low carbon development; and an increase in the supply of renewable energy to 2,000 MW (4,380 GWh/year).

Outcome: Smart-grid infrastructure via an interstate transmission system to evacuate variable renewable energy, connecting the solar park pooling station to the national grid injection point, and distributing to the national market, particularly to states that are not in a position to construct their own solar parks because of shortage of land or of solar resources.

Since the transmission infrastructure funded under this project will help evacuate the renewable energy generated under the CTF-funded Solar Parks Infrastructure Project, the results for this project are not reported separately to avoid double counting.

Source	Amount (\$ million)
CTF loan via ADB	125.00
CTF loan via World Bank	125.00
World Bank/ADB	800.00
Other (project sponsors, commercial banks, other financing)	550.00
Total	1,600.00

ADB = Asian Development Bank, CTF = Clean Technology Fund, MDB = multilateral development bank.

PIPELINE: Solar Rooftop PV

Impact: Acceleration of the government's rooftop PV program in various states through MDB loan and CTF financing, in the form of loans or guarantees, to catalyze a source of affordable credit for rooftop installers and to mitigate off-taker's risk. The project, by virtue of its transformational aspect, will provide affordable long-term credit to installers, which currently have no access to credit, allowing them to pass on the benefits to customers.

Outcome: Reduction of GHG emissions by 2.30 MtCO₂e per year; installation of 1,500 MW of solar capacity with generation output of 3,285 GWh yearly through the "commoditization" of solar rooftop PV into a "must-have" item, initially for commercial and industrial customers, and later for other customer categories.

The government has set a target of 40 GW of grid-connected solar rooftop installation by 2022. At present, a number of structural barriers prevent the subsector from taking off: (i) no appetite for commercial bank lending to the rooftop sector, whether to customers or to installers; (ii) poor understanding of the rooftop PV product, which is seen as a risky investment with unclear pricing and rules of the game; and (iii) distribution companies inadequately prepared (technically, commercially, or financially) to play their part in grid-connected solar rooftop PV.

The CTF funding will leverage funds from the commercial bank and private sector beneficiaries and, most importantly, will lower the funding cost for those who borrow for rooftop PV investment. Today such potential borrowers have no access to credit for rooftop PV.



Clean Technology Fund and Strategic Climate Fund–Forest Investment Program

a. Clean Technology Fund

Indonesia is the world's third-largest emitter of GHGs because of its dependence on fossil fuels for its expanding energy needs and because of rapid deforestation. Despite having 40% of the world's geothermal potential, the country has developed only about 4%. The National Energy Policy (2006) recognizes the potential long-term gains from replacing fossil fuels with geothermal energy sources in electricity generation and calls for an increase in the percentage share of energy derived from geothermal sources; from less than 5% as of 2011, the National Energy Council (Dewan Energi Nasional, or DEN) has recommended an increase in percentage share to 17% by 2020, and to 30% by 2050.

In response to these recommendations, the government formulated the Indonesia Geothermal Electricity Finance Program (2013) to promote the use of renewable sources of energy, particularly private sector–financed geothermal electricity generation. The government, together with ADB, IBRD, IFC, and key national stakeholders, drafted a country investment plan for the country in 2010, and revised the plan in 2013. The overall goal of the plan of mobilizing financing from the public and private sectors is seen to ease the

constraints that hinder the country from achieving its renewable energy and energy efficiency potential.

The CTF Trust Fund Committee approved the country investment plan in March 2010, with \$400 million in CTF cofinancing for its implementation. The plan emphasizes the expansion of geothermal-driven electricity generation capacity, and the broadening of the array of financing instruments available for geothermal electricity generation, energy efficiency, and small-scale renewable energy projects. A joint MDB mission in early 2013 led to the updating of the country investment plan in April 2013, in line with the government's goal of expanding private sector financing for renewable energy projects. The 2015 revision reflects the evolution of the government's relevant national policies and priorities assigning high priority to developing the geothermal sector and increasing private sector participation by removing barriers.

Increasing the allocation of CTF resources dedicated to private sector-led investments in low-carbon development initiatives is consistent with the government and CTF objective of leveraging commercial financing for climate-related investments. The fact that the initiatives under the revised climate investment plan will more than double the output of geothermal energy, the quantity of greenhouse gases abated, and the amount of total energy produced shows the efficiency of this approach.

Source	Amount (\$ million)
CTF loan, via ADB	150.00
ADB loan	350.00
Government counterpart funds	400.00
Private sector loan	1,100.00
Bilateral loan	600.00
Total	2,600.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

APPROVED: Private Sector Geothermal Investment Programs

Impact: Improved energy security through the displacement of future coal-fired power generation capacity, and the offsetting or displacement of diesel and gasoline (petrol) generator sets; increased investments in renewable energy following the demonstration of a viable business model for geothermal energy companies in the private sector.

Outcome: A 750 MW increase in geothermal-sourced electricity generation capacity. ADB is evaluating several prospective private sector geothermal projects over the next 3 years, ranging from 30 MW to more than 300 MW per project, for a total of 750 MW. Achieving this target would reduce GHG emissions by 4.4 MtCO₂e yearly. One million households are expected to benefit from the program, which will generate direct and indirect employment for about 4,000 people. Substantial health and environmental benefits from the incremental decrease in air pollution resulting from the program are likewise foreseen.

In principle, Indonesia's geothermal resources offer the potential for transitioning to low-carbon development. However, exploring, verifying, and developing geothermal energy sources presents many geologic and technical risks, and operating geothermal-sourced electricity generation facilities over the long term is likewise fraught with difficulties. Capitalizing on a country's geothermal energy potential is more challenging than backing the development of any other form of renewable energy. Indonesia's Private Sector Geothermal Energy Program comprises several private sector geothermal projects that are to be implemented over 3 years and face common development and financing barriers. The program will facilitate commercial lending and the financial close of geothermal power

projects undertaken by the private sector and state-owned enterprises borrowing without the benefit of a government guarantee. Two subprojects have so far been approved: the Sarulla Geothermal Power Generation Project and the Rantau Dedap Geothermal Power Project (Phase 1).

APPROVED: Sarulla Geothermal Power Generation Project

A subproject under Indonesia's Private Sector Geothermal Energy Program, this initiative will expand geothermal electricity generation capacity by about 320 MW. It will finance the design, construction, operation, and maintenance of three new power plants connected by a 20 km transmission line that will in turn connect with a transmission line to be built by Perusahaan Listrik Negara (PLN), Indonesia's national electric power company. Slated to be the largest single-contract geothermal power project in Indonesia, this project will pioneer a new business model and will demonstrate the potential of Indonesia's geothermal resources.

Source	Amount (\$ million)
CTF loan, via ADB	80.00
ADB (private sector) loan	250.00
Japan Bank for International Cooperation	533.60
Canadian Climate Fund for the Private Sector in Asia, under the Clean Energy Financing Partnership Facility	20.00
Private sector loan (commercial banks)	784.80
Total	1,668.40

ADB = Asian Development Bank, CTF = Clean Technology Fund.

The potential environmental and social impact of the project has been identified and effective measures to avoid, minimize, mitigate, and compensate for the adverse impact are incorporated in the safeguards reports and plans. An indigenous peoples plan has been prepared to mitigate the impact on members of the Batak ethnic group and to maximize project benefits for affected communities. Assistance will be provided to vulnerable women affected by land acquisition, to facilitate their employment during project construction and operation. These women are expected to fill 20%–30% of the permanent unskilled and semiskilled positions necessary for plant operation.

An annual reduction of 1.3 MtCO₂e in GHG emissions is foreseen as a result of the project. Electricity produced by the project will benefit 500,000 households. The construction of the three power plants will employ 1,600 persons, while their operation will create about 100 permanent jobs.

APPROVED: Rantau Dedap Geothermal Power Project (Phase 1)

The 240 MW Rantau Dedap Geothermal Development Project is an ideal opportunity for ADB and the CTF to be instrumental in developing the next generation of greenfield geothermal projects in Indonesia by pilot-testing an innovative, early-stage financing product. The project is located southwest of Palembang in South Sumatera. Phase 1 involves the initial geothermal resource exploration—drilling wells to better ascertain steam reservoir characteristics and

Source	Amount (\$ million)
CTF loan, via ADB	50.00
Private sector loan (commercial banks)	123.50
Total	173.50

ADB = Asian Development Bank, CTF = Clean Technology Fund.

capacity. If phase 1 is successful, a separate phase 2 will follow to complete the drilling of additional steam production and injection wells, and power plant construction. Phase 2 will be financed through a traditional limited-recourse, long-term project financing structure.

The project has been prioritized under PLN's long-term power development plan and the second 10,000 MW accelerated development program launched by the Government of Indonesia in 2010 (Fast Track Program 2). Phase 1 development began within the framework of a 35-year geothermal mining license (IUP), a 30-year power purchase agreement (PPA) with PLN, and a 20-year guarantee from the Ministry of Finance, as stipulated in a business viability guarantee letter signed in 2012. Overall, the project benefits from strong contractual arrangements with creditworthy parties including the Government of Indonesia.

b. Strategic Climate Fund–Forest Investment Program

Indonesia's National Action Plan for Reducing Greenhouse Gas Emissions (2009), its national REDD+ strategy, its Forest Management Unit program, and its recent tenure reforms are far-reaching initiatives that seek to make the country's forestry sector compatible with two overall development objectives: sustainable economic growth and social equity. This transformation now needs to be operationalized. However, there are several constraints, including low institutional capacity for sustainable forest management at the provincial and district levels, lack of institutional capacity for spatial planning, a business climate that is not conducive to investment in sustainable forestry and community forestry initiatives, weak implementation capacity on the part of local communities, and poor access to forest resources.

The FIP seeks to address these constraints on REDD+ implementation, and to increase provincial and local capacity to implement REDD+. ADB will administer a project that addresses various themes such as investments in community-based forest management, institutional development for sustainable forest and natural resource management, and community capacity building and livelihood development.

Indonesia's National Action Plan for Reducing GHG Emissions and its national REDD+ strategy both have ambitious national targets for reducing GHG emissions, to be accomplished by addressing the drivers of deforestation and by increasing forest carbon stocks, thus emphasizing the formulation of subnational action plans in priority provinces. West Kalimantan, a key forested province and the fifth-largest contributor among the provinces to Indonesia's carbon emissions, has been selected by the government as a target province. The key drivers of deforestation and forest degradation in West Kalimantan are commercial logging, conversion of forestlands to agricultural use, coal and gold mining, and uncontrolled fires.

Source	Amount (\$ million)
SCF–FIP grant, via ADB	17.50
Total	17.50

ADB = Asian Development Bank, FIP = Forest Investment Program,
SCF = Strategic Climate Fund.

PIPELINE: Community-Focused Investments to Address Deforestation and Forest Degradation (CFI-ADD+)

Impact: Reduction of 3.1 MtCO₂e in GHG emissions by 2025.

Outcome: Enhanced institutional capacity to implement REDD+ at subnational levels in West Kalimantan.

The project is focused on the implementation of national and provincial REDD+ strategies in Sintang and Kapuas Hulu districts, where natural forests of significant conservation value are threatened with deforestation and degradation. It is expected to improve local governance through the reform of local-government policies and institutions, the provision of positive incentives for promoting conservation, and the dismantling of incentives that encourage deforestation and forest degradation.

The project will provide institutional development assistance to five forest management units in two districts by assessing and mapping the status of the forests concerned, establishing a grievance and redress mechanism, pilot-testing an information system relating to safeguards, training relevant government officials, and pilot-testing incentive schemes. It will also undertake sustainable forest management activities including the provision of incentives, community forest tenure, and open-access production forests; support community capacity development and livelihoods by providing extension services as appropriate; and harmonize national and subnational policies relating to carbon stock improvement.

GHG reduction from the avoidance of deforestation is estimated at about 3 MtCO₂e, including about 1.82 MtCO₂e from the prevention of forest fires; avoidance of forest degradation is estimated at 21,192 tCO₂e of emissions reduction. Other reductions will be obtained from community-based forest management, promoting sustainable and equitable forest and land management, while also reducing poverty, improving the quality of life of indigenous peoples and local communities, protecting indigenous peoples' rights, and improving the conservation of biodiversity and other ecosystem services.



Innovative Private Sector Climate Investment Fund Financing

a. Cambodia Private Sector Set-Asides: Strategic Climate Fund–Pilot Program for Climate Resilience

The PPCR has over \$75 million in concessional funds set aside for innovative climate resilience and adaptation programs and projects in the private sector. This financing can cover private sector activities aimed at reducing a country's risk and exposure to the negative impact of climate change.

ADB is currently administering one such project in Cambodia.

PIPELINE: Spice Value Chain Development (Rainwater Harvesting and Drip Irrigation for High-Value Crop Production)

Impact: Demonstration of rainwater harvesting ponds and drip irrigation systems for growing high-value crops, and the establishment of a line of credit to allow local farmers to build or purchase these systems.

Outcome: More resilient agriculture sector in the Tonle Sap Lake floodplain as a result of leapfrogging from traditional to efficient irrigation and rainwater harvesting techniques.

This project introduces drip irrigation and improved rainwater harvesting technologies to a demonstration farm in Battambang Province in Cambodia to disseminate climate-resilient farming methods to local farming communities. Farmers already use the facility to learn about new agricultural practices and technologies for growing high-value crops such as organic spices. The knowledge gained will help farmers cultivate the surrounding land more efficiently. By using rainwater drip irrigation, farmers will be able to irrigate their land throughout the year without having to extract water from irrigation canals, lakes, rivers, or groundwater reserves.

The project supports the company Akay Cambodia and its investments across the spice value chain, with Akay acting as off-taker for local produce, exporting processed products to international markets.

The project activities are expected to kick-start the adoption of rainwater harvesting and drip-irrigation technologies in Cambodia and help diversify the agriculture sector, which has been traditionally dominated by low-value rice farming. The private sector agribusiness model to be introduced by the project is aimed at promoting export-oriented, high-revenue-generating agricultural activities based on the principles of climate resilience, environmental sustainability, and the pursuit of mutual benefits for local communities and agribusiness developers.

By providing capital for these technologies and on-lending to farmers, the project is expected to demonstrate that improving and modernizing water management practices can increase agricultural efficiency and revenues, while protecting crops against drought and other negative effects of climate change. The business model, once shown to be successful, is likely to be replicated by farmers, financiers, and agribusiness owners elsewhere in Cambodia.

Source	Amount (\$ million)
SCF-PPCR loan, via ADB	5.00
ADB loan	16.50
Local Commercial Banks	6.40
Other	1.10
Total	29.00

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

b. Dedicated Private Sector Program (Regional): Clean Technology Fund

The Dedicated Private Sector Program (DPSP) was created to channel CTF funds directly into private sector investments. It finances initiatives that deliver significant development impact and result in rapid, large-scale financing of CIF-relevant projects with funds leveraged from private sector sources, to achieve long-term reductions in GHG emissions; result in significant positive impact, including cobenefits in sectors other than the environment; and demonstrate proven implementation potential.

APPROVED: Renewable Energy Mini-Grids and Distributed Power Generation

Impact: Expanded access to electricity in rural areas of India, Indonesia, and the Philippines with associated development benefits such as improved health, better education, and opportunities for income generation. Increased scale of efforts to accelerate electrification

Source	Amount (\$ million)
CTF loan, via ADB	30.00
CTF grant, via ADB	5.00
Total	35.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

in target countries through the involvement of the private sector is also expected. Leapfrogging from traditional GHG-intensive development, which relies on petroleum fuels and coal, to the promotion and development of clean, renewable, reliable, and affordable low-carbon forms of energy will improve the lives of people with no access to electricity.

Outcome: The addition of up to 30 MW of new mini-grid capacity as a result of the project, together with GHG emissions reductions of about 1.42 MtCO₂e over the estimated 20-year life of the program, or 70,984 tCO₂e annually.

About half of all Asians—306 million living in India, 66 million in Indonesia, and 16 million in the Philippines—lack access to electricity and depend mainly on biomass, candles, and kerosene to meet their lighting, cooking, and energy needs. Compared with those that have access to modern energy sources, the energy poor generally have lower levels of literacy and education. Their incomes, as well as their access to modern health care and communication facilities, are also substandard by comparison. Escape from this state of recurrent poverty requires access to electricity.

The initiative is intended to catalyze the expansion of access to electricity in rural areas of India, Indonesia, and the Philippines that now lack access to national electricity grids, by relaxing the constraints faced by the private sector in installing and operating renewable energy mini-grids. These constraints include insufficient capital investment in mini-grids; private sector perceptions of unacceptable levels of risk, such as the relatively low rates of return on large-scale investments; the relatively high transaction costs of financing for small-scale projects; and the up-front capital costs of investing in mini-grids, which are relatively high compared with the capital costs of other types of investments.

The project is foreseen to (i) increase the output of renewable energy; (ii) reduce GHG emissions; (iii) demonstrate the profitability of private sector investment in electricity generation powered by renewable sources of energy, so that the technology can be scaled up and replicated across the region; (iv) provide lighting for homes and schools that now lack lighting; (v) clean up indoor air; (vi) lead to better-equipped health clinics; (vii) provide electricity to drive water pumps that increase agricultural output; (viii) improve sanitation facilities; (ix) increase the number of small and medium-sized enterprises; and (x) expand income-generating opportunities.

Under ADB, the program will deploy \$35 million in investment capital for the use of several private sector companies over a period of about 3 years, and will be supported by a \$3.5 million TA advisory program, administered in collaboration with ADB's Energy for All Partnership.

PIPELINE: Mezzanine Financing for Climate Change

Impact: Scaled-up climate equity investments in developing countries in Asia and the Pacific alongside investments made by large institutional investors, pension funds, and public sector institutions; expanded scope and range of potential investments under Asia Climate Partners (ACP); and catalyzed financing for projects that would ordinarily face difficulty raising sufficient debt and equity to reach financial close.

Outcome: The program would result in the installation of about 110 MW of new clean energy capacity and the generation of close to 290,000 megawatt-hours (MWh) per year of clean electricity. Emissions reductions for the program are expected to amount to 216,000 tCO₂e per year, or 4.3 MtCO₂e over the estimated 20-year life of projects.

The program involves establishing a mezzanine finance (subordinated debt, preferred stock and debt with warrant) facility with CTF funds for cofinancing high-development-impact mitigation projects in tandem with ADB's climate equity investment program, ACP. ACP is a joint-venture fund that will undertake commercially oriented private equity investments across a variety of environmental segments, including climate mitigation and adaptation, to demonstrate attractive risk-adjusted returns for investments in these area.

CTF funds would allow projects to proceed where commercial lenders are typically discouraged by the maturity of a sector risk or a country and political risk. The availability of a mezzanine facility as a "sidecar" to ACP is also likely to make the fund more attractive to potential investors, thus enhancing ACP's fund-raising with commercial and institutional investors and deployment activities. The project will be supported by a \$1.5 million TA program, administered by ADB, to facilitate the application of requisite investment evaluation and structuring expertise to the deployment of CTF funds, as well as to cover establishment costs for the facility and additional diligence and structuring costs for transactions undertaken by the CTF facility.

Funds would be deployed in middle-income and low-income developing countries where perceived risks in the country or the sector inhibit commercial investors. Eligible countries would be Bangladesh, Cambodia, India, Indonesia, Lao PDR, Maldives, Mongolia, Nepal, countries in the Pacific region, Papua New Guinea, the Philippines, Tajikistan, Thailand, and Viet Nam.

PIPELINE: Utility-Scale Renewable Energy—Geothermal (Indonesia and the Philippines)

Impact: Scaled-up development of geothermal energy in Indonesia and the Philippines.

Outcome: Support for geothermal resource validation through the mitigation of drilling risks for geothermal projects in both countries.

Source	Amount (\$ million)
CTF loan, via ADB	35.00
Total	35.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

Source	Amount (\$ million)
CTF loan, via ADB	30.00
Total	30.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

The program is expected to have a transformational effect on one of the most competitive sources of renewable energy by unlocking development and contributing to the scaled-up deployment of geothermal technology. The Utility-Scale Geothermal Subprogram has the potential to drive down the levelized cost of geothermal technology below that of alternative fossil-fuel base-load technologies by reducing the resource risk, investors' risk perception, and the cost of renting drilling rigs and hiring drilling professionals and contractors. The project would reduce the resource risk by accumulating and disseminating knowledge of successful risk-mitigation strategies in drilling operations, including technical improvements. The improvements in drilling techniques achieved under the project and the development of risk-mitigation and risk-sharing strategies and instruments, leading to lower premiums for debt and capital, would reduce investors' risk perception. Finally, the construction of new drilling rigs and the increase in the number of drilling professionals and contractors as demand for their services grows would lower rental and hiring costs.

A proposed expansion of the program would include Indonesia and the Philippines, where potential DPSP support areas have already been identified. Indonesia, which has 40% of the world's global geothermal resources, is confident that additional CTF funds would mitigate risks and support other private sector developers in the market. ADB expects all \$150 million of approved program funds under Indonesia's CTF Investment Plan (2010) to be used for the private sector. In the Philippines, ADB is in discussions with two separate private sector firms that are developing geothermal sites in the northern Luzon and eastern Visayas regions but are unable to get funding for the exploration and resource verification stages of their projects.

Source	Amount (\$ million)
CTF loan, via ADB	5.00
Total	5.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

PIPELINE: Renewable Energy Mini-Grids and Distributed Power Generation Program, Phase 2

Impact: Market transformation through the removal of financial and other barriers to private sector-led mini-grid development, and the demonstration of viable commercial business models, to catalyze an increase in the size of the market.

Outcome: Through the establishment of renewable energy mini-grids and distributed power generation systems, expanded access to clean, reliable, and affordable energy, resulting in improvements in the lives of people and benefits such as improved health, better education, and opportunities for income generation.

This program seeks to catalyze growth in access to electricity by addressing barriers to the private sector-led development of renewable energy mini-grids and distributed power generation. Phase 1 of the program (India, Indonesia, and the Philippines), approved by the TFC in 2013, is focused on the incubation of private sector-led development, the pilot-testing and validation of successful business models, and the distillation of lessons learned. The proposed phase 2, an expansion of the program, will promote replication and scale-up across a broader range of CIF countries, on the basis of these successful, "road-tested" business models and other lessons learned. The countries listed for participation include non-CTF countries: Bangladesh, Cambodia, the Maldives, Nepal, and countries in the Pacific region.

As proposed, phase 2 will use a combination of investment, TA, and advisory services to develop renewable energy off-grid and mini-grid solutions in the target countries and thus expand the number of customers with access to modern energy, mobilize investments from the private sector to mainstream mini-grid development, and demonstrate private sector business models that can be replicated and scaled up across the region.

The investment component will deliver a combination of senior debt, subordinated debt, guarantees, and equity investments ranging in size, depending on project structure, financing requirements, and anticipated development impact. CTF funds will be deployed as investment capital, either alongside ADB investments or on a stand-alone basis. Resources will be used to finance gaps in project financing or in a company's plans to scale up implementation, partially mitigate credit risks of project sponsors or perceived risks of other lenders, guarantee short- or medium-term loans to bridge timing gaps between capital expenditure needs and the payment of government subsidies, and, as lower-cost loans, help mitigate the high up-front capital costs of renewable energy systems.

KAZAKHSTAN



Clean Technology Fund

Central Asia's largest economy, Kazakhstan, has extensive fossil fuel reserves, which are the country's primary source of income. As fossil fuels support more than 87% of Kazakhstan's primary energy consumption, the country is unsurprisingly Central Asia's largest GHG emitter. Kazakhstan's energy-related activities account for 85% of annual GHG emissions, which have steadily increased since 2000, and eventually reached 208 MtCO₂e in 2007. Air and water pollution are likewise growing concerns.

In response, Kazakhstan has committed itself to reducing GHG emissions and has defined a goal of reducing the carbon intensity of the local economy by 50% over the period 2015–2020. The government has issued a set of explicit energy sector priorities, with which Kazakhstan's CTF investment plan is consistent.

Submitted in 2010 to the CTF Trust Fund Committee, Kazakhstan's original CTF investment plan was drafted by the government in coordination with the EBRD, IBRD, IFC, and key national stakeholders. After revisions in the original plan based on the Trust Fund Committee's recommendations, the new plan was approved in May 2013, with CTF financing of \$200 million. These funds are expected to leverage \$819 million more in funding from

the public and private sectors for investment projects that could dramatically reduce Kazakhstan's GHG emissions. Two projects in particular will receive CTF funding: (i) the Renewable Energy Development and Municipal Energy Efficiency Project, and (ii) the Karaganda District Heating Modernization Project. ADB will administer the latter project. Subject to approval, another initiative will be funded under the second project.

PIPELINE: Municipal Energy Efficiency and District Heating Modernization

Impact: Creation of an enabling environment for future energy efficiency projects and accelerated market penetration of advanced district heating system design and operations.

Outcome: A reliable, safe, and energy-efficient district heating distribution network for Karaganda district, providing heat supply to about 800 buildings and benefiting about 56,000 households. The project will create energy savings of 3,600 GWh and reduce GHG emissions by 500,000 tCO₂e yearly.

Source	Amount (\$ million)
CTF loan, via ADB	50.00
ADB	110.00
Government counterpart funds	90.00
Total	250.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

The term “district heating” refers to a network heating system powered by a central source that delivers heat to a number of buildings located close to one another. Unfortunately, district heating uses an outdated and inefficient technology. Heat losses average 26% of the total amount of heat generated.

The proposed project will modernize the oldest operating area of Karaganda's district heating system. It will be the first large-scale district heating modernization project in an intermediary city. The project design, which is consistent with international best-practice benchmarks, translates into higher costs for automated controls, instrumentation, and metering. The upgraded district heating system will be the first in Kazakhstan to achieve ISO 50001 compliance. The pioneering nature of the project imposes first-mover risks. Concessional finance is needed to cover the additional costs and risks, including technology transfer. The project will have a powerful demonstration effect, as the design can be replicated in the rest of Karaganda's district heating system and in several other cities. It will have a catalytic impact in accelerating and deepening the market penetration of advanced district heating system design and operations. The final scope and design of the project will be confirmed during the project preparation and feasibility study stage.

The project will inject concessional financing into a critical yet often-overlooked sector suffering from years of underinvestment because of artificially low tariffs and substantial distribution heat losses. It will improve the financial, operational, and technical performance of the implementing agency, with very high demonstration potential.

LAO PEOPLE'S DEMOCRATIC REPUBLIC



Strategic Climate Fund–Forest Investment Program

The Lao PDR has considerable forest, water, and mineral resources, all of which can be used for cultural development, environmental protection, and economic growth. However, the country's forest area has declined dramatically, from 70% of the land area in 1940, to 49% in 1982, and to only 40%, or about 9.5 million hectares, by 2010. While the forestry sector regulatory framework has undergone significant reform since the mid-1990s, the government still has limited capacity to operationalize this reform within the context of a developing political system.

The FIP investments in the Lao PDR are aimed at reducing emissions from deforestation and forest degradation, while facilitating adaptation to the negative impact of climate change. The plan's four themes are all consistent with the Lao PDR's goal of attaining 70% forest cover by 2020, and with the way in which this goal relates to the REDD+ strategy. These four themes are: (i) protecting forests to ensure a sustainable supply of ecosystem services, (ii) promoting smallholder forestry, (iii) scaling up participatory sustainable forest management, and (iv) creating an environment that facilitates the achievement of the foregoing three objectives. An ADB-administered project is proposed to address the first of these four themes.

PIPELINE: Protecting Forests for Sustainable Ecosystem Services (PFSES)

Impact: Reduction of GHG emissions by 801,608 tCO₂e over a 10-year period, positively affecting the environment by conserving biodiversity and other ecosystem services with payments-for-ecosystem-services mechanisms.

Outcome: Improved livelihood opportunities for residents, reduced poverty, economic development of forest-dependent communities of all ethnic origins, and increased gender equality.

The project, which is replicable elsewhere in Lao PDR, comprises four activities that build on ongoing ADB-supported initiatives consistent with Lao PDR's REDD+ strategy. Among the activities is the pilot-testing of participatory sustainable forest management or forest co-management in two or three protected forest areas, and of village and smallholder forestry schemes in beneficiary towns of the Greater Mekong Subregion Biodiversity Conservation Corridors initiative. Other activities involve implementing Lao PDR's REDD+ framework; identifying forests with significant conservation value that lie outside state forest areas; and formulating payments-for-ecosystem-services mechanisms that will ensure the protection of those forests.

Estimates of emissions reductions from deforestation and forest degradation are based on the 50,115 hectares of forest that communities are expected to patrol. While illegal logging and other causes of degradation will persist because of economic developments in the region, patrolling will achieve a 5% reduction in emissions in the first year, and the reductions will increase by about 5% yearly, to 50% by year 10. A total emissions reduction of 461,279 tCO₂e is foreseen over the decade. Other GHG emissions reductions totaling about 1.14MtCO₂e are expected from agroforestry, community-based forest management, and other livelihood support measures.

Source	Amount (\$ million)
SCF-FIP grant, via ADB	13.33
Total	13.33

ADB = Asian Development Bank, FIP = Forest Investment Program, SCF = Strategic Climate Fund.



Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

The Maldives is one of the lowest-lying countries in the world and is particularly vulnerable to a rise in sea level. The elevation of more than 80% of the country's total land area of 300 square kilometers, is less than 1 meter above mean sea level. The Maldives depends entirely on imported oil as its primary source of energy and is therefore very much exposed to fluctuations in the global price of oil. Each of the country's islands has its own electricity generation and distribution systems, all using diesel generators. Although renewable energy initiatives—including incentives for the development of solar–diesel hybrid systems—are in place, their impact has been minimal.

The Maldives was selected for SREP financing in July 2010; following its selection, the country prepared an investment plan that embraces SREP objectives. These include demonstrating the social and environmental viability of low-carbon development trajectories in the energy sector through a carbon-neutral policy that will result in a switch from fossil fuel to renewable sources of energy by 2020. Under the plan, this transformation will be achieved through large-scale generation of electricity using solar, wind, and waste-driven energy sources, in addition to hybrid systems. Such a transformation would also

support socioeconomic development and contribute to poverty reduction and sustainable development. The Maldives plan was endorsed by the SREP Sub-Committee in October 2012.

APPROVED: Preparing Outer Islands for Sustainable Energy Development Project

Impact: An increase in the country's renewable energy supply mix to 25% by 2022, from less than 1% in 2009. The reliable and high-quality supply of energy will improve social services such as community health centers and schools while creating livelihood and employment opportunities. The program will likewise produce direct public health and environmental benefits by reducing emissions of pollutants such as black carbon. It will also reduce the country's annual GHG emissions by about 80,000 tCO₂e.

Outcome: Provision of 21 MW of new solar capacity, 27.6 GWh of annual electricity output, and 7 MWh of energy storage. About 4,600 households will benefit from increased access to electricity in the first five subprojects. The number of beneficiaries will increase as the program covers more islands.

Because of the relatively high cost of imported fuel, in some locations in the Maldives, electricity generated from solar and wind energy sources is less expensive than that generated from diesel.

The Preparing Outer Islands for Sustainable Energy Development Project will transform existing mini-grids through investments in renewable energy and in energy management and control systems, and improvements in storage and distribution networks. The program has two main outputs: (i) renewable energy-ready mini-grid systems developed for the outer islands; and (ii) development of the capacity of the Ministry of Environment and Energy, the State Electricity Company, and Fenaka (the centralized utilities corporation) to implement renewable energy mini-grids.

The project supports solar-diesel hybrid mini-grid installations on 160 outer islands with a solar capacity of about 21 MW. These systems will replace diesel generator sets that currently have a total capacity of 20 MW, thus increasing the Maldives' percentage share of electricity generated from renewable energy sources, resulting in a more reliable supply of energy.

Source	Amount (\$ million)
SCF-SREP grant, via ADB	12.00
Asian Development Fund grant	38.00
Islamic Development Bank	10.00
European Investment Bank	50.00
Japan Fund for Joint Crediting Mechanism	5.00
Government counterpart funds	14.00
Total	129.00

ADB = Asian Development Bank, SCF = Strategic Climate Fund, SREP = Scaling Up Renewable Energy Program in Low-Income Countries..

MONGOLIA



Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Between 1940 and 2007, Mongolia's annual mean temperature increased by about 2.1°C. Annual precipitation fluctuated between a 5%–25% increase and a decrease of roughly the same magnitude. Summer in this landlocked country is unusually long—8 months—and heat waves have increased in duration by 8–18 days. Winters have become extremely harsh, with temperatures ranging from -10°C to -30°C, and dropping to -40°C at night.

The effects of climate change on water resources, land use, snow cover, permafrost, farming, and livestock are also likely to be significant, although Mongolia, with a population of about 2.84 million (2014), contributes relatively little to the GHG emissions total. Ulaanbaatar, the capital, is the political, economic, and cultural center of the country, with almost half of the total population, mostly as a result of in-migration from the countryside. It is also the world's coldest capital city. Safe, clean, and reliable heating is of vital importance to citizens particularly during the months of December and January.

Indigenous renewable energy resources are abundant, and the country has a highly educated science and engineering workforce. In recent years, the government has begun designing laws and regulations to reform the energy regime and engage the private sector in renewable energy development. Barriers, however, exist: financing availability is low, the costs of technology are high, and the regulatory framework is less than ideal.

SREP concessional financing is seen to address these barriers to renewable energy development and efficient heating services, particularly those related to the up-front cost of capital and the technology risks and off-taker risks.

PIPELINE: Upscaling Rural Renewable Energy

Impact: The project would transform rural areas outside Mongolia's Central Energy System into areas with high penetration of renewable energy.


Outcome: Two 10 MW solar PV plants would be installed and up to 5 MW of wind turbines constructed. For the solar PV plants, project site considerations include proximity to load centers to avoid transmission and distribution losses, access to transport for equipment and construction materials, closeness to the grid to minimize connection costs, and proximity to existing utility operations to enable the use of their staff for plant operation and maintenance. For wind power, several sites in Uvs province are being considered and wind capacity will be measured over a 12-month period before construction.

Source	Amount (\$ million)
SREP, via ADB	15.6
SREP, via World Bank	12.9
ADB	22.9
World Bank	11.4
Government counterpart funds	1.9
Total	64.7

ADB = Asian Development Bank, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

The Government of Mongolia is also looking into the possibility of using hydropower to expand the generation system. Ten sites in the Western Energy System area have been identified; four were developed previously but no longer operate because of improper maintenance. Some thought is also being given to rehabilitating the Uench hydropower plant, which a flaw in water intake design has kept from functioning properly. Rehabilitation could result in 930 kilowatts of installed capacity serving nearby districts via a 35-kilovolt overhead transmission line. This project would look as well into the rapid increase in the demand for electric heating in the Western Energy System, and possibly demonstrate the usefulness of shallow ground heat pump technology as a more efficient means of distributing electricity heating. The demonstration would take place at five public sector buildings such as provincial government administration or school buildings.

In summary, the project is expected to establish the feasibility of achieving high penetration of distributed renewables with incremental output from solar and wind sources and the viability of replacing coal heating systems with shallow ground heat pumps, and to rehabilitate small hydropower systems in preparation for their eventual operation. Capacity development TA in support of these activities would also be provided.



Strategic Climate Fund–Pilot Program for Climate Resilience and Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

a. Strategic Climate Fund–Pilot Program for Climate Resilience

Relative to many other Asian countries, Nepal is significantly vulnerable to the negative impact of climate change, with a climate ranging from subtropical conditions at an elevation of 60 meters above sea level, to arctic conditions at elevations exceeding 8,800 meters. The communities that inhabit Nepal's remote rural areas are poor and entirely dependent on natural resources for their livelihood, making them extremely vulnerable to climate change. The water sector faces particularly unique challenges. Rising average temperatures resulting from climate change are causing glaciers to retreat and snow cover to melt. Such outcomes make water discharge patterns uncertain, giving rise to long-run concerns about water availability, particularly in remote communities. Climate change thus directly or indirectly causes floods and droughts that destroy agricultural crops, displace people, adversely affect livestock, deposit sediment on agricultural lands, and diminish the supply of water for drinking and sanitation. These outcomes make women much more vulnerable than men because of their traditional roles, which include fetching water, gathering firewood and fodder, and tending agricultural lands.

While Nepal's institutions currently lack the capacity to address all of the challenges caused by present and future climate change, the government has recognized that resilience is an appropriate national goal. Nepal's National Adaptation Programme of Action (2010) comprises 43 climate change adaptation options clustered into nine priority profiles. Several of these call for interventions relating to soil and water conservation, watershed management, improvements in water storage, scaling up of multiple-use water systems, and ecosystem management. Formerly, water management in Nepal was based on administrative divisions rather than geographic boundaries. Through its Integrated Water Resources Management Policy, now in preparation, the Department of Soil Conservation and Watershed Management acknowledges that land management at the watershed scale is necessary for effective water management, and that such an approach would increase the capacity of watersheds to provide water for local residents.

Nepal's SPCR was drafted under the leadership of the government and in coordination with ADB, members of the World Bank Group (IBRD, IFC), and key national stakeholders. Several multi-stakeholder consultations have been convened since September 2009. In March 2010, ADB approved small-scale TA for an assessment of both the risks of local communities being adversely affected by climate change and their capacity to adapt to the effects. Broad-based consultations were held at both the national and local levels under this initiative. A second joint programming mission, in which government, NGOs, local government agencies, and civil society organizations participated, was fielded in November 2010 to review the findings of the SPCR preparatory team, and to reach agreement regarding the SPCR-supported projects that were to be given priority.

Nepal's SPCR supports projects that will improve the resilience of watersheds in mountainous regions, and reduce the vulnerability of communities and ecosystems to climate-related hazards, particularly through initiatives funded by the private sector. It has the following components: Building Climate Resilience of Watersheds in Mountain Eco-Regions; Building Resilience to Climate-Related Hazards; Mainstreaming Climate Change Risk Management in Development; Building Climate-Resilient Communities through Private Sector Participation; and Enhancing the Climate Resilience of Endangered Species.

Two of these components—Building Climate Resilience of Watersheds in Mountain Eco-Regions and Mainstreaming Climate Change Risk Management in Development—are administered by ADB. The first project will address the currently unreliable and insufficient supply of freshwater in communities dependent on watersheds in mountain ecoregions. The second project will support the integration of climate change risk management into Nepal's infrastructure investments, development programs, and policy making.

APPROVED: Mainstreaming Climate Change Risk Management in Development (Technical Assistance 1)

Impact: Increased resilience to climate variability and climate change.

Outcome: Safeguards against the effects of climate change incorporated in the government's infrastructure development programs and policies.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	7.16
Nordic Development Fund grant	0.60
Total	7.76

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

The TA was designed after consultations with stakeholders from government, NGOs, academic institutes, and development partners during the preparation of Nepal's SPCR. Its key activities build on the country's ongoing and completed climate change initiatives, as well as an earlier ADB TA aimed at strengthening the institutional capacity of the SPCR focal agency, the Ministry of Science, Technology and Environment. The TA's strategy addresses priorities identified in Nepal's National Adaptation Programme of Action, the findings of the SPCR assessment, and consultations with participating sector departments.

The overall focus is on infrastructure—irrigation, flood protection, roads, water supply and sanitation, and urban development. Eight districts from across the country were selected for case studies on integrating climate change risk management into development planning. The case studies inform a vulnerability assessment and adaptation planning process using climate threat profiles downscaled to each district and tools designed for each infrastructure sector. The field assessments are synthesized in order to guide national sector departments in the reform of policies, procedures, and design standards to address the impact of climate change. These tools will be incorporated in an overall climate change risk management framework. The government departments concerned will then use these tools in screening future development projects for their ability to address impact and significant risks in the project areas concerned. Department staff will be trained to apply vulnerability assessment and adaptation planning tools and implement the identified reforms. These activities will ultimately result in the use of the tools and mechanisms for screening climate change risk in future projects.

The TA is also undertaking training, research, and education activities to enhance knowledge about climate resilience among diverse stakeholders including local government planners, researchers, and university and secondary school teachers and students. Finally, the TA is assisting the Government of Nepal in improving coordination and developing a common results management framework across its various climate change programs.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	23.54
Nordic Development Fund grant	4.63
Total	28.17

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Building Climate Resilience of Watersheds in Mountain Eco-Regions

Impact: Improved climate resilience in Nepal mountain communities.

Outcome: Access to more reliable water resources for communities in selected climate-vulnerable mountain watersheds.

SPCR support is a critical factor in increasing the resilience of water resources and mountain ecosystems. This project will improve the management of water catchments, and build or upgrade water storage infrastructure in six districts in the West Seti Subbasin of the Karnali River Basin in the Himalayas. The Lower West Seti and Budhi Ganga watersheds were selected because of their high degree of vulnerability to climate change impacts, with their collective population of nearly half a million living on subsistence income. The mountain slopes in this area average nearly 30 degrees and most of these settlements are accessible only on foot.

The project design is based on techniques formulated by the DSCWM, lessons learned from the experience of international NGOs and research organizations, international and national experience in watershed management, and links with Nepal's local action plans for adaptation. It supports, strengthens, and facilitates the scaling up of interventions that build long-term resilience to the negative impact of climate change in the country.

Major outputs consist of improvements in the management of water catchments and the upgrading of water storage infrastructure. To achieve these, about 100 subprojects managed by the beneficiary communities will be implemented. In consultation with communities, the project will formulate and implement water catchment management plans to stabilize gullies and hillsides, build water collection structures, and construct water storage ponds. Information relating to water conservation methods and water-saving agricultural techniques will be provided to beneficiary communities. At the national level, the soil and watershed department's watershed management and planning capacity will be strengthened to ensure that water and land management at the local level is both integrated and socially inclusive.

Experience in improving water resource access and reliability in all six beneficiary districts will be shared through a knowledge management plan allowing knowledge gained in the project to be widely disseminated and replicated in other country-level programs, and communicated to stakeholders at all levels in Nepal and at international forums on climate change adaptation. The capacity of all project management and implementing units to coordinate activities related to the project with those of other government agencies and NGOs will be strengthened.

Ultimately, the project will improve catchment management in beneficiary communities, and will construct or upgrade existing water storage infrastructure, thus improving the availability and reliability of water supply for 45,000 households. It will also facilitate the joint management of water and land by local communities and the government, with a view to making watershed management integrated and socially inclusive in serving beneficiary communities, improving the resilience of Nepal's mountain communities, and allowing knowledge gained through the project to be replicated elsewhere in Nepal and beyond.

b. Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

The power generated by the Nepal Electricity Authority, with its total installed capacity of 706 MW, is supplemented by electricity purchased from India. However, the availability of electricity falls short of what is required to meet demand, resulting in the current energy crisis. The inevitable forced load shedding has reached 12–16 hours per day during the dry season. More than 80% of the country's population lives in the rural areas and only 56% of all households have access to electricity, some through networks not connected to the national grid. Households that lack access to electricity depend largely on kerosene for lighting, while some consumers rely on diesel or gasoline generators. Dependence on traditional biomass—wood in particular—to meet energy requirements has resulted in accelerating deforestation, which in turn leads to erosion and environmental pollution. Nepal's inadequate supply of energy is a major constraint on economic growth and poverty reduction, especially with energy demand projected to grow by 7% yearly until 2020.

The government has established the National Rural and Renewable Energy Programme in response to the situation. This program gives priority to the development of electricity generation facilities powered by renewable energy sources, both on- and off-grid. However, although the country appears to have substantial solar and wind resources capable of producing electricity, its hydropower potential has remained largely undeveloped.

The SREP Investment Plan for Nepal, which was developed in consultation with partner MDBs and approved by the SREP Sub-Committee in November 2011, forms part of the National Rural and Renewable Energy Programme. The objectives of this plan are to (i) leverage complementary credit, grant, and private sector equity cofinancing for the development of electricity generation facilities powered by renewable energy; (ii) scale up access to renewable sources of energy; (iii) reduce poverty in a socially inclusive and gender-neutral manner while mitigating climate change impacts; and (iv) ensure sustainable operations through TA and institutional capacity building.

The revised investment plan approved in April 2015 takes a more realistic view of sustainable energy prospects in Nepal over the next 12–18 months. Given the macroeconomic challenges and operational constraints in the finance sector, the small hydropower project sector, and other renewable energy prospects, cost reduction in solar power systems, and the expanding solar supply chain, CTF funds were reallocated from private sector on-grid small hydropower projects to public–private partnerships in solar power development, which ADB will also administer.

Source	Amount (\$ million)
SCF–SREP grant, via ADB	11.20
ADB loan (Asian Development Fund)	5.00
Community contributions	8.47
Government counterpart funds/NRREP	3.25
Total	27.92

ADB = Asian Development Bank, NRREP = National Rural and Renewable Energy Programme, SCF = Strategic Climate Fund, SREP = Scaling Up Renewable Energy Program in Low-Income Countries..

APPROVED: South Asia Subregional Economic Cooperation Power System Expansion Project Mini and Micro Initiatives (Off-Grid Rural Electrification through Renewable Energy)

Impact: Increased access to electricity from renewable energy sources in rural areas of Nepal and improved power exchange across the border; and improved income and welfare of rural communities engaged in activities relating to agriculture, education, health, and rural enterprise.

Outcome: Installation of up to 4.3 MW of mini hydroelectric power plants and up to 0.5 MW of

mini-grid-based solar or wind systems producing about 25,228 MWh of renewable energy yearly, providing more than 30,500 rural households with access to electricity.

This project, the second component of Nepal's SREP investment plan (Mini and Micro Energy Initiatives: Off-Grid Electricity), will have the following outputs: (1) transmission system expansion and upgrading; (2) distribution system expansion and upgrading; (3) off-grid renewable energy development, with SREP funding; and (4) capacity building, also with SREP funding.

An SREP grant will support the development of mini-grid-based renewable energy systems in off-grid, rural communities, including the installation of up to 4.3 MW of aggregated mini hydroelectric power plants and up to 0.5 MW of aggregated mini-grid-based solar or solar–wind hybrid systems. The introduction of small-scale wind power is a first step in the

development of Nepal's wind resources at a progressively larger scale. The renewable energy mini-grid scale will be tailored to community needs. Subprojects will be developed by rural communities on the basis of their ability and willingness to pay, and in line with the available incentives provided under the National Rural and Renewable Energy Programme.

The physical investments will be reinforced and supplemented by capacity-building support for the Alternative Energy Promotion Centre, including project management support, institutional capacity enhancement, and parallel livelihood development activities in the project area. The capacity development component will facilitate the overall expansion of mini-grid installations and the scaling up of the average size of installations. The scope of capacity development will be tailored to project implementation needs, and will include procurement assistance, training in operation and maintenance for renewable energy plant operators, and activities aimed at building brand awareness and consumer engagement in communities to be served by these investments.

PIPELINE: On-Grid Utility-Scale Solar Development (Public-Private Partnership for Solar Development)

Impact: Direct support for the growth of the solar supply chain through renewable energy equipment and service providers, and for the removal of psychological barriers via price discovery while indirectly maximizing private sector participation. The sector reforms will promote policy evolution to create a viable self-sustaining market for solar energy services.

Source	Amount (\$ million)
SCF-SREP loan, via ADB	20.00
Asian Development Fund	50.00
European Union grant	20.00
Private sector equity	5.00
Government counterpart funds	5.00
Total	100.00

ADB = Asian Development Bank, SCF = Strategic Climate Fund, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

Outcome: Increased solar energy capacity through the installation of at least 25 MW with annual generation output of 36.5 GWh. This is expected to reduce GHG emissions by about 25,000 tCO₂e annually by 2020. The project will benefit around 19,000 households, or 91,000 people, with access to clean energy.

The project will support installations that can be constructed and commissioned as an immediate response to Nepal's power deficit. Three types of installations will be pilot-tested: (i) captive generation at industrial estates, reducing diesel-based generation; (ii) semicaptive generation, with surplus power delivered to the grid; and (iii) conventional installations delivering power directly to the grid. Candidate sites are industrial estates, Nepal Electricity Authority sites with available land, telecommunications towers, and other sites with sufficient land area such as airports (active or abandoned). SREP funds will be used to address up-front development risks for captive generation. For installations selling power to the grid, the funds can cover part of the cost difference between the solar output and the average cost of supply from the Nepal Electricity Authority. SREP funds will cofinance a program loan from ADB so that physical investments are synergistic with energy sector reforms.

PACIFIC REGION



Strategic Climate Fund–Pilot Program for Climate Resilience

The Pacific island states are some of the smallest countries on earth. Located in the world's largest ocean, these are generally geographically remote countries with fragile environments and small, widely dispersed populations, resulting in significant development challenges. The degree of vulnerability to natural hazards for most of these countries is extreme, as they are prone to a variety of natural disasters, predominantly weather and climate related. These events often adversely affect both the lives and the livelihoods of local residents, as well as the national economy overall. Residents of these countries' low-lying atolls and islands are particularly susceptible to a rise in sea level. Subsistence agriculture and fishing support large portions of their economies, which are often at significant risk of damage from natural disasters. While the long-term goal of most Pacific island countries is rapid, sustained, broad-based economic growth, this objective must somehow occur within the context of a small, narrowly focused economy that is vulnerable not only to natural disasters but also to external shocks of human origin such as widely fluctuating prices of fuel and imported food.

There is deep concern in the Pacific region that climate change will exacerbate disaster risk, which will in turn place an additional burden on humanitarian and development systems.

The negative impact of climate change on these countries heightens the vulnerability of Pacific island households, with extreme weather-related events now more frequent than in past decades. These events include a wide array of disasters such as droughts, floods, coastal erosion, rising sea levels, and increases in average air and sea temperature and in the frequency and intensity of tropical cyclones. Women are particularly vulnerable owing to their traditional responsibilities of ensuring food supply, and maintaining a degree of health for the household to which they belong.

Because of this vulnerability, the PPCR Sub-Committee invited the Pacific region to prepare a collective SPCR. A draft SPCR was prepared under the leadership of the governments of three pilot countries—Papua New Guinea, Samoa, and Tonga—and in coordination with ADB, IBRD, and other development partners, as well as key stakeholders in the region. It builds on existing cooperative frameworks for addressing climate change-related risks. Each of these three countries is also preparing a national-level SPCR.

Approved by the PPCR Sub-Committee on 30 April 2012, the SPCR has the overall objective of mainstreaming adaptation to climate change and disaster risk reduction into national, sectoral, and local planning and development initiatives. A particular focus of the regional SPCR is the improvement of institutional capacity in the Pacific island countries to plan and coordinate initiatives that will increase their climate resilience.

The regional SPCR has three components: (i) Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into National and Local Development Policies, and Planning; (ii) Identifying and Applying Practical Climate Change Adaptation and Disaster Risk Reduction Knowledge and Experience; and (iii) Building Pacific Island Countries' Capacity to Respond to Climate Change Risks. ADB will administer the first and third components, which will be implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) under a regional TA initiative.

APPROVED: Implementation of the Strategic Program for Climate Resilience

Impact: Increased resilience of Pacific DMCs to climate variability and climate change.

Outcome: Improved capacity of Pacific DMCs to respond to climate change impact and related natural disasters.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	3.69
Total	3.69

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

The Pacific regional SPCR has three complementary components, to be administered by ADB (components 1 and 3, to be implemented under a regional TA initiative) and the World Bank (component 2), and delivered through the agencies and mechanisms of the Council of Regional Organisations in the Pacific. The TA for the first and third components has two major objectives: (i) to mainstream climate change adaptation and disaster risk reduction into national and local development planning and policy making, and (ii) to improve the capacity of Pacific island countries to respond to climate change-related risks, thus increasing the resilience of Pacific island countries.

ADB's Pacific Department is the executing agency for the TA. The department thus has overall responsibility for coordinating, supervising, and implementing all activities related

to the TA. ADB has in turn engaged the Secretariat of the Pacific Regional Environment Programme in Apia, Samoa, to provide program management services.

An advisory panel will guide the program in conjunction with agencies of the Council of Regional Organisations in the Pacific. A coordination secretariat to be established at the Pacific Islands Forum Secretariat in Suva, Fiji, will serve as the advisory panel's secretariat. It will coordinate the implementation of the various components of the regional SPCR, and national and regional SPCR programs.



Strategic Climate Fund–Pilot Program for Climate Resilience

Papua New Guinea (PNG) comprises the eastern half of the island of New Guinea, as well as four other large islands and 600 smaller ones, some of which are low-lying islands. Climate change will affect all sectors of the PNG economy, with its semisubsistence rural economy supporting more than 85% of the population. The country's coastal areas will suffer inundation, loss of wetlands, and flooding, as well as damage to reefs, mangroves, and fisheries, all of which will ultimately result in the displacement of entire communities. In some cases, smaller islands, including some of the country's barrier islands, will be completely submerged. Coastal infrastructure, including roads, marine installations, and urban settlements, will likewise be damaged. Changing weather patterns and increasing average temperatures will threaten the food security of a significant portion of the country's population that relies on subsistence agriculture for its livelihood.

Both bilateral and multilateral donors as well as international NGOs have provided PNG with a significant amount of development assistance, much of which addresses the impact of climate change. However, the combined resources of PNG and these development assistance providers remain inadequate to meet the challenges the country faces as a result of its vulnerability. PNG's overall level of knowledge and awareness of climate change, as well as its institutional capacity and tools for addressing the crisis, is still limited. There is little

understanding of the risk of negative climate change impact at the local community level, and there is limited institutional capacity at the national level to integrate the management of the risk of negative climate change impact into overall development planning. What is needed to address these constraints—but is currently lacking nationwide—is a systematic approach that is based on building resilience to the risk of climate-related disasters.

Following an invitation to PNG to participate in the Pilot Program for Climate Resilience, ADB approved TA for the design and formulation of a Strategic Program for Climate Resilience in support of the implementation of climate change-related initiatives included in the PNG's Vision 2050, Development Strategic Plan (2010–2030), Medium-Term Development Plan (2011–2015), Public Investment Program (2014–2018), and Climate-Compatible Development Strategy (2010). All of these strategies are aimed at safeguarding PNG's development investments against the negative impact of climate change, by improving access to resources, knowledge, and tools that relate to climate change impact and ensuring that the country's entire infrastructure is climate resilient. These measures are necessary for sustaining social development, food security, and poverty reduction.

PNG's SPCR comprises a single investment project with three components: (i) Building Climate Resilient Communities; (ii) Addressing Climate Change Risks to Food Security; and (iii) Climate Resilient Infrastructure. ADB will provide funding for a project preparatory grant to support the formulation of the investment project and will administer this grant. PNG's climate change and development authority will be the executing agency during the project implementation phase.

PNG's SPCR has identified five target provinces: Bougainville, East New Britain, Manus, Milne Bay, and Morobe. All of these provinces comprise small, low-lying coral islands or atolls. The small communities that inhabit these islands have the following characteristics: relatively high population density, geographic remoteness, poor transport and communication links, weak or no access to government services, limited areas suitable for food production, and significant dependence on marine resources for both food and livelihood. Many of these communities suffer from a complete lack of potable groundwater. The project will focus on 21 priority vulnerable islands and atolls identified through a participatory process using SPCR-identified risk factors.

Stakeholder participation during the preparation of PNG's SPCR was extensive. It took the form of focus group discussions with key stakeholders, a series of consultative workshops at the national level, semi structured interviews with representatives of NGOs and Office of Climate Change and Development communications staff, and a household survey of vulnerable communities in Central Province. An environmental assessment and review framework has been formulated to guide environmental assessments at each project site. The project will not require the resettlement of any households, and none of the residents of the beneficiary communities is a member of any group of indigenous people.

Source	Amount (\$ million)
SCF–PPCR grant, via ADB	30.00
Government counterpart funds	2.04
Total	32.04

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Building Resilience to Climate Change in Papua New Guinea

Impact: Increased resilience to the impact of climate variability and change.

Outcome: Improved capacity of communities (in vulnerable atolls and islands), government agencies, and civil society to plan and respond to the impact of climate change.

First, climate change and vulnerability assessments will be carried out and adaptation plans developed for the target communities. For the 21 identified vulnerable islands, the project will (i) prepare local climate projections; (ii) undertake climate vulnerability assessments in consultation with local administrations and beneficiary communities, develop climate change vulnerability adaption plans and emergency response strategies in the event of extreme climate events, and provide training in actions and procedures to be followed if such extreme climate events occur; (iii) install around 190 priority water supply and storage facilities and 100 ventilation-improved pit latrines identified during the vulnerability assessments near community facilities (schools, aid posts, and churches with their large collection areas and public access) to improve village hygiene against waterborne disease; (iv) assist communities in preparing climate adaptation subprojects; and (v) incorporate the climate adaptation subprojects in local, district, and provincial development plans. On the basis of these plans, the project will support communities in preparing financing applications for identified climate adaptation subprojects to either the government's District Services Improvement Program or, where appropriate, a small grant facility to be established under the project.

Second, sustainable fishery ecosystems and food security investments will be pilot-tested in nine vulnerable island and atoll communities. The project will assist local communities in nine sites in (i) pilot-testing techniques used in the rehabilitation of protective coral reefs and degraded mangrove forests, including the definition and operation of locally managed marine areas and the development and implementation of management plans, mapping, and environmental monitoring (including fish, coral, and seaweed species); (ii) pilot-testing income-generating activities in the marine environment, including aquaculture of fish and crustaceans, and localized processing of marine products to extend their shelf life and improve food security; and (iii) pilot-testing the stabilization of watershed catchment areas, adopting a ridge-to-reef approach in island hinterlands through tree planting and other slope stabilization measures, as appropriate.

To further improve food security in the same nine vulnerable islands and strengthen trading links between the islands and the mainland, the project will (i) assess the extent of food insecurity anticipated from climate change and variability, (ii) identify options and priorities for addressing food insecurity in consultation with local communities, (iii) demonstrate how to implement selected priority options, and (iv) increase the production and distribution of planting material in selected agricultural stations.

Third, an enabling framework for climate-resilient infrastructure will be established and the communications network extended. The project will develop an enabling framework to mitigate the impact of climate change on coastal infrastructure (ports, wharves, and jetties) by (i) developing policy documents, (ii) upgrading engineering design standards, (iii) incorporating benefits from climate protection in feasibility studies, and (iv) recommending sustainable financing alternatives for operation and maintenance. Training will be provided to enhance the capacity of national agencies, the PNG Ports Corporation, provincial administrations, and Coastal and Inland Fisheries Development Agency personnel to incorporate climate change considerations in the design, construction, operation, and maintenance of coastal infrastructure.



Clean Technology Fund

In 2010, the transport sector consumed 66% of all fuel imported into the Philippines and accounted for nearly one-third of total GHG emissions. As motorcycles and motorized tricycles are the most inexpensive motorized mode of transport, they now compose more than 52% of the country's entire motor vehicle fleet and are considered responsible for 80% of all air pollution in Metropolitan Manila.

The Philippines relies heavily on imported fuel. In 2010, the country's oil import bill reached \$8.78 billion. The results of preliminary models suggest that the country could reduce its volume of oil imports by 6% if it increases the use of electric vehicles to at least 7% of all motor vehicles by 2015. Further, if this percentage share were to rise to 15% by 2030, the volume of oil imports would fall by more than 40%. Besides reducing the country's oil import bill, these shifts in the composition of the motor vehicle fleet would significantly reduce GHG emissions and result in other economic benefits.

Energy-efficient electric vehicles (EEEVs) could reduce overall energy consumption by up to 50% and GHG emissions by up to 60%, compared with vehicles using internal combustion engines. The electric vehicle policy being prepared by the government would exempt all

EEEVs from import taxes for 9 years, and would provide other incentives to encourage the electric vehicle industry in the Philippines.

Following an invitation to apply for CTF funding, the government formulated a country investment plan in coordination with ADB, IBRD, IFC, and key national stakeholders. The benchmark level of funding used in formulating this plan was \$250 million in CTF financing. The funds were to be used to support public and private sector investment in (i) energy-efficient transport; (ii) energy efficiency in the industry sector; and (iii) the expansion of electricity generation facilities powered by renewable sources of energy.

A revision of the plan refocused the proposed CTF funding on an EEEV project and a revised solar energy development project. These changes gave the original plan a more direct focus, which was to promote the development and use of the country's renewable energy sources, increase energy efficiency, and encourage the use of sustainable transport. CTF resources are thus to be used directly to accelerate investment in the electric vehicle industry and in renewable energy systems. In August 2012, the CTF Trust Fund Committee endorsed the Philippines' revised country investment plan. The \$250 million in CTF funding that has been approved is expected to leverage \$2.5 billion in additional funding. ADB will administer the country's revised country investment plan.

APPROVED: Market Transformation through Introduction of Energy-Efficient Electric Vehicles

Impact: Sustainable transport and energy security as a result of the development of nontradable domestic renewable energy resources as transport fuel, and accelerated growth of the electric vehicle industry in the Philippines through the demonstration of new technology and business models.

Source	Amount (\$ million)
CTF grant, via ADB	5.00
CTF loan, via ADB	100.00
ADB loan (ordinary capital resources)	300.00
Government counterpart funds	99.00
Total	504.00

ADB = Asian Development Bank, CTF = Clean Technology Fund...

Outcome: Reduction of GHG emissions by more than 250,000 tCO₂e through the introduction of 100,000 e-trikes; reduction of air pollution in areas where the e-trikes are deployed; and creation of about 10,000 jobs (the number will increase as the industry grows).

Following the success of the ADB-funded EEEV pilot project in Manila, the government is now expanding the geographic coverage of the project to the entire country. An important feature of the expanded project is the economic incentives it provides to encourage the early adoption of EEEVs as the most cost-efficient means of establishing a sustainable domestic e-vehicle industry. The overall objective of the project is to replace 100,000 gasoline-fueled tricycles with three-wheeled plug-in electric vehicles or e-trikes that use rechargeable batteries.

This project delivers immediate benefits. With e-trikes accommodating up to seven passengers, compared with only four in the case of tricycles driven by internal combustion engines, the project will immediately increase access to motorized transport.

Electric transport vehicles in addition to e-trikes are likely to be used even after the project, at least some of them replacing transport vehicles powered by internal combustion engines. The widespread adoption of e-trikes will likewise increase the income of drivers by reducing maintenance and fuel costs. It will also generate upstream employment in the e-trike

manufacturing subsector. Although these vehicles are mostly assembled locally, some parts will be produced in the country. Finally, over the long term, the project could lead to the establishment or upgrading of vehicle safety and efficiency standards.

Source	Amount (\$ million)
CTF loan, via ADB	20.00
Government counterpart funds	20.00
ADB	80.00
Total	120.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

PIPELINE: Solar Energy Development Project

Impact: Increased energy security, foreign exchange savings, and protection against global price fluctuations through the use of nontradable domestic energy sources; and improvement of sector efficiency through the entry of more players and choices into the market, reducing the cost of technology and improving technology credibility through the actual operation of rooftop systems.

Outcome: Net reduction of about 0.03 MtCO₂e per year as a result of the installation of at least 40 MW of rooftop solar PV systems.

The goal of this project is to support the establishment of 40 MW of solar-powered electricity generating capacity, which will be installed at commercial establishments, government offices, and residences. The project will demonstrate the viability of solar energy technology through the operation of rooftop systems, at a unit cost that is expected to fall over time. Analysis of the project's benefits suggests that for each solar rooftop system established, at least 10 more systems will be installed over the long term because of the project's demonstration effect.

A photograph showing the silhouette of a woman in profile, looking out over a city street. In the background, there are buildings and a white car. The image is used as a header for the report.

Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Solomon Islands comprises about 996 islands in the South Pacific with an economy made up of a mixed subsistence-based sector, on which the majority depends, and a small monetized sector controlled by large-scale commercial enterprises. The country's population in 1999 was about 515,870, with 80% living in the rural areas and 20% residing in the urban areas. A decade into the new millennium, the total population was growing by about 2.3% per year. The urban population was growing even more rapidly, at 4.7% yearly, indicating a higher energy demand from urban areas.

The country is almost entirely dependent on imports of refined petroleum fuels for its electricity generation, transport, and lighting needs. The installed grid generation capacity is 28 MW and is currently 100% diesel generation. Generation capacity outside Honiara, the capital city, is 6.9 MW; Honiara accounted for 90% of the total energy generated in 2012. As of 2009, 11.8% of households in Solomon Islands were connected to the electricity grid, 0.7% owned generators, and 8.7% were supplied with energy from solar sources—for a total household electrification rate of 21.2%.

The country has a National Energy Policy Framework (2007), which is currently (2013) being revised to set broad policy directions for the industry. The latest draft of this revised

framework includes a renewable energy target of 50% installed capacity by 2020. The implementation of the draft revised National Energy Policy Framework is supported by the draft Renewable Energy Investment Plan (REIP), where the country outlines key investments in renewable energy.

The World Bank Group and ADB conducted joint missions to the islands in August 2012 and August 2013. The SREP Sub-Committee approved the country's SREP Investment Plan in June 2014.

Source	Amount (\$ million)
SCF-SREP loan, via ADB	6.80
ADB	6.50
Private sector	1.00
Government counterpart funds	2.50
Total	16.80

ADB = Asian Development Bank, SCF = Strategic Climate Fund, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

PIPELINE: Solar Photovoltaic Development

Impact: Economic benefits from increased solar generation through reduced importation of fossil fuels, improved energy security, and reduced tariff volatility due to partial conversion of the national grid to renewable energy; and reduced GHG emissions.

Outcome: Increased grid-connected solar power generation following the construction of 2 MW of trial grid-connected solar power; increased energy access

through a private sector-led household solar system rollout benefiting 2,000 households in rural areas; and an enabling environment and strengthened institutional and human resource capacity.

Given the country's solar irradiation, estimated at 5.5–6.5 kilowatt-hours per square meter per day, and the likelihood that stand-alone solar and home systems will put an end to land acquisition and resettlement issues common in the islands, there is significant potential for the expansion of both grid-connected and distributed solar generation in the country. The proposed project will address barriers to private sector entry into solar development in the country, design electricity generation system models, and conduct outreach to potential private sector investors.

The first component will increase grid-connected renewable energy capacity by supporting the construction of 2 MW of grid-connected solar generation at four locations on the Solomon Islands Electricity Authority grid. System modeling for solar power integration and training for Solomon Islands Electricity Authority staff will be implemented to ensure sustainability. The model will be readily replicable for use in connecting rooftop solar systems to the grid at commercial scale.

The second component—the scale-up of household solar power—will involve developing a private sector fee-for-service model for rural households that install, own, operate, and maintain household solar systems. Under the project, the model will be designed, capacity-building assistance will be provided to the private sector, and equipment costs will be partially subsidized. Ownership of the household solar systems will remain with the private sector and households will pay an up-front fee for service delivery to cover operation and maintenance costs and partial asset depreciation, to help address issues of irregular income generation in the rural areas, the need for regular external maintenance, and difficulties with tariff collection in remote locations. Households that pay for electricity services are more likely to better manage and address issues related to their electricity consumption rather than if they were given the services for free.

TAJIKISTAN



Strategic Climate Fund–Pilot Program for Climate Resilience

Tajikistan, among the countries in Central Asia, is one of the most vulnerable to climate change. Increases in average temperature have significantly reduced the country's snow cover in the past few decades, resulting in more frequent avalanches, droughts, landslides, rockfalls, and violent winds, which destroy land, crops, and infrastructure, and sometimes even lead to loss of human life. Future climate change is likely to worsen these conditions by altering the timing of snowmelt, thus adversely affecting the country's water supply and disrupting both agricultural production and availability of electricity, particularly since hydropower is the source of virtually all electricity generated in the country. Glacial lake outburst floods and consequent destabilization of mountain slopes will likewise affect a number of economic sectors, in addition to the localized negative impact on human life and property.

Overlapping, and sometimes conflicting, mandates of government, inadequate coordination among agencies, meager flows of financial resources, and weak resource allocation mechanisms all constrain the government's ability to address climate-related problems. Furthermore, government plans and policies, including the National Development Strategy (2010–2015), the Poverty Reduction Strategy (2010–2012), and the National Action Plan

for Climate Change Mitigation (2003), are weakly linked to the government's poverty reduction goals for the economy's productive sectors. Finally, current climate change-related policies and initiatives do not undergo any monitoring and evaluation.

Tajikistan is one of the nine countries invited to participate in the PPCR. The country's PPCR program was designed under the leadership of the government and in coordination with ADB, EBRD, members of the World Bank Group (IBRD, IDA, and IFC), and key Tajik stakeholders. The assessments and consultations conducted in advance of the formulation of the PPCR identified a number of issues that must be addressed if climate change impact is to be minimized. These issues include (i) inadequate data and information concerning climate change and its likely impact; (ii) lack of resources for maintaining equipment needed for managing climate-related disasters; and (iii) inadequate technical capability on the part of government staff to address climate change-related risks. Knowledge of climate change risk management and of the means of making physical infrastructure more resilient to climate impact is weak. Building codes, land-use planning laws, and public awareness programs reflect the need for resilience only minimally, if at all. Tajikistan's PPCR addresses these issues in a straightforward manner.

The SPCR was approved on 10 November 2010. At the request of the SPCR Sub-Committee, a revised version of the document, which clarified several aspects of the original plan, was prepared.

The revised SPCR has six components: (i) building institutional capacity to improve climate resilience; (ii) improving the delivery of weather, climate, and hydrological services; (iii) developing climate science and modeling programs; (iv) upgrading the climate resilience of the country's energy sector; (v) expanding agricultural output and achieving sustainable land management; and (vi) building climate resilience in the Pyanj River Basin. Initiatives (i) and (vi) of Tajikistan's SPCR have been approved by ADB.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	6.00
Government counterpart funds	0.01
Total	6.01

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Building Capacity for Climate Resilience.

Impact: Increased resilience to climate variability and climate change.

Outcome: Safeguards against the adverse effects of climate change incorporated in national development programs and policies.

This TA will enhance the Government of Tajikistan's abilities to plan climate adaptation in vulnerable sectors and populations at both the national and local levels. Main activities include (i) establishing a climate modeling facility in the State Hydrometeorological Agency (Hydromet); (ii) training Hydromet experts in climate modeling and impact assessment; (iii) developing a national strategy for climate change adaptation, and local adaptation plans for the five most vulnerable districts; and (iv) improving monitoring, evaluation, and reporting systems for PPCR projects, along with periodic updating on the PPCR website. As of February 2015, procurement plans for the facility and the training plans were being finalized. The strategy is to be finalized by the end of 2015 by incorporating inputs from relevant stakeholders. Surveys will be conducted in the five districts to assess suitable

climate change adaptation measures and local adaptation plans will be developed. Knowledge and information management systems have been developed through monitoring and evaluation workshops and NGO roundtables.

Consistent with targets, the number of households that suffer economic losses from droughts, floods, and landslides will be reduced by 20% by 2022 compared with the 2011 baseline. This projection is based on the outcome of climate-proofing projects under national policies and development programs.

Information relating to climate change will be made available to users at both the national and local levels. The project will support the integration of climate change risks into overall national development planning and the implementation of development projects. PPCR-funded initiatives will be monitored through a single reporting system. The TA will support the sustainability of the PPCR secretariat beyond the end the project period.

APPROVED: Building Climate Resilience in the Pyanj River Basin

Impact: Improved livelihoods of Pyanj River basin communities vulnerable to climate variability and change.

Outcome: Reduced adverse effects of climate variability and climate change in 59 villages in the Pyanj River basin.

Source	Amount (\$ million)
SCF-PPCR grant, via ADB	21.55
Government counterpart funds	0.87
Participating financial institutions	0.28
Total	22.70

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

The Pyanj is the largest of Tajikistan's five principal river basins and is also the country's breadbasket. Most of the agricultural land is located in the area. The basin's population of 1.27 million is already experiencing extreme climate-related weather events, and in some parts of the basin, avalanches, droughts, floods, landslides, rock falls, and violent winds disrupt social and economic life, damage houses and other infrastructure, and erode the productivity of agricultural land. Elsewhere in the basin, droughts, floods, and mudflows occur yearly. The basin's water and irrigation infrastructure is in disrepair, as the government's capacity to plan for, and maintain, infrastructure is weak, leading to rapid out-migration of males and the predominance of female-headed households.

This project is consistent with ADB's country partnership strategy for Tajikistan (2010–2014) and is included in ADB's country operations business plan (2013–2014). The design of the project, which was approved by ADB's Board of Directors in July 2013, incorporates lessons learned from previous ADB interventions in the country.

Achieving the project objectives will entail climate-proofing infrastructure, including irrigation systems and household water supply systems, in beneficiary *jamoats* (municipalities) through climate-resilient operation and maintenance guidelines, practices, and training activities. To be able to provide microcredit and microdeposit facilities to beneficiary households for the purpose of promoting climate resilience, participating financial institutions must increase their institutional capacity to provide such facilities, local residents must become more familiar with financial matters, and the feasibility of a credit insurance scheme must be assessed. Two Tajikistan-regulated microfinance institutions have been selected to participate in the first phase of microfinance activities.

THAILAND



Clean Technology Fund

Thailand's stellar economic growth in recent decades has led to a corresponding increase in energy demand and, hence, in GHG emissions. Over the period 1996–2001, industrialization and expanding demand for motorized transport together accounted for 86% of Thailand's total growth in energy demand, and were a major cause of the 10% increase in the energy intensity of the Thai economy over the period. Thailand imports more than 60% of the total primary energy it consumes, and fossil fuels make up more than 90% of the country's base energy supply. While petroleum-based fuels predominate in the transport sector, most electricity generation relies on natural gas sourced domestically from the Gulf of Thailand and imported from Myanmar.

Ensuring sustainability in the face of Thailand's expanding demand for energy requires significant low-carbon investments in the power and transport sectors. From the perspective of economic efficiency, these investments should focus on solar and wind-powered electricity generation.

The government's Alternative Energy Development Plan (2012–2021) notes that Thailand's potential solar-powered electricity generation capacity is an estimated 50,000 MW. But the

pace of growth of investments in solar-powered electricity generation has been somewhat disappointing. In addition to lack of experience in this subsector, the 10-year duration of the feed-in solar-powered electricity tariff is largely responsible for this outcome. Given the level of risk assumed by the private sector in investing in solar-powered electricity generation at an early stage of development of the industry, such an incentive is insufficient to drive investment at a scale required for the efficient exploitation of the country's significant solar-powered electricity generation potential.

Similarly, Thailand's potential for wind-powered electricity generation is vast. The Ministry of Energy's Department of Alternative Energy Development and Efficiency has continually assessed the country's wind potential since 1975 through the use of 70 monitoring stations. The results of this long-term assessment are positive, as noted in the government's Alternative Energy Development Plan (2012–2021).

The invitation from the CTF Trust Fund Committee specified the need for a country investment plan that would increase the percentage share of alternative energy in total energy supply from 7% in 2010 to 20% by 2022. Endorsed in December 2009, Thailand's original CTF investment plan included several public sector projects in Bangkok and its immediate environs. However, since public sector financing at attractive rates had already become available, these initiatives were financed with public sector funds.

As a result, the major emphases of Thailand's revised plan, which was endorsed in February 2012, include the engagement of the private sector, and the removal of financial barriers to the scale-up of renewable energy projects. The revised plan features a portfolio of renewable energy initiatives aimed at reducing GHG emissions and accelerating private sector investment in utility-scale renewable energy projects.

APPROVED: Private Sector Renewable Energy Investments

Impact: Diversification of energy mix and increased participation of the private sector and scale-up of its investments in renewable energy, thus helping the country progress toward its clean energy targets.

Source	Amount (\$ million)
CTF loan, via ADB	100.00
Total	100.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

Outcome: Renewable energy electricity generation facilities with a total capacity of 520 MW installed and in operation; and annual GHG emissions reduced by an estimated 1 MtCO₂e.

This program corresponds to an ADB program for scaling up private sector investment in solar, wind, and waste-to-energy electricity generation using a combination of CTF and ADB resources to finance renewable energy projects at specific locations in Thailand. ADB is currently engaging the private sector in a number of renewable energy projects that are at various stages of project preparation.

One constraint faced by such initiatives is the degree of risk inherent in investing in new technologies. The risk is greatest for the first investor, since at the initial stage, the profitability of the investment is unproven. This program provides CTF funding to cover a portion of the capital cost of initial investment in the renewable energy subsector, and extends the duration of the loan beyond that which commercial banks would provide. In

view of the significant capital costs associated with investing in renewable energy generation, both purposes of CTF funding significantly reduce the perceived level of risk faced by an initial investor in the renewable energy subsector.

ADB has approved four CTF-supported projects under Thailand's Private Sector Renewable Energy Program: two solar power projects (the Provincial Solar Power Project and the Central Thailand Solar Power Project) and two wind power projects (the Theppana Wind Power Project and the Subyai Wind Power Project).

Source	Amount (\$ million)
CTF loan, via ADB	12.60
ADB	25.20
Private sector loan	25.20
Total	63.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

APPROVED: Provincial Solar Power Project

The project involves the development of a 32 MW solar photovoltaic plant (with off-take from the Provincial Electricity Authority) and is seen to generate over 60,000 MWh of electricity per year. The project is expected to reduce emissions by 38,400 tCO₂e per year for 25 years, or by 0.96 MtCO₂e over its life.

The project is part of the corporate strategy of one of Thailand's petroleum refining companies, Bangchak Petroleum (BCP), to become carbon neutral. It contributes to accelerating and expanding private investment in clean energy infrastructure in Thailand. Successful project implementation and viable returns are expected to attract other private investors to solar energy projects.

The project's environmental and social impact has been assessed; measures for avoiding, minimizing, and mitigating negative environmental and social impact and for compensating those adversely affected by the project have been incorporated into the initial environmental examination (IEE) report on the project. The institutional capacity of Bangchak Solar Energy—the company that will construct and operate the facilities—and its commitment to manage the project's social and environmental impact post assessment have been deemed adequate. This impact is described in the environmental management plan that is included in the IEE report.

Public participation in the design and formulation of the project as required by ADB was ensured through public hearings and information dissemination activities targeted at a wide range of stakeholders.

Source	Amount (\$ million)
CTF loan, via ADB	4.00
ADB	4.54
Private sector loan (Thai commercial banks)	4.54
Total	13.08

ADB = Asian Development Bank, CTF = Clean Technology Fund.

APPROVED: Theppana Wind Power Project

The other private sector project under Thailand's Private Sector Renewable Energy Program is the first wind power project financed by ADB in Southeast Asia. It entails the construction of a 7.5 MW wind-powered electricity generation plant with three wind turbines, each with a capacity of 2.5 MW. The project is expected to generate over 14,000 MWh of electricity per year. It will reduce annual GHG emissions by 10,800 tCO₂e. Its construction will employ more than 250 persons.

The construction site is in Chaiyaphum Province, about 500 meters above sea level. The developer is the Electricity Generating Public Company, a company privatized in 1992. The project is a public–private partnership, under Thailand’s very-small-power-producer program, which uses renewable energy from private sector power plants with a capacity of up to 10 MW to provide clean electricity to the grid. The project will be developed and managed by Theppana, a special purpose company incorporated in Thailand that is 90% owned by the Electricity Generating Public Company, Thailand’s first independent power producer and now the second-largest in the country.

APPROVED: Central Thailand Solar Power Project

The objective of this private sector project is the installation of solar PV–powered electricity generation facilities with a total capacity of 57 MW. This combined capacity will comprise six separate facilities of 9.5 MV capacity each, to be installed at three sites in Nakhon Pathom and Suphan Buri provinces. The project is expected to generate over 100,000 MWh of electricity per year. It will diversify the energy mix of the Thai economy, and will reduce annual GHG emissions by 68,300 tCO₂e. It will likewise employ at least 50 permanent staff members, and will attract private sector investors to the solar energy production subsector. Implementation arrangements include six standard power purchase agreements (PPAs) with the relevant provincial electricity authority. These PPAs are automatically renewable every 5 years. The project is part of the long-term growth strategy of the Electricity Generating Public Company, which emphasizes expanding investments into renewable energy to strengthen its business in independent power generation in Thailand. The project is being developed as a public–private partnership under Thailand’s very-small-power-producer program, which uses renewable energy from private sector power plants with a capacity of up to 10 MW to provide clean electricity to the grid.

As with the Thailand Provincial Solar Power Project, the potential adverse environmental and social impact of the Central Thailand Solar Power Project were identified in the IEE report of the project, and measures for mitigating these were built into the project design. The institutional capacity of Solarco—the implementing company—and its commitment to manage the project’s social and environmental impact are deemed adequate. These are described in the environmental management plan included in the IEE report.

APPROVED: Subyai Wind Power

The project entails the construction and operation of an 81 MW power plant, comprising 32 wind turbines, each with 2.5 MW capacity, in Chaiyaphum Province. It is expected to produce at least 120,000 MWh of wind power delivered to the off-taker per year. This will reduce GHG emissions by at least 65,000 tCO₂e yearly. The project will employ up to 250 people during construction.

Source	Amount (\$ million)
CTF loan, via ADB	35.00
ADB	52.00
Private sector loan	72.00
Total	159.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

Source	Amount (\$ million)
CTF loan, via ADB	30.00
ADB	53.00
Private sector loan	129.00
Total	212.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

The project's successful implementation and demonstration of viable returns is also expected to catalyze private sector investments in wind energy projects, and broadly help accelerate the expansion of private investments in clean energy infrastructure. Wind energy will help diversify the country's energy mix and will reduce reliance on imported fossil fuels, thus strengthening energy security.

The project will enter into a PPA with the Electricity Generating Authority of Thailand for up to 90 MW under the small-power-producers program. The PPA is automatically renewable every 5 years and, in addition to the wholesale tariff, includes an incentive adder of B3.5 per kilowatt-hour for 10 years from the start of commercial operation. The project will be constructed under a fixed-price, date-certain, turnkey engineering, procurement, and construction (EPC) arrangement on a joint and several basis. The scheduled commercial operation date under the PPA is December 2016.

Source	Amount (\$ million)
CTF, via ADB	18.9
ADB	157.5
Private sector	453.6
Total	630.0

ADB = Asian Development Bank, CTF = Clean Technology Fund.

APPROVED: Northeastern Thailand Project

The project will construct and operate wind power facilities with a total installed power generation capacity of 260 MW on three sites in Chaiyaphum Province. It will also finance the construction of a substation of the Electricity Generating Authority of Thailand, the state-owned power utility, and three 155-kilovolt transmission lines 180 kilometers in

length to connect the wind power facilities to the substation. GHG emissions that would be avoided yearly as a result of the project are estimated at 140 million tons.

This is the fifth project under the CTF-funded Thailand Private Sector Renewable Energy Program. The project sponsor, Energy Absolute, is the largest renewable energy company in Thailand and operator of the country's largest solar power project. Its aim is to expand its investments in renewable energy generation and become a leading alternative energy company in the region. This objective complements the Government of Thailand's commitment to renewable energy development to improve the country's energy security, save foreign exchange by reducing energy imports, and protect the economy from price volatility in the global energy markets.

The project will be developed by five subsidiaries of Energy Absolute—Banchuan Development, Benjarat Development, Nayangklak Development, Nayangklak Wind Power, and Pongnok Development. Each company will enter into a 5-year renewable PPA with the Electricity Generating Authority of Thailand under the small-power-producers program. The borrowers will guarantee one another's obligations. Like the Subyai Wind Power Project, this project benefits from a feed-in tariff incentive of B3.5 per kilowatt-hour on top of the wholesale tariff for 10 years from the start of commercial operations. It will be constructed under a fixed-price, date-certain, EPC arrangement. Powerchina Zhongnan Engineering will be the offshore contractor, and DEMCO the onshore contractor, on a joint-and-several-liability basis. The V126-3.0 MW model of wind turbines developed and manufactured by Vestas Wind Systems for medium- and low-wind regimes will be used. The project is scheduled to start operating in the second quarter of 2018.



Strategic Climate Fund–Pilot Program for Climate Resilience

All of Tonga's key economic sectors will ultimately be adversely affected by climate change with environmental, economic, and social consequences, as this impact is substantial. Of particular concern is the impact on agricultural output, the supply of potable water, and coastal infrastructure. Over the past few decades, rainfall levels in Tonga have become more variable, causing localized flooding and El Niño–related droughts, as well as higher ocean temperatures than previously recorded. These have resulted in turn in coral bleaching, and a rise in sea level estimated at 6 millimeters per year on average, contributing to coastal erosion and damage to infrastructure and property. More frequent and intense tropical cyclones and storm surges have likewise led to significant economic losses.

Tonga's national strategy for addressing climate change, the Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management (2010–2015), was the first strategy for addressing climate change to be formulated by any Pacific island country. However, operationalizing this plan has been constrained by a number of factors. The National Infrastructure Investment Plan, which outlines the government's plans for major economic infrastructure initiatives over the period 2013–2023, stresses the integration of

climate change adaptation and disaster risk management into overall development planning and investments. Both of these documents use the results of existing studies to broadly assess the degree of vulnerability of Tonga's socioeconomic infrastructure to climate change impact and natural disasters. These assessments are valuable in that they facilitate the identification of economic sectors that should receive priority in infrastructure climate-proofing investments under the second phase of Tonga's SPCR.

Following an invitation by the PPCR Sub-Committee, Tonga prepared the first phase of its SPCR under an ADB-financed TA initiative, focusing on the overall design of the SPCR and on the strengthening of the government's institutional capacity to plan for climate change adaptation. In consultation with numerous stakeholders, the government identified several barriers to an effective response to the challenge of climate change: (i) the limited availability of trained and qualified experts capable of mainstreaming adaptation and disaster risk management into the activities of local communities and national agencies; (ii) the lack of appropriate information, tools, and legislative frameworks for formulating and implementing climate change adaptation strategies; and (iii) difficulties in gaining access to financing for adaptation. Also under this phase, government staff and other stakeholders were trained to assess the degree of risk of climate-related impact, and Tonga's capacity for adaptation.

Approved by the PPCR Sub-Committee in April 2012, Tonga's SPCR comprises several phased interventions that will help put the country on a climate-resilient development trajectory. Both ADB's Pacific Approach (2010–2014) and its country operations business plan (2013–2015) for Tonga emphasize the need to upgrade Tonga's capacity to adapt to climate change and to manage the risk of natural disasters. Several ADB-financed development initiatives in Tonga have also helped identify what the country needs to improve its capacity to mainstream climate change adaptation and disaster risk reduction into overall government operations.

The TA that supported the preparation of the Climate Resilience Sector Project—the second phase of Tonga's SPCR—identified cyclones and storm surges as having the greatest potential to damage Tonga's infrastructure, particularly along the coast, over the short term. On the other hand, more intense rainfall, drought, limited access to safe drinking water, and increased incidence of water- and vector-borne diseases pose the greatest risk of climate-related economic damage over the long term. However, climate change is relatively gradual and predictable, and the increasing severity of climate-related impact can therefore be managed through appropriate investments in climate-resilient infrastructure, capacity building, and small-scale financing, all of which are included in the second phase of Tonga's SPCR.

Source	Amount (\$ million)
SCF–PPCR grant, via ADB	19.25
Government counterpart funds	3.88
Total	23.13

ADB = Asian Development Bank, PPCR = Pilot Program for Climate Resilience, SCF = Strategic Climate Fund.

APPROVED: Climate Resilience Sector Project
(Implementation of the SPCR)

Impact: Increased resilience of vulnerable communities in Tonga to climate variability and change, and disaster risk.

Outcome: Strengthened capacity of government and communities to finance, develop, monitor, and implement investments to improve ecosystem resilience and climate-proof critical infrastructure.

The implementation of the second phase of Tonga's SPCR will increase the resilience of vulnerable communities to climate-related disasters through five output categories.

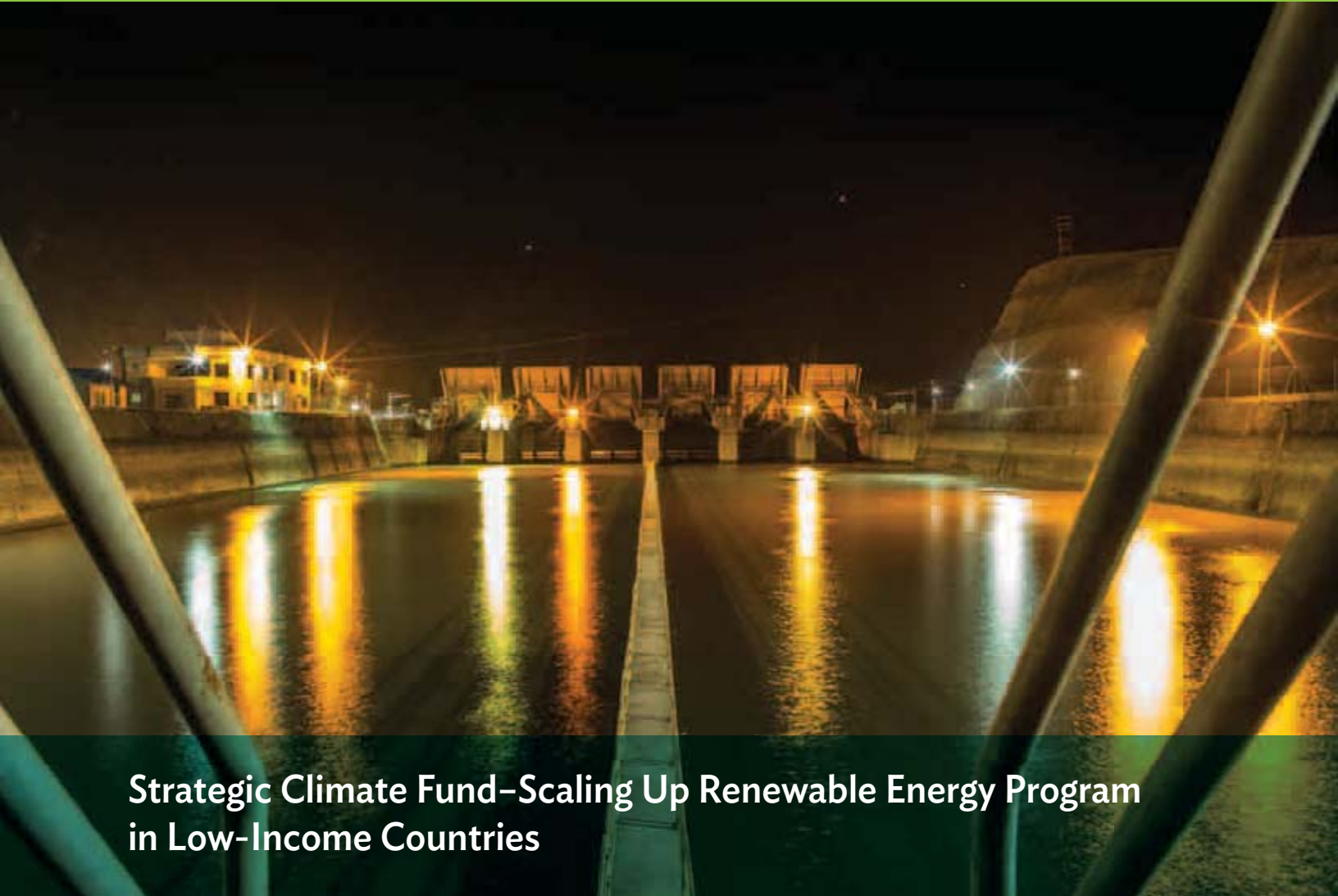
First, climate resilience will be mainstreamed into development planning through (i) the upgrading of the climate-related skills of government officers and the provision of university scholarships for this purpose, (ii) the integration of climate change-related issues into relevant laws, (iii) the standardization and dissemination of methodologies for community-based adaptation activities, and (iv) the improvement of methods currently used in managing freshwater resources.

Second, climate-related data will be upgraded. This will entail upgrading coastal monitoring and data dissemination systems, including early warning systems for weather events.

Third, funding will be provided for the establishment of the Tonga Climate Change Trust Fund, which will support adaptation to climate change among residents of vulnerable communities, particularly women.

Fourth, investments will be made in climate-resilient infrastructure, especially in coastal areas. This will entail the establishment of marine management areas in Vava'u, the rehabilitation of 126 hectares of mangroves to protect the shoreline from storm surges and high waves, the upgrading of several kilometers of coastal access roads, and the improvement of coastline protection through the upgrading of buildings and drainage facilities in five schools.

Finally, project resources will support project management and implementing units in project monitoring, evaluation, and knowledge management. Government agencies will receive appropriate operational support.



Strategic Climate Fund–Scaling Up Renewable Energy Program in Low-Income Countries

Vanuatu is an archipelago of 82 volcanic islands in the South Pacific, only 65 of them inhabited and extending about 1,300 km north to south. In 2014, it had a population of about 270,000, with about 28% living on the main island of Efate and the rest in the rural areas.

Energy access is low: only a third of households have electricity and almost half of those with electricity are not connected to the grid. Among the 65 inhabited islands, only four have grid systems, covering only part of each island. The grids are operated under local concession arrangements, each one covering generation, distribution, dispatch, billing, and settlement for consumers within its area. The vast majority of customers are off-grid. They use solar systems or diesel generators, or in the rural areas, mostly rely on kerosene, gas, or candles for lighting.

On-grid electricity generation is primarily from diesel, with smaller contributions from hydropower, wind power, coconut oil-powered diesel generator units, and solar PV energy. This high reliance on diesel is detrimental to Vanuatu's economy. The development of more renewable energy sources such as hydropower has significant potential to reduce generating costs and allow the cost-effective expansion of the grid, particularly in remoter areas.

Reduced generation costs combined with increased capacity will allow the expansion of the distribution grids. Maximizing renewable energy use is important to the Vanuatu economy. It would (i) reduce fossil-fuel imports; (ii) lower the cost of power generation and place downward pressure on power tariffs, thereby supporting the private sector and reducing household expenditure; and (iii) improve energy security. The use of renewable energy also reduces GHG emissions, which contribute to global warming.

The Government of Vanuatu has set a target in its National Energy Roadmap of achieving 100% energy access by 2030, a major portion of which will come from renewables, and is tapping \$14 million from CIF's SREP toward achieving this target. The SREP Investment Plan (2014), developed by the government, ADB, the World Bank, and key stakeholders, is expected to leverage more funds from public and private sector investments.

PIPELINE: Small Hydro Power: Energy Access Project

Impact: Diversified energy generation mix, reduced dependence on expensive fossil fuels, and economic growth; and improved livelihoods of households in Malekula and Espiritu Santo.

Outcome: Increased supply of renewable electricity through the installation of Brenwe Hydropower Plant with a total capacity of 400 kilowatts, which is expected to generate a total of 2.8 GWh yearly. Increased clean energy access in the two islands of Espiritu Santo and Malekula benefiting more than 1,000 households. This will reduce GHG emissions by about 2,900 tCO₂e yearly, or about 72,500 tCO₂e over the 25-year project lifetime.

The project will assist the Government of Vanuatu in expanding the country's renewable energy generation and increase energy access by constructing the Brenwe Hydropower Plant in Malekula and extending the distribution grid in both Malekula and Espiritu Santo. The project will have four outputs: (1) the Brenwe Hydropower Plant, a 400 kilowatt run-of-river hydropower plant; (2) distribution grid extension; (3) capacity building for newly connected households regarding options for electricity-based income generation, electricity safety, and household budget management; and (4) efficient project management services through the creation of a project management unit.

A communication, consultation, and participation plan, which will provide a framework for the participatory process and activities of the project, will be developed as part of its stakeholder participation strategy. The plan will facilitate and help improve a beneficiary-driven approach to sustainable social development, particularly for women and other vulnerable groups, as well as for landowners and resource users.

Source	Amount (\$ million)
SCF–SREP loan, via ADB	7.00
ADB Special Funds resources, loan	2.50
ADB Special Funds resources, grant	2.50
Government counterpart funds	3.10
Total	15.10

ADB = Asian Development Bank, SCF = Strategic Climate Fund, SREP = Scaling Up Renewable Energy Program in Low-Income Countries.

VIET NAM



Clean Technology Fund

ADB has supported the reform of Viet Nam's electricity generation sector since 1994. It has done so mainly through a series of TA initiatives with a total of \$2.48 billion in financing. Two ADB-financed projects have resulted in recommendations for providing a sector loan to support Viet Nam's continued progress in modernizing the electricity generation sector.

Private vehicles—motorcycles are widely used—dominate the urban transport sector. But the government is intent on significantly expanding the role of public transport, in the interest of economic growth and less environmental degradation over the long term. The government is similarly committed to mitigating the negative impact of climate change by placing the urban transport sector on a low-carbon development trajectory and encouraging energy efficiency, thus reducing the level of GHG emissions. Through modernization, the government is also taking steps to reduce the energy intensity of the national economy, and to increase the reliability of electricity supply. Demand for electricity is forecast to grow from 120 terawatt-hours in 2012 to 330 terawatt-hours in 2020, and possibly to 700 terawatt-hours by 2030. To meet this projected demand, energy generation capacity needs to increase from 26.5 GW in 2012 to 75 GW by 2020.

In response to an invitation from the CTF Trust Fund Committee, the government formulated an investment plan in coordination with several MDBs. This investment plan was initially endorsed by the committee in December 2009, and approved, following revisions, in October 2013.

ADB, which supports the improvement of Viet Nam's urban transport infrastructure and the promotion of public transport, in its country partnership strategy (2012–2015), will administer four projects under Viet Nam's investment plan. Two of these projects will further develop mass rapid transit (MRT) lines in Ha Noi and Ho Chi Minh City. A third project will improve the energy efficiency of the electricity grids in the two cities. A related TA initiative will assist the government in improving its national framework for coordination, capacity building, and monitoring and evaluation of investments that mitigate the adverse effects of climate change.

APPROVED: Monitoring and Evaluation Technical Assistance

Impact: Improved national framework for coordination, capacity building, monitoring, and evaluation of investments in climate change mitigation.

Source	Amount (\$ million)
CTF grant, via ADB	1.00
Total	1.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

Outcome: Increased investments in climate change mitigation.

The TA will have three main outputs: (1) strengthening of monitoring, reporting, and verification systems for CTF projects; (2) establishment of transport and energy sector mitigation guides; and (3) enhancement and coordination of agencies' capacity for climate change mitigation.

The TA will enhance the environment and sector agencies' capacity for climate change mitigation and interagency cooperation and coordination using the shared monitoring, reporting, and verification plans and the mitigation guides to design, monitor, and evaluate mitigation actions across the transport and energy sectors through knowledge sharing and capacity development. Activities include (i) developing a communications and knowledge management plan for climate change mitigation; (ii) designing and conducting training programs for the Ministry of Natural Resources and Environment and relevant agencies; (iii) developing CTF media products; and (iv) disseminating information about CTF progress and achievements at the national, regional, and international levels through climate change forums.

The TA will support CTF project activities by strengthening the technical and institutional capacity of the implementing agencies to perform monitoring and evaluation activities, monitor project implementation progress, improve project operations, and address delays, in order to achieve project objectives and results indicators.

Source	Amount (\$ million)		
	Project 1: Metro Rail System ^a	Project 2: SUT	Total
CTF loan, via ADB	50.00	48.95	98.95
ADB loan	293.00	4.20	297.20
Agence Française de Développement	143.00	0.00	143.00
Direction Générale du Trésor	325.00	0.00	325.00
European Investment Bank	95.00	0.00	95.00
Government counterpart funds	573.80	5.80	579.60
Total	1,479.80	58.95	1,538.75

ADB = Asian Development Bank, CTF = Clean Technology Fund, SUT = Sustainable Urban Transport.

^a Includes original and additional financing.

APPROVED: Sustainable Transport, Ha Noi (Ha Noi Metro Rail System Project: Line 3, Nhon–Ha Noi Station Section; and Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3)

Impact: Integrated and sustainable public transport system, improved energy security from fuel savings of about 21 million liters per year, and strengthened urban transport policies and regulations encouraging a modal shift in public transport.

Outcome: Competitive metro rail services along the project corridor and improved integration of Metro Rail System Line 3 stations with other public and private modes of transport. The project will

increase access to low-carbon mobility services with an estimated daily demand of 157,000 passengers per day in 2018, and progressively increasing to 458,000 passengers per day by 2038; reduce GHG emissions by about 663,000 tCO₂e over the 20-year life of the project, or by an average of 33,150 tCO₂e per year; reduce the rate of traffic accidents and injuries; and provide substantial public health benefits and direct and indirect employment opportunities.

The Ha Noi Metro Sustainable Urban Transport Program comprises two investment operations: (i) Ha Noi Metro Rail System Line 3: Nhon–Ha Noi Station Section (Project 1), which will develop a new double-track metro rail line in Ha Noi, including stations and depot facilities, and electrical and mechanical systems; and (ii) Strengthening Sustainable Urban Transport for Ha Noi Metro Rail System Line 3 (Project 2), which will implement sustainable transport measures for the effective and sustainable use of Metro Rail System Line 3.

Project 1 will result in an operational Metro Rail System Line 3 and the enhanced capacity of the Ha Noi Metropolitan Railway Management Board. Project 2, on the other hand, will install accessibility features at Metro Rail System Line 3 stations, integrate the public transport system that serves five districts of Ha Noi and introduce innovative public transport services and measures to support the efficient use of Ha Noi Metro Rail System Line 3, and develop public transport policy.

Pedestrian subways and footbridges, bus stops and feeder links, dedicated taxi stands, park-and-ride facilities for two-wheeled vehicles, and waiting areas for other public transport service providers will be constructed. A station access management system will also be installed to facilitate the efficient flow of people and traffic around the metro stations. Enforcement measures will be improved to ensure clear pedestrian access and smooth traffic flow and to manage private vehicle parking around the metro stations. Public transport policy, including systems and strategies related to station parking, public transport ticketing, and pricing of public and private transport, will be developed. Capacity development and training of transport agencies in Ha Noi will also be part of project activities.

APPROVED: Sustainable Transport, Ho Chi Minh City (Sustainable Urban Transport for Ho Chi Minh Mass Rapid Transit Line 2)

Impact: Integrated and sustainable public transport system, improved energy security as fuel consumption in the public transport sector drops by a projected 18 million liters per year, and strengthened urban transport policies and regulations encouraging a modal shift in public transport.

Outcome: Integrated and improved public transport system serving six districts of Ho Chi Minh City. The project is expected to increase the share of public transport in total urban transport services from 7% in 2013 to 15% in 2022, and to 30% by 2038; increase daily demand by 83,824 passengers by 2018; and reduce GHG emissions by 600,000 tCO₂e over the project's useful life, as well as local pollutant emissions, with substantial public health benefits. The poorest 60% of the city's households will compose the majority of the project beneficiaries.

The project will help integrate MRT Line 2 into Ho Chi Minh City's public transport network and improve public access to MRT Line 2 by constructing infrastructure and facilities at all stations, upgrading connections between the MRT and other modes of public transport to improve access, and supporting the reform of public transport policy and regulation.

Gender-sensitive, accessible pedestrian subways and footbridges, bus stops and feeder links, dedicated taxi stands, park-and-ride facilities for two-wheeled vehicles, and waiting areas at sites served by non-MRT public transport providers will be constructed. A public transport information system providing real-time bus and train arrival information will be installed for MRT Line 2 and linked to the city's bus control center. This system will complement the improvements to be made in the citywide bus network with World Bank support.

An urban transport pricing policy framework will be drawn up and policies for parking at MRT Line 2 stations and for traffic management will be formulated to ease vehicle flow in areas around the stations. The project will also have capacity development and training components.

PIPELINE: Grid Energy Efficiency

Impact: Rehabilitation, expansion, and further development of the electric power grid in Ha Noi and Ho Chi Minh City; application of smart-grid technology to improve system efficiency and reduce GHG emissions.

Outcome: Increased capacity and reliability of power supply and reduction of annual GHG emissions in both cities.

Source	Amount (\$ million)
CTF loan, via ADB	48.95
ADB loan	10.00
Government counterpart funds	6.05
Total	65.00

ADB = Asian Development Bank, CTF = Clean Technology Fund.

Source	Amount (\$ million)
CTF loan, via ADB	60.40
ADB loan	200.00
Government counterpart funds	100.00
Other	100.00
Total	460.40

ADB = Asian Development Bank, CTF = Clean Technology Fund.

This project is consistent with the overall modernization of Viet Nam's electricity generation sector, with the country's National Power Development Plan (2011–2020), with Orientation Towards 2030, and with the investment plans of the executing agencies. It is included in ADB's country partnership strategy (2012–2015).

Sustainable electricity supply, the major output of the project, will meet Viet Nam's expanding national demand for electricity, by upgrading both the reliability and the efficiency of power generation and transmission systems in both cities. The project will reduce power distribution losses by an estimated 1.1% by 2020 in Ha Noi, and an estimated 0.6% in Ho Chi Minh City by the same year.



Total CIF FUNDING for ADB DMCs

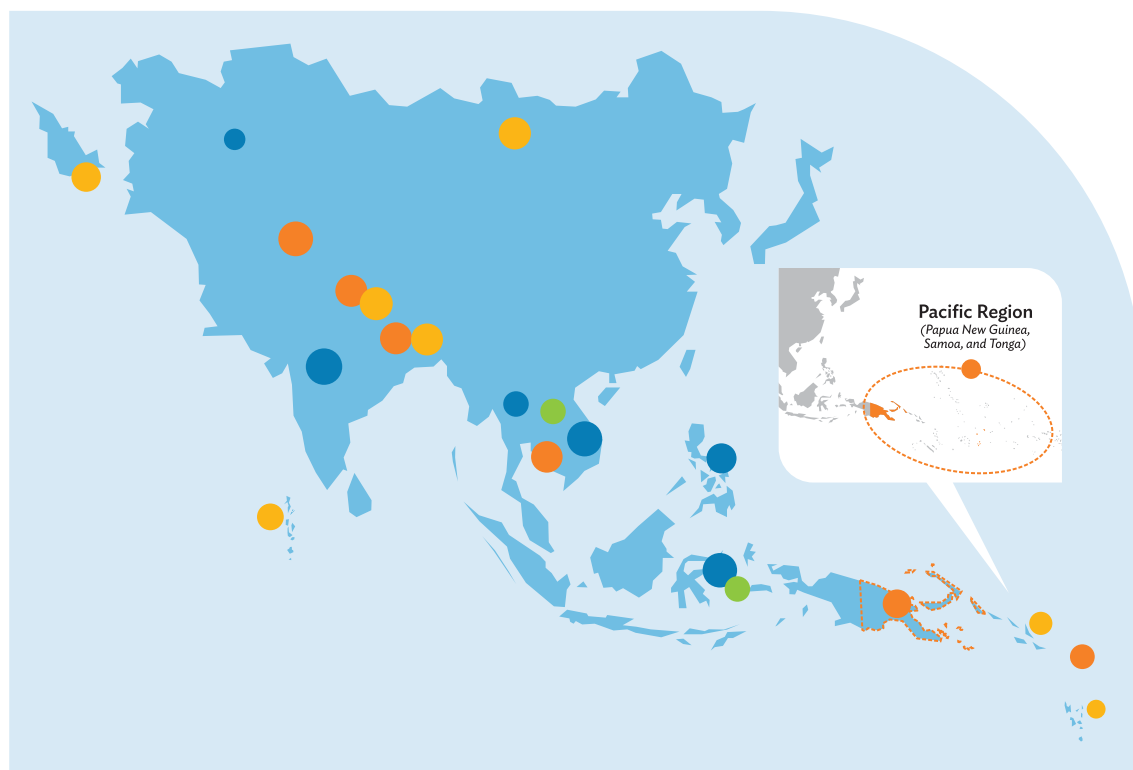
\$3.3 billion

\$1.5 billion

48%

Total CIF
FUNDING
administered
by ADB

Note: Out of the \$1.5 billion ADB CIF Portfolio, total project funds approved to date amount to \$1.08 billion (68%)

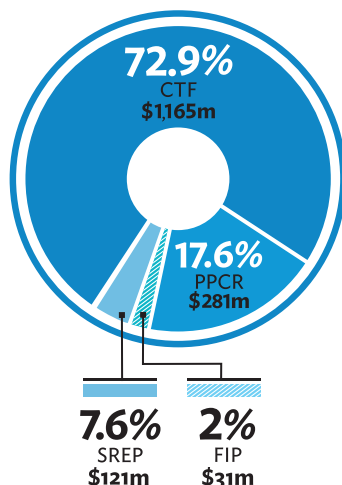
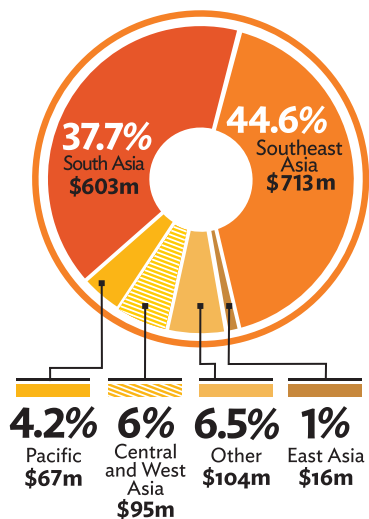
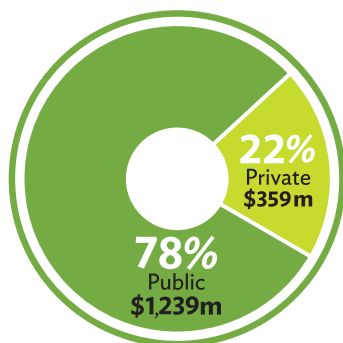


CTF CLEAN TECHNOLOGY FUND		\$1.1b for 17 projects/programs
\$ million	# OF CTF PROJECTS/PROGRAMS	
\$104	Dedicated Private Sector Programs/Projects	4
\$ 50	Kazakhstan	1
\$100	Thailand	1
\$125	Philippines	2
\$150	Indonesia	1
\$211	Viet Nam	4
\$425	India	4

PPCR PILOT PROGRAM FOR CLIMATE RESILIENCE		\$281m for 19 projects
\$ million	# OF PPCR PROJECTS	
\$ 5	Private Sector Adaptation Projects (Cambodia)	
\$ 4	Pacific Region	1
\$ 20	Tonga	1
\$ 30	Papua New Guinea	1
\$ 28	Tajikistan	2
\$ 32	Nepal	2
\$72	Bangladesh	3
\$ 91	Cambodia	8

FIP FOREST INVESTMENT PROGRAM		\$31m for 2 projects
\$ million	# OF FIP PROJECTS	
\$ 13	Lao PDR	1
\$ 18	Indonesia	1

SREP SCALING UP RENEWABLE ENERGY IN LOW INCOME COUNTRIES PROGRAM		\$121m for 9 projects
\$ million	# OF SREP PROJECTS	
\$ 7	Vanuatu	1
\$ 7	Solomon Islands	1
\$ 13	Maldives	1
\$ 16	Mongolia	1
\$ 17	Armenia	1
\$ 30	Bangladesh	2
\$ 32	Nepal	2





CTF CLEAN
TECHNOLOGY
FUND

\$1.1b
for 17 projects/
programs

\$ million

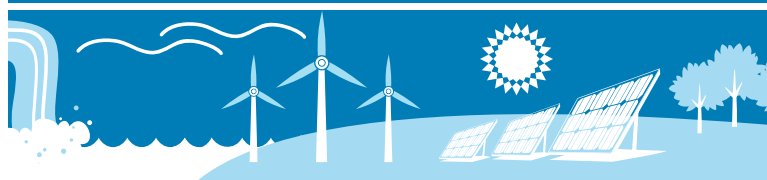
OF CTF PROJECTS/PROGRAMS

\$104	Dedicated Private Sector Programs/Projects	4
\$ 50	● Kazakhstan	1
\$100	● Thailand	1
\$125	● Philippines	2
\$150	● Indonesia	1
\$211	● Viet Nam	4
\$425	● India	4

Note: Out of the \$1.1 billion CTF funds to be administered by ADB, \$775 million have been approved by the Trust Fund Committee

\$799m

Renewable Energy



69%

\$255m

Transport



22%

\$110m

Energy Efficiency

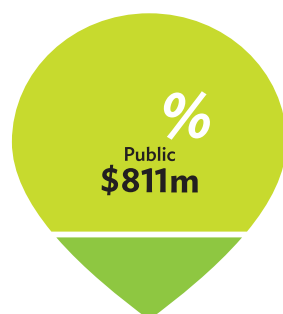
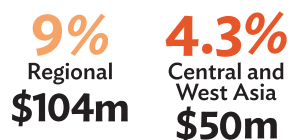
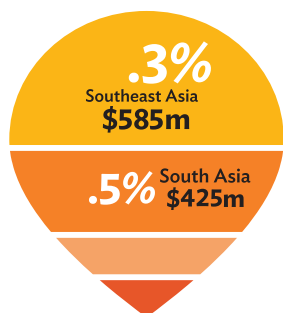


9%

\$1m

M&E

0.1%



AT LEAST
5,342MW
installed capacity



with expected annual electricity output of about **12,400 GWh** from renewable energy sources

from the (i) Rajasthan Renewable Energy Transmission Investment Program, (ii) Indonesia Geothermal Program, (iii) Thailand Private Sector Renewable Energy Program, and (iv) DPSP Renewable Energy Mini-Grids and Distributed Power Generation Program



AT LEAST
1.7m
households with
access to clean energy



OVER
13,500
jobs created

expected as a result of the (i) Rajasthan Renewable Energy Transmission Investment Program, (ii) Indonesia Geothermal Program, and (iii) DPSP Renewable Energy Mini-Grids and Distributed Power Generation Program

during the construction and operation of (i) Indonesia Geothermal Program, (ii) Thailand Renewable Energy Program, and (iii) Market Transformation through Introduction of Energy Efficient Electric Vehicles Project

AT LEAST
941,000

people to benefit from improved public transport



from the (i) Market Transformation through Introduction of Energy Efficient Electric Vehicles Project, (ii) Sustainable Urban Transport for Ho Chi Minh City MRT Line 2, and (iii) Sustainable Urban Transport for Ha Noi Metro Line 3



AT LEAST 203m
tCO₂e avoided

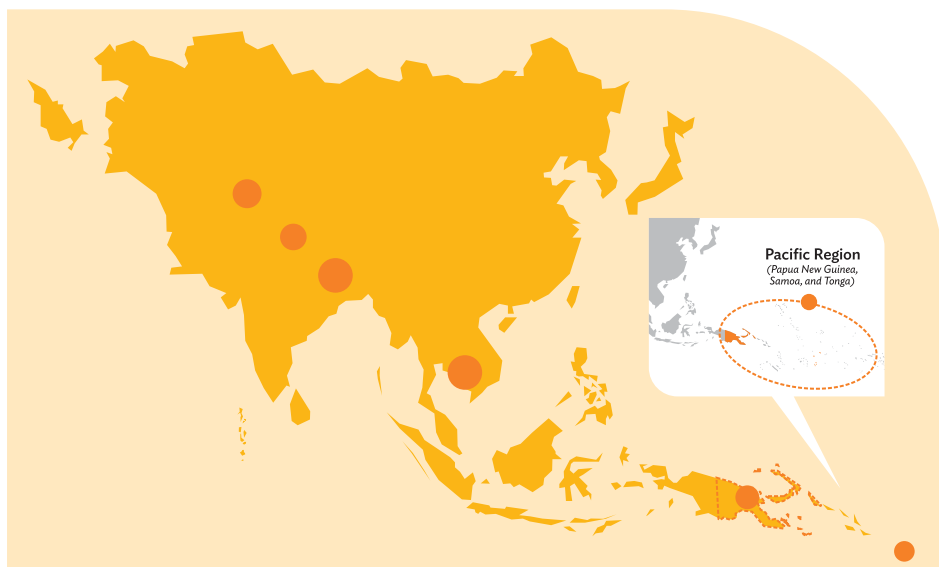
during project lifetimes of the (i) Rajasthan Renewable Energy Transmission Investment Program, (ii) Indonesia Geothermal Program, (iii) Market Transformation through Introduction of Energy Efficient Electric Vehicles Project, (iv) Thailand Renewable Energy Program, (v) Sustainable Urban Transport for Ho Chi Minh City MRT Line 2, (vi) Sustainable Urban Transport for Ha Noi Metro Line 3 Project, and (vii) DPSP Renewable Energy Mini-Grids and Distributed Power Generation Program



CLIMATE
INVESTMENT
FUNDS

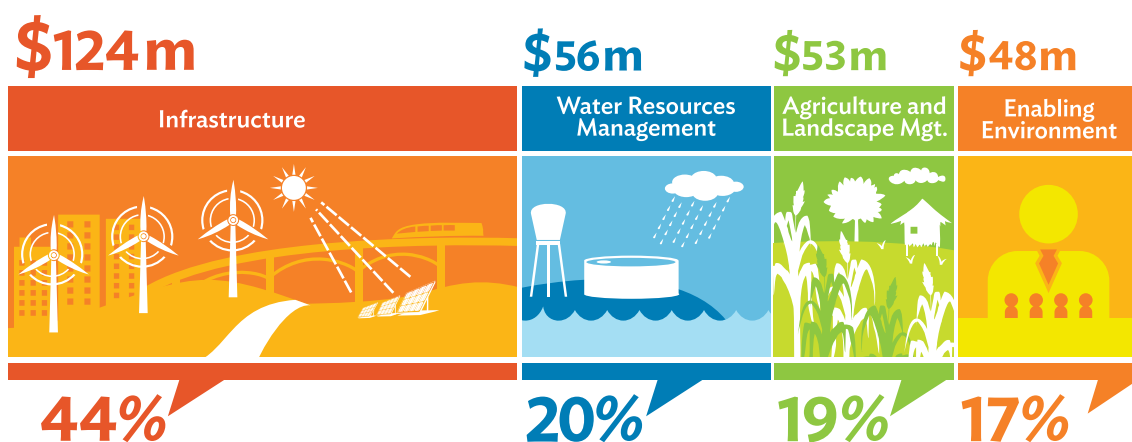
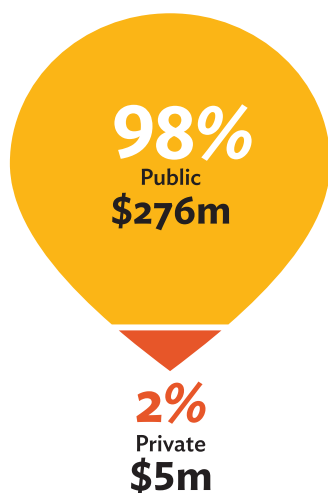
ADB PORTFOLIO OF PPCR PROJECTS

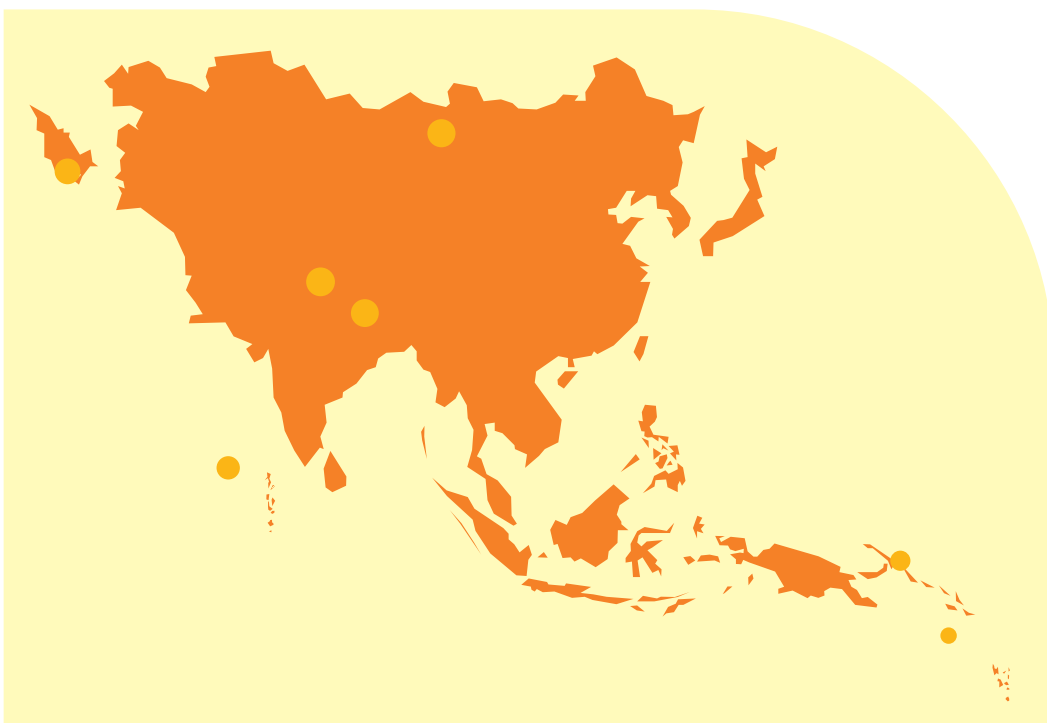
ADB



PPCR PILOT PROGRAM FOR CLIMATE RESILIENCE		\$281m for 19 projects
\$ million	# OF PPCR PROJECTS	
\$ 5	Private Sector Adaptation Projects (Cambodia)	
\$ 4	Pacific Region	1
\$ 20	Tonga	1
\$ 30	Papua New Guinea	1
\$ 28	Tajikistan	2
\$ 32	Nepal	2
\$ 72	Bangladesh	3
\$ 91	Cambodia	8

Note: The \$281 million PPCR funds to be administered by ADB have all been approved by the Sub-committee





SREP

SCALING UP RENEWABLE
ENERGY IN LOW INCOME
COUNTRIES PROGRAM

\$121m
for 9 projects

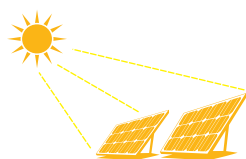
\$ million		# OF SREP PROJECTS
\$ 7	Vanuatu	1
\$ 7	Solomon Islands	1
\$ 13	Maldives	1
\$ 16	Mongolia	1
\$ 17	Armenia	1
\$ 30	Bangladesh	2
\$ 32	Nepal	2

Note: Out of the \$121 million SREP funds to be administered by ADB, \$32 million have been approved by the Sub-committee

AT LEAST
26 MW

installed capacity with
expected annual electricity
output of **55.6 GWh** from
renewable energy sources

from the (i) Maldives Preparing Outer Islands for Sustainable Energy Development Program, (ii) Nepal South Asia Subregional Economic Cooperation Power System Expansion Project, and (iii) Vanuatu Energy Access Project



AT LEAST
36,000

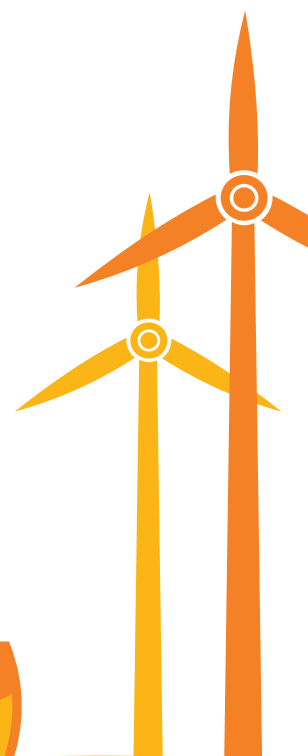
households with
access to clean energy

expected as a result of the (i) Maldives Preparing Outer Islands for Sustainable Energy Development Program, (ii) Nepal South Asia Subregional Economic Cooperation Power System Expansion Project, and (iii) Vanuatu Energy Access Project



AT LEAST
1.4m
tCO₂e avoided

during project lifetimes of the (i) Maldives Preparing Outer Islands for Sustainable Energy Development Program, (ii) Nepal South Asia Subregional Economic Cooperation Power System Expansion Project, and (iii) Vanuatu Energy Access Project





FIP FOREST
INVESTMENT
PROGRAM

\$31m
for 2 projects

\$ million

OF FIP PROJECTS

\$ 13

● Lao People's Democratic Republic

1

\$ 18

● Indonesia

1

FOREST INVESTMENT PROGRAM

The FIP supports developing country efforts to reduce deforestation and forest degradation and promote sustainable forest management that leads to emissions reduction and enhancement of forest carbon stocks (REDD+). In two of the eight FIP pilot countries, Indonesia and the Lao People's Democratic Republic, ADB will administer projects under the approved investment plans.



The Asian Development Bank and the Climate Investment Funds

Country Fact Sheets Second Edition

Through the Climate Investment Funds, ADB is participating in 22 investment plans for 18 developing member countries, a regional investment plan for the Pacific, and regional programs under the Clean Technology Fund Dedicated Private Sector Program, as well as other projects in Cambodia under the Pilot Program for Climate Resilience Private Sector Set-Asides. This publication documents the development initiatives under the various Climate Investment Funds windows that ADB administers, highlighting approved projects as well as those in the pipeline for ADB member countries.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to the majority of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



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