



2012

Clean Energy Investments

Project Summaries



Asian Development Bank



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Note:

In this report, "\$" refers to US dollars.

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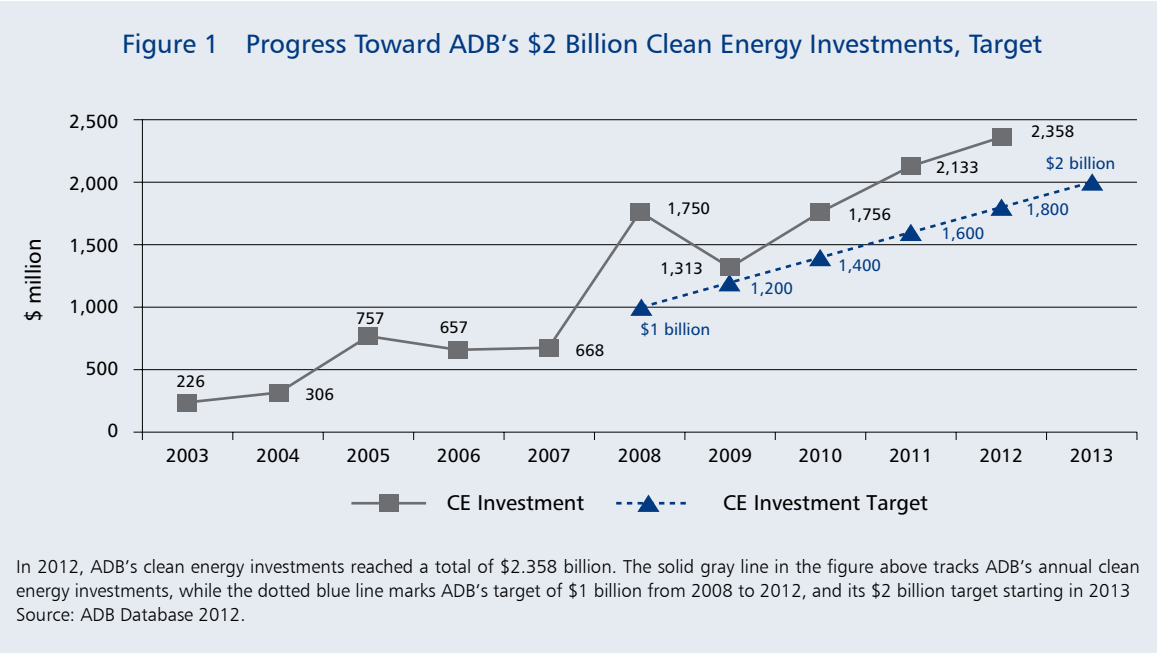
Abbreviations

ADB	–	Asian Development Bank
CAREC	–	Central Asia Regional Economic Cooperation Program
CCGT	–	combined-cycle gas turbine
COSO	–	Central Operations Services Office
CWRD	–	Central and West Asia Department
EARD	–	East Asia Department
IGCC	–	integrated gasification combined-cycle
IMAR	–	Inner Mongolia Autonomous Region
kg	–	kilogram
LPG	–	liquefied petroleum gas
OCO	–	Office of Cofinancing Operations
OGC	–	Office of the General Counsel
PARD	–	Pacific Department
PLN	–	PT Perusahaan Listrik Negara (State Electricity Corporation)
PRC	–	People’s Republic of China
PSOD	–	Private Sector Operations Department
RSDD	–	Regional and Sustainable Development Department
SARD	–	South Asia Department
SERD	–	Southeast Asia Department
tCO ₂ e	–	ton of carbon dioxide equivalent

Executive Summary

In 2012, the Asian Development Bank (ADB) achieved clean energy investments of \$2.3 billion, continuing a remarkable level of investment in the sector. Previously, in 2008, ADB set a target to reach \$2 billion annually in clean energy investment by 2013—this target was met 2 years ahead of schedule in 2011. ADB then pledged to continue to meet its \$2 billion goal annually until 2013. This year’s results confirm that ADB’s later pledge also has been realized, and shows its continued commitment to a policy of supporting clean energy development in as many sectors and ways as possible.

This strategy, enshrined in ADB’s 2009 Energy Policy, has been proven to have correctly anticipated the high interest and enormous appetite for clean energy that exists among the developing countries of Asia and the Pacific.



Global clean energy investments in 2012 declined by 11% compared to 2011, but 2012 still remained the second highest year on record with \$268.7 billion directed to the sector. Industry experts attribute the recent fall in investment to regulatory uncertainty in major markets and to changes in policy, specifically the end of subsidy and incentive programs. However, enthusiasm for clean energy is still driving a remarkable amount of global investment, with new records in installment produced even in this “down” year. The United States recorded 13.2 gigawatts of new wind energy, Germany installed 7.6 gigawatts of solar power, and the People’s Republic of China represented the world’s largest market for wind energy in 2012. More than a third of all new wind power capacity (35% or 15 gigawatts) was installed in the People’s Republic of China last year. Wind is now the PRC’s third largest energy source after coal and hydropower.

Prices for equipment and the operation and maintenance of wind and solar all have dropped, making these options more affordable for developing countries. Analysts have described 2012 as the year when established markets shrank, but lower prices for major renewable technologies encouraged growth in developing countries.

Solar photovoltaic (PV) technologies had a strong year in 2012, with the 2012 REN-21 Global Status Report estimating that a total of 91 GW of PV capacity was installed around the world by the end of 2012, up from around 70 GW in 2011, and more than double that of 2010. Over the past six years global PV Capacity has grown by nearly ten-fold. The IEA estimates that by 2016 the installed PV capacity could reach 230 GW, and have predicted that, if favorable conditions continue, PV could be providing 5% of the world's total electricity supply by 2030, and 11% by 2050.

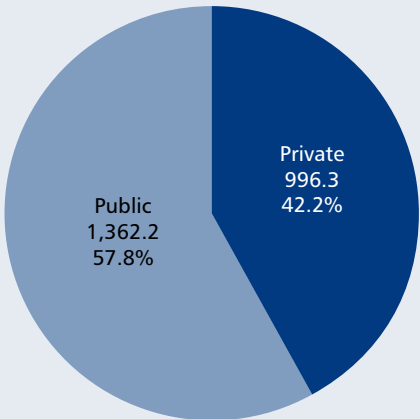
ADB's strong support for solar continues with \$247 million invested in 2012. This investment supported development in solar PV and also in concentrating solar thermal power technology, a highly promising type of solar which so far has had lower penetration in Asia. Through its Asia Solar Energy Initiative, ADB aims to catalyze the development of three additional gigawatts of solar power in the region, and so far, has supported 1056 megawatts of new solar-related investment.

ADB's investment record supports this conclusion. As another record setting year, 2012 witnessed a wave of investments in tried and true clean technologies such as solar. Also popular were newer technologies including waste-to-energy, and so-called "energy smart" technologies to improve energy efficiency on both the supply and demand side and in electric vehicles.

Of ADB's total clean energy investment of \$2.3 billion, the majority (58%) were public sector or sovereign loans totaling \$1.4 billion, while the remaining \$996 million (42%) went to the private sector. Both public and private sector investments increased by some \$100 million each compared to 2011 numbers.

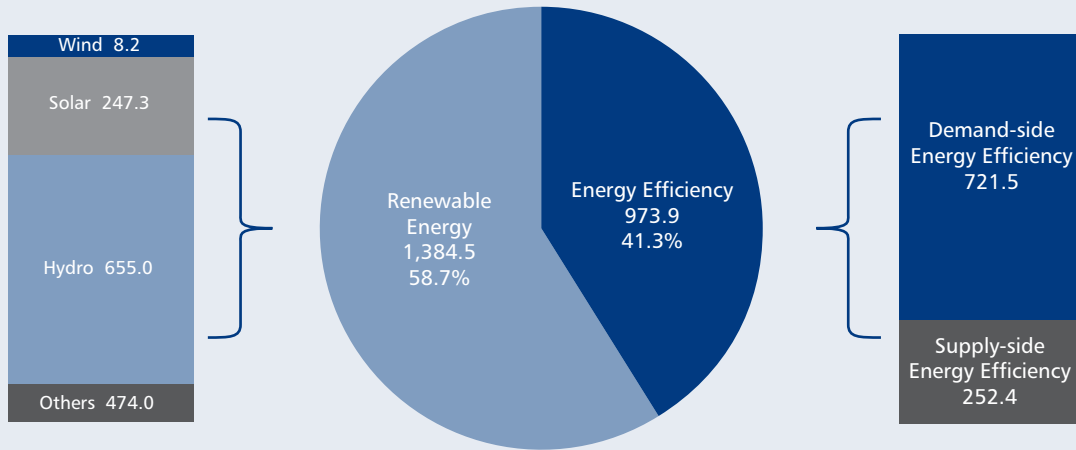
In terms of clean energy by project type, ADB's renewable energy investments make up the largest share, as can be seen in Figure 3. Investments in renewables amounted to \$1.3 billion in 2012, up by \$200 million compared to 2011. Energy efficiency investments remained strong in 2012, with \$974 billion invested. This represented a slight expansion from \$950 million in 2011, but a significant increase compared to the \$340 million invested in 2010.

Figure 2 Clean Energy Investments—Public versus Private Sector, 2012
(\$ million)



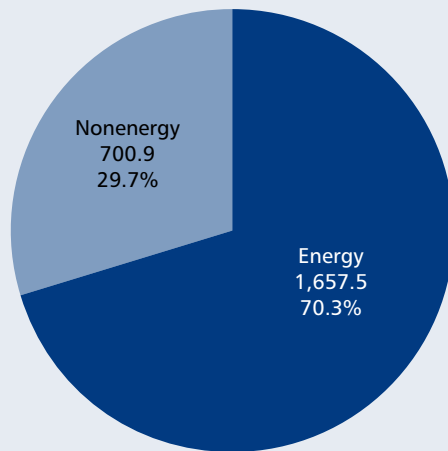
Source: ADB Database 2012.

Figure 3 Clean Energy Investment by Clean Energy Project Type, 2012
(\$ million)



"Others" refers to investments mainly in clean energy financing guarantee, equity, and biomass.
Source: ADB Database 2012.

Figure 4 Clean Energy Investment by Sector, 2012
(\$ million)

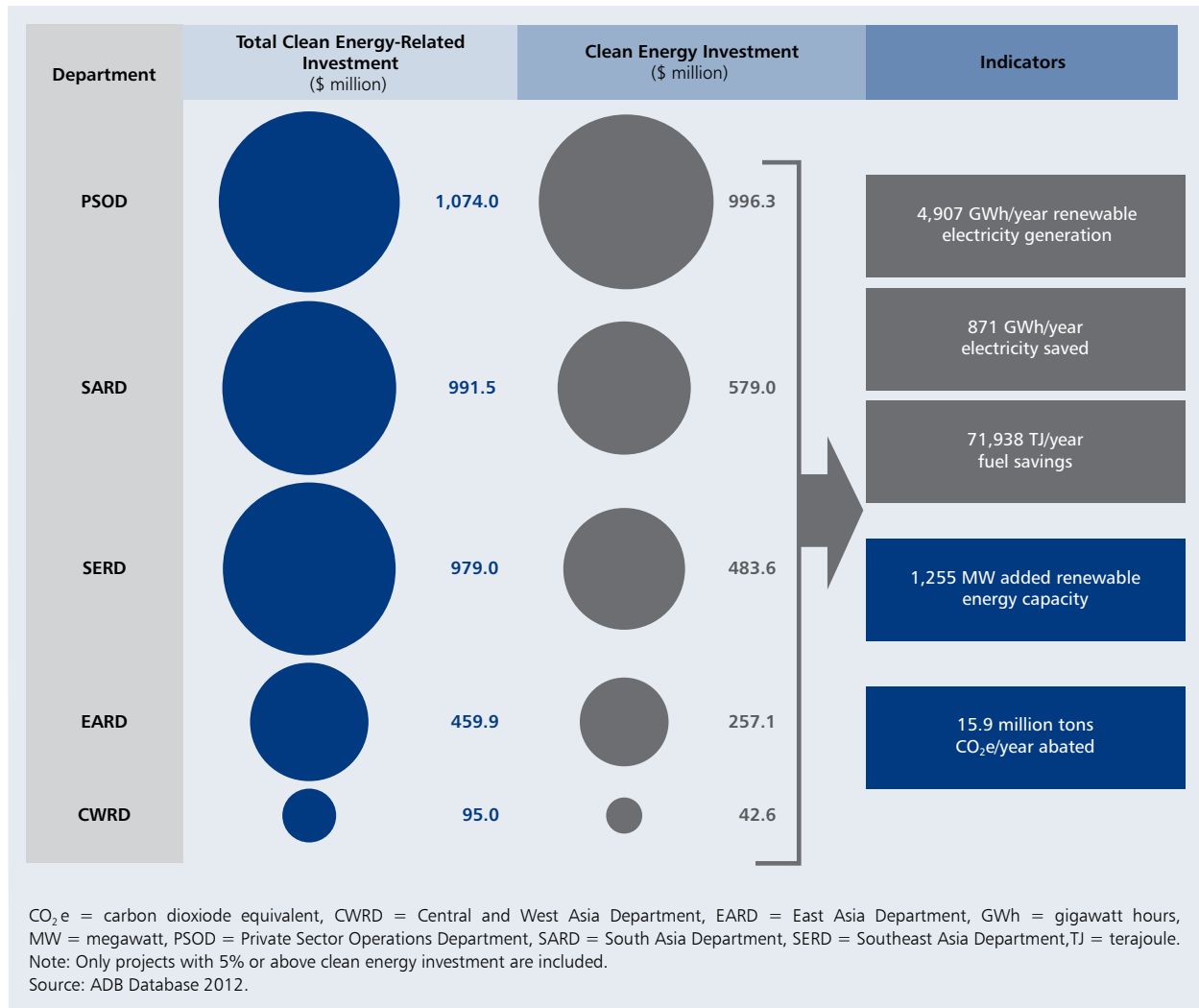


Source: ADB Database 2012.

As shown in Figure 4, out of ADB's total clean energy investments, \$1.7 billion was invested in the energy sector, while \$400 million was directed to projects in non-energy sectors including transport and water.

In 2012, ADB's \$2.3 billion clean energy investment is expected to produce the following significant gains: a total of 4.9 terawatt hours per year of clean electricity from renewable sources such as solar, wind and hydro; 871 gigawatt hours of electricity savings from energy efficiency; more than 71,000 terajoules per year from

Figure 5 Indicators for Clean Energy Investments, 2012
(\$ million)



avoided consumption of direct fuel; abatement of 15.9 million tons of carbon dioxide equivalent (tCO₂e) per year; and installation of 1,255 megawatts of renewable energy generation capacity (see Figure 5).

An analysis of clean energy investment by operations department at ADB shows that the Private Sector Operations Department generated a leading share (42%) of investment at \$996 million. This can be expected as ADB's work in the private sector supports projects all across the region. The South Asia Department claimed the second greatest share (25%) of investment at \$579 million, followed by the Southeast Asia Department at \$483 million (20%), the East Asia Department with \$257 million (11%), and finally the Central and West Asia Department at \$42 million (1%).

Of ADB's overall clean energy portfolio in 2012, three grant-financed investments totaled \$34.4 million. A grant was extended to the Kyrgyz Republic to improve the delivery of electricity service in the country, with \$27.9 million of a total of \$40 million supporting the rehabilitation and upgrade of a hydropower plant. The second grant of \$5 million was part of a major ADB project in the Philippines involving energy-efficient electric vehicles (specifically commuter tricycles), and the last grant of \$1.5 million assisted a pilot solar rooftop project in Sri Lanka. For more details on these three grants, see Appendix 1.

Central and West Asia Department

Loan Number: 2860-ARM
Project Number: 45299-001
Water Supply and Sanitation Sector
(additional financing)

Rationale

In October 2007, AHDB approved a water supply and sanitation sector project that aimed to rehabilitate the system, improve management and operational efficiency. This project is set to be completed in the first quarter of 2012, one year ahead of schedule. Encouraged by this success, the government has decided continue the rehabilitation and tapped ADB for additional financing.

Foreseeing the likely success of the current project, the government has requested through the State Committee for Water Economy (SCWE) that ADB further fund and support the government's continued efforts to rehabilitate and extend WSS systems, with an additional 10 subprojects and further improve the operational efficiency and financial management of the Armenia Water and Sewerage Company (AWSC), a government-owned commercial company that Société d'Aménagement Urbain et Rural (SAUR), an international water utility, manages and operates through a management contract.

The additional financing is included in the country operational business plan and strongly supports the government's objective of facilitating human development through better access to reliable and sustainable supplies of potable water, improving living conditions in approximately 18 towns and 92 villages in Armenia.

Description

The additional financing will (i) rehabilitate and upgrade water supply infrastructure, (ii) improve the performance of water services, and (iii) improve the management and operational efficiency of the water utility company. Also, the additional financing will ensure further public health and environmental improvements by providing potable and reliable water supply to households in approximately 18 towns and 92 villages in the provinces of Aragatsotn, Ararat, Amavir, Geharqunik, Tavush, Lori, Kotayq, Shirak, Syunik, and Vayotz-Dzor.

Total Loan Amount: \$40 million (ADF)
Clean Energy Investment: \$ 2.56 million
Project Category: Demand-side energy efficiency
Energy Savings: 2.77 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 1,209 tCO₂/year
Board Approval: 12 April 2012
Project Life: 40 years

Impact Improved public health and environment in project towns and villages.

Outcome Improved access to safe, reliable, and sustainable water WSS services in about 21 project towns and up to 97 project villages, managed on commercial principles and with environmentally sound practices.

Outputs

- Rehabilitated, replaced, and expanded water supply and sewerage systems in project towns and villages.
- Improved water services in project towns and villages.
- Strengthened and expanded Armenia Water and Sewerage Company (AWSC).
- Improved community management skills

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Project team

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Executing agency State Committee for Water Economy

Loan/Grant Number: 2869/0294-KGZ

Project Number: 44198-013

Power Sector Rehabilitation Project

Rationale

The Kyrgyz Republic's power sector is characterized by aging assets, high commercial losses (25% of net supply), below-cost tariffs, and poor financial performance of sector companies. Power assets are generally over 30 years old and approaching the end of their economic life.

Considering the extent of financing available and the critical importance of hydroelectric power plants (HEPPs), the government identified rehabilitation of HEPPs as a top priority. An assessment of HEPPs on the Naryn cascade concluded that all HEPPs require rehabilitation; rehabilitation of 1,200-MW Toktogul HEPP was identified as the first priority. Failure of Toktogul HEPP would affect the stability of the central Asian power systems (CAPS) and be catastrophic for the Kyrgyz Republic's electric supply. Toktogul HEPP has been in operation for over 35 years without major rehabilitation. Critical equipment is failing, resulting in availability dropping to 80%. Availability rates will continue to drop in the absence of rehabilitation.

High commercial losses and poor sector financial performance are partly attributable to inadequate wholesale and retail metering; and poor procedures for distribution of sector revenues to generation, transmission, and distribution companies. Reliable and current data on energy flows are not available, which impedes identification of losses. In addition, distribution of sector revenues by the Ministry of Energy and Industry (MOE) is based on operational priorities and carried out in an inconsistent manner—preventing proper financial planning by power companies, including open joint-stock company Electric Power Plants (EPP), the owner of Toktogul HEPP.

Description

The project will: (i) rehabilitate Toktogul HEPP by replacing existing mechanical and electrical equipment; (ii) establish an electricity transactions settlement center; (iii) conduct a safety assessment of dams on the Naryn cascade, and (iv) conduct a public information program on sector reforms. The project will improve energy supply, reduce system commercial losses, identify dam rehabilitation measures, and inform the public on sector developments.

Total Loan Amount: \$ 15 million (ADF)

Total Grant Amount: \$ 40 million (ADF)

Clean Energy Investment: \$ 40 million

Project Category: Renewable Energy

Renewable Energy Generation: 300 gigawatt hours/year

Greenhouse Gas Emission Reduction: 26,100 tCO₂/year

Board Approval: 11 June 2012

Project Life: 45 years

Impact Increased reliability of national and regional power systems.

Outcome Improved operational performance of the Kyrgyz Republic power sector.

Outputs

- Rehabilitation of Toktogul HEPP
- Establishment of electricity settlement center
- Dam safety assessment
- Public information program

Division Energy Division, CWRD

Project team

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Executing agency Ministry of Energy and Industry
OJSC Electric Power Plants (open joint stock company)

East Asia Department

Loan Number: 2898-PRC

Project Number: 44011-013

Heilongjiang Energy Efficient District Heating Project

Rationale

Heilongjiang is an underdeveloped inland province in the northeastern region of the People's Republic of China (PRC). Heating service in Heilongjiang, where temperatures fall below -40°C in the wintertime and the heating season lasts for up to 6 months, meets one of the basic human needs and provides essential support to socioeconomic activities. Many existing heating systems in the province are old and inefficient, and lack modern emission control equipment. Household use of coal stoves for heating is a major cause of indoor air pollution and respiratory diseases. Emissions from existing small and inefficient neighborhood boilers also worsen outdoor air quality and cause significant cumulative harm to public health. Combustion efficiency of existing small heat-only boilers of 55% in many cities is far below the 87% that can be achieved in modern combined heat and power (CHP) plants or large heat-only boilers.

Providing cleaner and reliable district heating services to households and other community areas will (i) reduce cases of respiratory diseases through improved indoor and outdoor air quality, reduce carbon monoxide (CO) poisoning by providing safer district heating services; (ii) improve living conditions; (iii) reduce heating expenditure by switching from individual household stoves and decentralized heating systems to centralized energy efficient heating systems; (iv) provide a better schooling environment during the winter; and (v) increase incomes through job opportunities created during construction and operation. Women and vulnerable people, including the elderly and children, connected to the modern district heating networks will enjoy a cleaner, safer living environment.

Description

The project will remove small, inefficient, and polluting neighborhood coal-fired boilers and coal-fired household stoves in eight cities of Heilongjiang province; and construct centralized district heating networks where heat is supplied by highly energy efficient CHP plants and large boilers, thereby reducing the overall carbon emissions and air pollution of district heating.

The project includes installation of (i) 321 heat exchangers—between primary and secondary heating networks, (ii) 271 km of insulated heat pipelines of primary heating networks, (iii) 3 high efficiency heating source plants, and (iv) 8 computerized supervisory control and data acquisition (SCADA) systems.

Total Loan Amount: \$ 150 million (OCR)

Clean Energy Investment: \$ 61.70 million

Project Category: Supply-side energy efficiency

Energy Savings: 7,917 terajoules/year

Greenhouse Gas Emission Reduction: 1,000,000 tCO₂/year

Board Approval: 25 September 2012

Project Life: 40 years

Impact Improved energy efficiency and a cleaner environment in Heilongjiang province.

Outcome Improved air quality and reduced greenhouse gas emissions in eight urban areas in Heilongjiang province.

Outputs

- Coverage of the district heating system in eight project cities without net increase in emissions expanded.
- Energy efficient heat generation capacity in three project cities improved.
- Private sector participation in district heating in two project cities promoted.

Division Energy Division, EARD

Project team

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Executing agency Heilongjiang Provincial Government

Loan Number: 2962-PRC

Project Number: 43031-013

Hunan Xiangjiang Inland Waterway Transport Project

Rationale

Inland waterway transport (IWT) is an efficient, cost-effective, and environmentally friendly way to move bulk commodities over long distances. Efficient use of waterways to transport cargo can reduce congestion on roads and railways, lower the average amount of energy needed for freight transport overall, and cut back emissions of greenhouse gases. IWT can also be developed in ways that bring other benefits, such as the generation of power. The infrastructure of IWT can also be adopted for power generation – a low head run-of-river barrage may be constructed to regulate river levels and flows and allow installation of a hydro electric power generation plant.

The Hunan Provincial Government (HPG) believes that inland waterways play an important role in promoting regional development. It issued a Xiang River Network Master Plan for river navigation management and water resources and hydropower development in 1986 and revised it in 2007, making IWT on the river its priority. The plans includes the construction of nine navigation-cum-hydropower complexes along the river to make it a class III navigable waterway and enable reliable all-season access for barges of up to 1,000 deadweight tonnage (dwt) on its upper reaches (276 km) and up to 2,000 dwt downstream of Hengyang (497 km). This will significantly reduce the operating cost of barges in the corridor. The Xiangjiang Inland Waterway Transport Project will provide one of the last of the series of complexes needed to fully upgrade the waterway.

Description

The Project will include (i) construction of Tugutang Hydro power complex composed of a class III ship-lock and a 90-MW run-of-river hydropower plant, complete with transmission lines, construction of access roads, reservoir tank protection, channel improvements and installation of navigational aids; (ii) construction of cargo terminal berths at Songbai and Yunji, and improvement of public landing stages; and (iii) enhancement of capacity and performance of waterway management agencies.

Total Loan Amount: \$ 150 million (OCR)

Clean Energy Investment: \$ 150 million

Project Category: Renewable Energy

Renewable Energy Generation: 363 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 290,000 tCO₂/year

Board Approval: 7 December 2012

Project Life: 80 years

Impact An efficient, safe, affordable, and sustainable inland waterway transport system developed in Hunan province.

Outcome A low carbon waterway transport system improved on the Xiang River in Hunan province.

Outputs

- Tugutang navigation-cum- hydropower generation complex constructed.
- Cargo terminal berths at Songbai and Yunji and public landing stages improved.
- Capacity and performance of waterway management agencies enhanced.

Division Transport and Communications Division, EARD

Project team

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Executing agency Hunan Provincial Department of Transport

Loan Number: 2885-PRC

Project Number: 44013-013

Shanxi Energy Efficiency and Environment Improvement Project

Rationale

Shanxi is an underdeveloped inland province in the PRC's north-central region. The heating season in the province lasts for 5 months and temperatures can fall below -20°C in the winter. In the absence of district heating, inefficient and polluting coal based household stoves and small neighborhood boilers continue to be widely used. Urban pollution from small boilers worsens outdoor air quality and causes significant cumulative harm to public health. The government plans to expand the coverage of district heating, which would allow closure of the small, inefficient heat-only boilers, and increase the use of energy-efficient combined heat and power (CHP) plants as a heat source. District heating also allows the introduction of consumption-based billing, which enables consumers to regulate the amount of heat they consume. It avoids significant heat losses in the system, reinforcing the energy efficiency of district heating.

Shanxi, known for its rich coal resources, faces serious pollution and environmental problems closely related to the mining, use, and transport of coal. The underground coal mines in Shanxi release large amounts of coal mine methane (CMM) during operation. The capture and use of CMM not only helps avoid serious mining accidents but also provides large environmental and climate change mitigation benefits.

The project will help solve the issues described above by extending and expanding energy-efficient district heating to more than 270,000 residents in five highly polluted urban areas of Shanxi. It will replace small, inefficient, and polluting inner-city coal-fired boilers and coal-fired household stoves with a highly energy-efficient CHP plant and large heat boilers, utilizing local CMM supply, thereby reducing the overall environmental footprints of district heating.

Description

The Project will improve energy efficiency and reduce emission of greenhouse gases and other pollutants in Shanxi province by introducing district heating in four urban cities and expanding the gas distribution network in another city. The components of the project include (i) upgrading the district heating source and installation of pipelines, heat exchangers and computer monitoring and control systems; (ii) construction and installation of CMM gas supply system and gas distribution network; and (iii) institutional strengthening.

Total Loan Amount: \$100 million (OCR)

Clean Energy Investment: \$ 41.13 million

Project Category: Supply-side energy efficiency

Energy Savings: 1,614 terajoules/year

Greenhouse Gas Emission Reduction: 254,379 tCO₂/year

Board Approval: 31 August 2012

Project Life: 40 years

Impact Greater energy efficiency and cleaner environment in Shanxi province.

Outcome Better air quality and reduced greenhouse gases emission in five urban areas in Shanxi province.

Outputs

- Energy-efficient district heating in five urban areas.
- Expanded CMM distribution network in Liulin.
- Institutional strengthening and capacity building.

Division Energy Division, EARD

Project team

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Executing agency Shanxi Provincial Government

Loan Number: 2934/5-MON

Project Number: 39256-024

Urban Transport Development Investment Program-Tranche1

Rationale

Ulaanbaatar faces serious transport problems. Its population has been growing rapidly. The city grew from about 600,000 people in 1989 to over 1.2 million in 2010 and is expected to reach 1.7 million in 2020. The increasing number of vehicles, unplanned urbanization, the overburdened transport system, and poor traffic management are contributing to congestion, reduced traffic safety, and deteriorating air quality. An average of 35,000 private vehicles has been added annually, representing an average increase of more than 25% per year. About 65% of Ulaanbaatar's road network is in poor condition. The lack of a reliable road network is a major barrier to the provision of public transport to serve new areas. Increased trip frequency and travel time, excessive fuel use, and high vehicle emissions are reducing the quality of life and causing health problems in Ulaanbaatar. Development of sustainable urban transport for the growing population is one of the most important urban development issues facing the city.

Description

The first tranche will (i) widen Peace Bridge with two dedicated bus rapid transit (BRT) lanes; (ii) upgrade 7.7 km of road allocated for the North-South BRT corridor; (iii) rehabilitate electric trolleybus infrastructure along the North-South BRT corridor (14 km); (iv) prepare the North-South BRT corridor; (v) introduce an intelligent transport system (ITS); and (vi) promote capacity building and skills transfer. The investment component will be supplemented by grant assistance aiming at (i) reducing and preventing road traffic accidents involving schoolchildren in poor *ger* areas of Ulaanbaatar; (ii) implementing effective public transport, traffic and parking management, traffic safety, and ITS policies and programs.

Total Loan Amount: \$29.7 million (OCR)
\$30.2 million (ADF)

Clean Energy Investment: \$4.24 million

Project Category: Demand-side energy efficiency

Energy Savings: no data

Greenhouse Gas Emission Reduction: no data

Board Approval: 08 November 2012

Project Life: 20 years

Impact Economic growth of Ulaanbaatar is promoted by sustainable and efficient urban transport system and services.

Outcome Efficient, safe, and affordable urban transport services developed in Ulaanbatar.

Outputs

- Developing BRT infrastructure (improve 7.7 km of road, expand the Peace Bridge for the BRT, and install 14.0 km of electric trolleybus infrastructure [electric wires, feeder cables, and substations]) for the BRT system in the north–south corridor of Ulaanbaatar;
- Introducing a 14.0 km BRT line on the north–south corridor, and procuring five trolleybuses and vehicle emission testing equipment;
- Installing an intelligent transport system (ITS) component (the BMS); and
- Providing resources for project management, detailed engineering design, and institutional and policy development.

Division Urban and Social Sectors Division, EARD

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Executing agency Municipal Government of Ulaanbaatar

Private Sector Operations Department

Loan Number: 7361/2906 to 7366/2911-IND

Project Number: 44932-014 to 44932-064

145-MW Grid Solar Power Project

Chattel Construction Private Limited (7361/2906)

Ganges Green Energy Private Limited (7362/2907)

Hiraco Renewable Energy private Limited (7363/2908)

Responsive Sutip Limited (7364/2909)

Sand Land Real Estate Private Limited (7365/2910)

Ujiwala Power Private Limited (7366/2911)

Rationale

India is in chronic need of additional power generation capacity. It continues to suffer from power shortages, with peak demand exceeding supply by 8.5% and an energy deficit of 8.2% in April 2012. To address this shortage and keep up with economic growth, the government set a target of 92,700 megawatts (MW) of capacity addition during the 11th Five-Year Plan period, 2007–2012, which is equivalent to annual growth of 11.4%.

India also needs to maintain its mix of energy sources, not only to combat climate change but also to preserve its energy security. Availability of indigenous fuels is diminishing and India has to import increasing quantities of coal, liquefied natural gas, and uranium. Building solar power and other renewable power plants mitigates this dependence on imports.

India has vast solar energy potential: approximately 5,000 terawatt-hours solar irradiation per year, with most parts receiving 4–7 kWh per square meter per day and averaging 4.5 kWh/square meter/day nationally. Effective harnessing of this huge potential, through photovoltaic or concentrated solar thermal power, provides the ability to generate power on a distributed basis and enables rapid capacity addition with short lead times (e.g. less than 1 year).

Description

The project entails the construction of five 25 MW and one 20 MW solar photovoltaic power generation plants, totaling 145 MW, across six locations in Gujarat state. The project sites are generally within a 150-kilometer radius of the cities of Ahmedabad, Porbandar, and Rajkot and are readily accessible by public roads. The annual global horizontal irradiance across the six subproject sites is estimated to be 2,014–2,062 kilowatt-hours (kWh) per square meter per year, among the strongest in the country.

The project will use a mix of crystalline silicon (105 MW), amorphous silicon (10 MW), cadmium telluride (20 MW), and tandem junction amorphous silicon (10 MW) photovoltaic panels across the six subproject sites on fixed-tilt mounting structures, with one subproject site (Chattel) employing some single-axis manual tracking structures adapted to site conditions. The mixture of panel technologies and suppliers were chosen based on optimum cost and schedule delivery criteria.

The electricity generated from each subproject will be evacuated to existing substations through a combined total of about 45 kilometers length of 66 kilovolts double-circuit transmission lines to be built by Gujarat Electricity Transmission Company.

Loan number: 7361/2906 to 7366/2911-IND Project number: 44932-014 to 44932-064

Total Loan Amount: \$ 100 million (OCR)
 Clean Energy Investment: \$ 100 million
 Project Category: Renewable Energy
 Renewable Energy Generation: 208 gigawatt-hours/year
 Greenhouse Gas Emission Reduction: 182,229 tCO₂/year
 Board Approval: 18 September 2012
 Project Life: 25 years

- Impacts**
- Diversified energy mix through the addition of renewable energy capacity
 - Replication of utility-scale (>25 MW) solar power generation projects.

Outcome Demonstrated profitability and sustainability of a variety of solar photovoltaic technologies at utility scale on a private generation basis.

Output Construction and operation of utility-scale solar photovoltaic power generation facilities.

Division Infrastructure Finance Division 1

Project team

Team leader T. Minnich, Senior Investment Specialist, PSOD

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 J. Munsayac, Safeguards Specialist, PSOD
 M. Pateguana, Investment Specialist, PSOD
 M. Tsuji, Principal Safeguards Specialist, PSOD
 J. Ventura, Investment Officer, PSOD

Loan Number: 7353/2853-IND

Project Number: 46902-014

Industrial Credit and Investment Corporation of India

Rationale

There is large demand for financing small and medium-sized renewable energy and energy efficiency projects in India, in which the Asian Development Bank (ADB) cannot directly participate and where market penetration by local banks remains low. However, the ICICI Bank, one of the strongest and highest-rated banks in India, has an experienced group, the Technology Finance Group (TFG), that (i) has pioneered, developed, and supported a large range of new and innovative renewable energy and energy efficiency projects over the past three decades; and (ii) collaborates with the ICICI Bank's corporate finance, project finance, and small and medium-sized enterprises divisions to boost its lending activities to renewable energy and energy efficiency projects. Given its strong franchise, thorough understanding of the corporate credit market, and extensive experience in renewable energy and energy efficiency lending, the ICICI Bank is one of the most suitable candidates for intermediating funds for clean energy development in India.

ADB is particularly keen to increase support for energy efficiency initiatives in India, and views the potential cooperation with the ICICI Bank as an excellent opportunity to engage with a strong and reputable bank that has the reach, capability, and interest in pursuing energy efficiency projects alongside the ICICI Bank's current efforts in renewable energy. The ICICI Bank has the appropriate experience (it has been active in clean energy investments for several years) and a pipeline of potential renewable energy and energy efficiency projects to be financed under the credit line. The credit line will be ADB's first non-sovereign loan that supports energy efficiency enhancement in India.

The ICICI Bank will be required to use the credit line exclusively for funding projects in priority sectors recommended by ADB, ensuring close alignment of focus between the ICICI Bank and ADB in promoting clean energy development in India.

Description

ADB proposes to provide a USD 100 million credit line to ICICI bank for funding of renewable energy (RE) and energy efficiency (EE) projects in India. The credit line will target only selected RE/EE sectors identified by ADB and ICICI Bank taking into consideration Indian Government objectives and overall impact assessment.

Total Loan Amount: \$ 100 million (OCR)

Clean Energy Investment: \$ 100 million

Project Category: Renewable energy/energy efficiency

Renewable Energy Generation: 219 gigawatt-hours/year

Energy savings: 400 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 600,000 tCO₂/year

Board Approval: 28 March 2012

Project Life: no data

- Impacts**
- Increased availability of clean energy in India.
 - Increased availability of financing for renewable energy and energy efficiency projects and initiatives.

Outcome Renewable energy and energy efficiency projects developed.

Output The ICICI Bank expands financing to environmentally and socially sustainable renewable energy and energy efficiency projects.

Division Capital Markets & Financial Sectors Division (PSCM)

Project team

Team leaders M. Jensen, Investment Specialist, PSOD
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A. Zhou, Energy Specialist, Regional and Sustainable Development Department

Loan Number: 7354/2854-IND
Project Number: 46900-014
Rajasthan Sun Technique Energy Private Limited

Rationale

The assistance to the project will demonstrate strong support for the government's Jawaharlal Nehru National Solar Mission (NSM) as well as for the further development of solar energy in the underdeveloped state of Rajasthan. The project will strongly complement ADB's ongoing initiatives in solar energy in India, including technical assistance to the nodal ministry for the NSM, regular training programs on solar energy for financial institutions, and the \$150 million solar power generation guarantee facility supporting smaller solar power projects. This will be ADB's first financing of a CSP project.

Description

The project entails the construction of a 100 MW CSP generation plant near the village of Dhursar in Jaisalmer district of Rajasthan state. The electricity generated from the project will be evacuated from the project site to the existing 220-kilovolt (kV) Dechu substation of Rajasthan Vidyut Prasaran Nigam Limited, the state transmission company, through a 30-km 220-kV double circuit transmission line.

Total Loan Amount: \$103 million (OCR)
Clean Energy Investment: \$103 million
Project Category: Renewable energy
Renewable Energy Generation: 243 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 229,368 tCO₂/year
Board Approval: 29 March 2012
Project Life: 25 years

- Impacts**
- Diversified energy mix through the addition of renewable energy capacity.
 - Replication of utility-scale CSP generation projects in India.

Outcome Demonstrated viability of a utility-scale private solar power generation project

Output Construction and commissioning of one of India's first utility-scale CSP power generation facilities.

Division Infrastructure Finance Division 1

Project team

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Approval Numbers: 7368/2899 and 7369/2900-PRC

Project Number: 46906-014

China Everbright Biomass Energy Investment Limited(7368/2899)

China Everbright Environmental Energy Limited (7369/2900)

Rationale

The PRC faces a serious environmental and social challenge in dealing with waste, which has been rapidly increasing as a consequence of the country's economic growth. Uncontrolled disposal of untreated waste is widespread in urban and rural areas; untreated waste can find its way into drinking water exposing the population to infectious diseases and other health problems. Inadequately treated waste will threaten food production and security in rural areas, as nutrients contained in straw cannot be recycled into the fields without proper treatment. Direct incineration of straw in the fields has a thermal impact on the soil, leading to deterioration of organic matter and loss of moisture. Uncontrolled direct incineration of agricultural waste can also generate fumes and fly ash, which have become a major source of environmental pollution and respiratory diseases.

The common goal of agricultural waste and municipal solid waste (MSW) management is to treat the waste in an environmentally and socially acceptable manner. Incineration is recognized as an effective method for waste treatment. It reduces waste volume by 90% and eliminates methane emissions; waste heat from the incineration process can be recovered and used for electricity generation or district heating. By replacing fossil fuel combustion and avoiding methane, waste-to-energy (WTE) technologies help mitigate climate change.

The WTE option for agricultural waste has further merits as it yields additional income to farmers who sell agricultural waste and also to small and medium-sized enterprises in charge of waste collection and transportation. In addition, the treated bottom ash could be harnessed as an organic agricultural fertilizer for the domestic community.

Description

Leveraging the successful operation of the municipal WTE projects, China Everbright International Limited (CEIL) applies its clean technologies to utilize agricultural waste to produce clean energy. The primary objective of the project is to support CEIL in extending its operations to agricultural WTE projects. In parallel, but to a lesser extent, municipal WTE projects will also be supported. Under the project, CEIL aims to develop and invest in agricultural and municipal WTE projects to treat approximately 7,300 tons of waste daily with installed capacity of 210 megawatts (MW) to generate approximately 1,240 gigawatt-hours (GWh) of electricity annually by 2016.

The ADB assistance is to provide a credit line to fund through the borrowers a series of WTE projects in CEIL's investment plan. The plan includes civil works, equipment and materials, other procurement, and working capital for 9–12 WTE projects from 2012 to 2015. The ADB loan will play a catalytic role to enable borrowing from the local banks at the project companies owned by the borrowers.

Total Loan Amount: \$100 million (OCR)
\$100 million (B-Loan)
Clean Energy Investment: \$ 200 million
Project Category: Renewable energy
Renewable Energy Generation: 1,240 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 638,000 tCO₂/year
Board Approval: 26 September 2012
Project Life: 40 years

- Impacts**
- Waste management in the PRC is improved.
 - Energy generation capacity from agricultural and municipal waste in the PRC is increased.

Outcome Increased production of energy from viable and environmentally sustainable WTE power plants in the PRC.

Output Nine WTE plants installed

Division Infrastructure Finance Division 2

Project team

Team leader S. Hashizume, Investment Specialist, PSOD

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B. Quang, Safeguards Specialist, PSOD
Y. Wang, Investment Officer, PRC Resident Mission

Loan Number: 7377/2960-PRC

Project Number: 46930-014

Dynagreen Environmental Protection Group Company

Rationale

The PRC is currently the world's second-largest generator of solid wastes, producing more than 220 million tons annually. The country's urban population has more than tripled from 1980 to 2011 and is expected to add more than 200 million people more by 2030. This demographic shift will lead to significant increases in municipal solid-waste (MSW) generation which must be treated properly. The project will address the need to treat MSW in small and medium-sized cities and supply electricity to the local grid. Waste-to-energy (WTE) is recognized as the single most effective method for MSW treatment, as it reduces waste volume by 90% and eliminates methane emissions. WTE technologies recover the waste heat from the incineration process and produce electricity and heat. By substituting for fossil fuel combustion and avoiding methane, it reduces greenhouse gas emissions and mitigates climate change.

Description

The project involves the construction and operation of nine WTE plants with a total capacity of 120 MW. The WTE plants will annually treat 2.8 million tons of MSW, generate 610 GWh of electricity and avoid 450,000 tons carbon dioxide emissions.

Total Loan Amount: \$100 million (OCR)
\$100 million (B-Loan)

Clean Energy Investment: \$200 million

Project Category: Renewable energy

Renewable Energy Generation: 610 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 450,000 tCO₂/year

Board Approval: 10 December 2012

Project Life: 40 years

- Impacts**
- Improved urban solid-waste management in small and medium-sized cities of the PRC.
 - Increased renewable energy generation capacity from municipal waste in the PRC.

Outcome Technically efficient and environmentally sustainable solid-waste management and WTE solutions developed in small and medium-sized cities in the PRC.

Output Installation and operation of nine WTE plants

Division Infrastructure Finance Division 2

Project team

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Y. Wang, Investment Officer, PRC Resident Mission

Loan Number: 7352-REG
Project Number: 45918-014
Customized Fund Investment Group

Rationale

The fund's concept was initially driven by the interest of a set of large institutional investors, who view climate change challenges in Asia as a compelling investment opportunity. On four occasions during 2007–2009, the Prince of Wales convened some of the world's largest public pension funds, which collectively represent approximately \$3 trillion of assets, with key experts to discuss and develop investment strategies for tackling climate change risks. Inspired by existing and possible models, these investors approached the Department for International Development (DFID) of the United Kingdom and then ADB to collaborate with them to design an innovative, commercially viable vehicle for climate and environmental finance investment in developing Asia.

Description

The fund is envisaged to invest in environmental finance in Asia. The fund will use a unique platform that combines private sector investment expertise with development finance institutions to provide equity, debt, and grant facilities to climate- and environment-related sectors in the developing member countries (DMCs) of the Asian Development Bank (ADB). ADB will invest up to 25% in the general partner of the fund, provide extensive services under a service agreement to assist the fund manager in day-to-day operations, and invest as a limited partner in the fund.

ADB will provide (i) a proposed equity investment of up to the lesser of \$1,000,000 and 25% of the shares in a company to act as the general partner of the Climate Public–Private Partnership Fund; (ii) a proposed equity investment of up to the lesser of \$1,000,000 and 25% of the shares in a company to act as the special limited partner of the fund; and (iii) a proposed equity investment as a limited partner in the fund of up to the balance of \$100 million less the amounts contributed under items (i) and (ii). ADB will also contribute human resources to the fund under the terms of a service agreement to be entered into between it and the fund manager. Each of the investee companies (i.e the general partner and the special limited partner entities) will be formed after the date of finalization of fund documentation.

Total Loan Amount: \$ 100 million
Clean Energy Investment: \$ 100 million
Project Category: Renewable energy/energy efficiency
Energy Savings: no data
Renewable Energy Generation: no data
Greenhouse Gas Emission Reduction: 2,500,000 tCO₂/year
Board Approval: 15 February 2012
Project Life: No data

- Impacts**
- Increase of capital and expertise in environmental finance in Asia and the Pacific.
 - Demonstrated viability of environmental finance in Asia and the Pacific
 - Reduction in or avoidance of greenhouse gas emissions.

Outcome Increased number of profitable, well-governed, and environmentally responsible investee companies and funds in environmental finance.

Output Fund established and funded as planned.

Division Capital Markets and Financial Sectors Division (PSCM)

Project team

Team leader D. da Silva, Investment Specialist, PSOD

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W.C. Um, Deputy Director General, Regional and Sustainable Development Department

Loan Number: 7371/2919-REG
Project Number: 46914-014
Cofely Southeast Asia Pte.Ltd

Rationale

The project will play a pioneering role in demonstrating the viability of smaller-scale clean energy projects in the Asia and Pacific region. The demonstration effect is expected to encourage more investment in clean energy, specifically energy efficiency in ADB Southeast Asia DMCs. Additionally, with reduced information barriers, proven net savings, and greater access to financing, the demand for energy efficiency solutions will grow, stimulating greater provision of energy efficiency services in the region and, subsequently, more qualified full-service energy service companies (ESCOs). Energy savings are a promising and cost-effective mechanism to close the gap between energy demand and supply. ADB DMCs in Southeast Asia must enable private sector participation to develop and finance a substantial amount of energy efficiency projects to help meet their growing energy demand and climate mitigation targets. The demonstrational effect will provide a model for other ESCOs to replicate and build-operate-transfer (BOT) investors to follow in terms of financial structuring and environmental and social standards.

Description

The project seeks to remove both the financial constraints and the information barriers that inhibit the development of the energy efficiency market through a loan and parallel research and development TA. Specifically, it will support the investment program of Cofely to expand and upgrade energy efficiency services in Cambodia, Indonesia, the Lao PDR, Malaysia, the Philippines, Thailand, and Viet Nam. The loan will finance long-term energy efficiency solutions in ADB developing member countries (DMCs) in Southeast Asia that guarantee energy savings for hotels, hospitals, large commercial centers, office buildings, business districts, and industrial facilities, and the expansion of energy efficiency services and small-scale renewable energy generation. ADB and Cofely will finance the investment program on a consolidated basis to reduce financing transaction costs that typically beleaguer small energy efficiency projects.

Total Equity Amount: \$ 40 million
Clean Energy Investment: \$ 40 million
Project Category: Demand-side energy efficiency
Energy Savings: 150 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 90,000 tCO₂/year
Board Approval: 12 October 2012
Project Life: 20 years

- Impacts**
- Increased investment in clean energy (including energy efficiency) projects.
 - Increased provision of energy efficiency services in Southeast Asia.

Outcome Demonstrated viability of energy efficiency investments.

Output Energy efficiency projects implemented and performance achieved.

Division Private Sector Infrastructure Finance 2

Project team

Team leader D. Wiedmer, Senior Investment Specialist, PSOD

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Loan Number: 7356/2875-THA
Project Number: 45923-014
Bangchak Solar Energy Company Limited

Rationale

Power generation in Thailand depends heavily on conventional fuels, with 64% produced by natural gas and 22% produced by coal and lignite. Natural gas has traditionally been Thailand's reliable and low-cost source of energy, but growing demand and dwindling reserves in the Gulf of Thailand mean the country must begin the transition toward secure alternative sources. Fortunately, Thailand has abundant renewable energy sources. Use of these domestic sources of renewable energy can boost Thailand's energy security, save foreign exchange, and protect the country from global price fluctuations.

As part of its strategy to diversify the energy mix and promote renewable energy, the government prepared the Alternative Energy Development Plan, 2012–2021, and set a new target of generating 25% of primary commercial energy from renewable energy sources by 2021. This target includes 9,201 MW of renewable energy capacity by 2021, of which 2,000 MW is solar. To reach the target, the plan will encourage private sector development and the promotion of new technologies.

The project is part of the corporate strategy of Bangchak Petroleum Public Company Limited (BCP) to expand its operations into renewable energy through limited-recourse project financing to become carbon neutral. The project will be the first time ADB mobilizes clean technology (CTF) cofinancing for a private sector project. CTF provides scaled-up financing to demonstrate, deploy, and transfer low-carbon technologies with significant potential to avoid greenhouse gas emissions over the long term. It is one of the largest funds available to help developing countries fill gaps in financing climate change mitigation. ADB's long-term, fixed-rate financing in local currency combined with the CTF cofinancing reduces the additional costs and risks associated with investments in solar power.

Description

The project will be developed and implemented over two phases (phase 2A in Chaiyaphum Province and phase 2B in Ayutthaya Province) under four standard renewable energy power purchase agreements (PPAs) of 8 MW each with the Provincial Electricity Authority (PEA) in Chaiyaphum and Ayutthaya. The project will have a total capacity of 32 MW and will utilize multicrystalline photovoltaic technology. Any additional generation from the project beyond the PPA contract capacity will be distributed to the grid free of charge as an economic benefit to the country. The PPAs are automatically renewable every 5 years and, in addition to the wholesale tariff, include an adder of 8.0 baht per kilowatt-hour (kWh) applicable for 10 years from the date of commercial operation. The project will be developed under separate engineering, procurement, and construction arrangements for each phase, with the commercial operation of both phases planned from 2013.

Total Loan Amount: \$25.2 million (OCR)
\$12.6 million (CTF)

Clean Energy Investment: \$ 37.80 million

Project Category: Renewable Energy

Renewable Energy Generation: 60 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 38,000 tCO₂/year

Board Approval: 25 June 2012

Project Life: 25 years

- Impacts**
- Diversified energy mix through the addition of renewable energy capacity in Thailand.
 - Increased private sector participation in solar power production.

Outcome Demonstrated viability and sustainability of large private sector solar farms

Output Installation and operation of two large solar power generating facilities with combined capacity of 32 MW.

Division Infrastructure Finance Division 2

Project team

Team leader D. Wiedmer, Senior Investment Specialist, PSOD

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E. Serafica, Energy Project Specialist, PSOD
S. L. Tu, Senior Safeguards Specialist, PSOD

Loan Number: 7370/2912-THA
Project Number: 46907-014
Gulf JP UT Company Limited

Rationale

In accordance with the Thai government's policy to promote private sector participation in the power sector, Electricity Generating Authority of Thailand (EGAT) invited qualified generators in 2007 to participate in an independent power producer (IPP) bidding process. The early engagement of the Asian Development Bank (ADB) with IPP bidders and its ability to provide long-term financing was critical, as it allowed bidder Gulf JP Company Limited (Gulf JP) to extend its planning horizon, project financial leverage for a longer period, and bid a lower electricity tariff. Gulf JP's competitive tariff enabled its two efficient combined cycle natural gas-fired power plants, with combined capacity of 3,200 MW, to contend with low-cost proposals of other generators that use coal as the primary source of fuel.

ADB financed the first Gulf JP 1,600 MW plant (Nong Saeng) and has been closely involved in the financing of the remaining 1,600 MW plant since 2007. ADB's continuing support is crucial to ensure implementation of the second 1,600 MW given current difficulty in securing long-term US dollar financing and the project's sustained need for long-term private sector financing. The project will complete the implementation of the 3,200 MW capacity secured by Gulf JP in the 2007 IPP solicitation, and the new capacity will arrive at a critical time. Power demand continued to grow in 2012 and the latest forecasts indicate impending supply constraints toward the end of the decade. The project's addition of 1,600 MW of capacity will help Thailand maintain a reserve margin above the Ministry of Energy's critical threshold of 15%. The marked increase in installed capacity offered by the full Gulf JP 3,200 MW contribution promotes the stability of overall power supply and broad economic growth.

Description

The Project will construct a 1,600 MW combined cycle power plant in Rojana Industrial Park, U-Thai district, Ayudhaya Province.

Total Loan Amount: \$185 million (OCR)
Clean Energy Investment: \$ 107.29 million
Project Category: Cleaner Fuel/Energy efficiency
Energy Savings: 35,486 terajoules/year
Greenhouse Gas Emission Reduction: 3,800,000 tCO₂/year
Board Approval: 02 October 2012
Project Life: 30 years

- Impacts**
- Improved reliability of Thailand’s power supply.
 - Increased use of PPPs in the power sector.

Outcome Competitively priced, cleaner power generated from an independent power producer (IPP).

Output Large gas-fired power plant compliant with ADB safeguards and other social requirements commissioned.

Division Infrastructure Finance Division 2

Project team

Team leader D. Wiedmer, Senior Investment Specialist, PSOD

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Loan Number: 7376/2945-THA
Project Number: 45924-01
Theppana Wind Farm Company Limited

Rationale

To achieve sustainable long-term economic growth, Thailand is promoting alternative sources of energy such as wind for power generation and is beginning its transition to a low-carbon economy. Wind energy is a clean and sustainable source of electricity that diversifies the country's energy mix, strengthening energy security and reducing reliance on fossil fuel. The project will diversify Thailand's energy mix by adding wind energy capacity, thus helping the country progress toward its clean energy targets.

The project also contributes to accelerating and expanding private investment in clean energy infrastructure in Thailand. It is expected that successful project implementation and viable returns will attract other private investors to wind energy projects.

Description

The project entails the construction and operation of a 7.5 MW power plant consisting of three wind turbines, 2.5 MW each, in Chaiyaphum Province, 250 kilometers northeast of Bangkok.

Total Loan Amount: \$4.54 million (OCR)
\$3.63 million (CTF)
Clean Energy Investment: \$8.17 million
Project Category: Renewable Energy
Renewable Energy Generation: 10 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 6,000 tCO₂/year
Board Approval: 20 November 2012
Project Life: 25 years

- Impacts**
- Diversified energy mix through the addition of renewable energy capacity.
 - Increased private sector participation in wind power production.

Outcome Demonstrated viability and sustainability of utility-scale private sector wind farm.

Output Installation and operation of 7.5 MW utility-scale wind power plant.

Division Private Sector Infrastructure 2

Project team

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South Asia Department

Loan Number: 2862/2863/2864-BAN

Project Number: 42169-013

Greater Dhaka Sustainable Urban Transport Project

Rationale

Dhaka is one of the most densely populated cities in the world, with 45,508 people per square kilometer in the core area. Such high density in a city with limited inhabitable land owing to the city's topography, limited infrastructure, and low level of public services results in tremendous congestion and constrains the urban transport system (UTS) from providing mobility for all people. Car ownership and usage are still low because of lack of disposable income, but these figures are increasing fast with a growing middle class. With annual motorization growth of 8% there could be up to half a million cars in Dhaka by 2025, increasing local air pollutants and greenhouse gas (GHG) emissions from the transport sector. The high level of congestion and pollution result from (i) rapid motorization, (ii) a weak road network accounting for only 10% of the urban area when the required ratio is 25%, (iii) weak traffic management to organize the dense and anarchical mix of many competing modes, (iv) lack of transport demand management, and (v) inefficient public transport services.

To ensure a sustainable future for Dhaka, public transport focused on people's mobility needs and accessibility has to be improved and given priority over simple road projects. International experience documents well that interventions to promote non-motorized transport (NMT), a modal shift from private vehicles to public transport, and integration of land-use and transport planning also help lower GHG emissions in the long run. Investigations conducted as part of the project preparatory TA have shown that, out of six suburban corridors analyzed, the corridor connecting Dhaka North City Corporation (DNCC) (over 20% of its length) with the emerging Gazpur City Corporation (GCC) (over 80% of its length) has the best potential to organize urban development and support a mass transit infrastructure; and that bus rapid transit (BRT) is the most cost-effective mass transit mode for the selected corridor.

Description

The project will contribute to develop a sustainable UTS in GCC, which forms part of north Greater Dhaka, through the delivery of a 20-kilometer (km) bus rapid transit (BRT) corridor. This pilot project provides a holistic solution for integrated urban mobility, bearing a demonstration effect as no modern mass transit system exists in Bangladesh yet.

Total Loan Amount: \$ 100 million (OCR)
\$ 60 million (ADF)

Clean Energy Investment: \$ 20.14 million

Project Category: Demand-side energy efficiency

Energy savings: 540 terajoules/year

Greenhouse Gas Emission Reduction: 40,000 tCO₂/year

Board Approval: 17 April 2012

Project Life: 20 years

Impact A sustainable urban transport system is developed in DNCC and GCC.

Outcome The public transport system is improved in DNCC and GCC, benefiting a population of 1 million.

Outputs

- DNCC's and GCC's main urban transport corridor is restructured.
- Project management is effective, and BRT operations are sustainable.
- Urban quality of the corridor is improved.

Division Urban Development and Water Division, SARD

Project team

Team leader D. Margonsztern, Urban Development Specialist (Transport), SARD

Team members K. Emzita, Principal Counsel, Office of the General Counsel
A. Fox, Procurement Specialist, SARD
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M. N. Islam, Project Implementation Officer, SARD
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F. Sultana, Senior Social Development Officer (Gender), SARD

Executing agency Roads and Railways Division (RRD)-Ministry of Communications

Loan Number: 2865/2866-BAN
Project Number: 45273-001
Financing Brick Kiln Efficiency Improvement Project

Rationale

High energy intensity from growing inefficient industrial operations is a major contributor to greenhouse gas emissions and fine particulate pollution in Bangladesh. Brickfields are among the largest industrial polluters. Brick-making contributes to about 1% of gross domestic product. However, due to the lack of relevant policy and legislations, the brick sector is poorly regulated. Instead of a small number of highly efficient modern brickfields, a large number of unqualified small businesses operate on the back of outmoded technologies, severe industrial pollution, and poor labor standards.

Currently, 92% of the 4,880 brickfields in Bangladesh are using a highly polluting fixed chimney kiln (FCK) design. Improved zigzag kilns, vertical shaft brick kilns (VSBKs), hybrid Hoffman kilns (HHKs), and tunnel kilns are rare because of the general lack of awareness of these technologies and the inadequate market funding support. To improve environmental conditions, Ministry of Environment and Forests (MOEF) issued a directive on 15 July 2010 requiring that (i) no annual FCK licenses be renewed after September 2012; (ii) environmental clearance favor more energy-efficient improved zigzag kilns, VSBKs and HHKs; and (iii) all FCKs cease to exist from September 2013.

Description

The proposed project intends to establish a credit facility of \$50 million equivalent in local currency at Bangladesh Bank (central bank) for relending to participating financial intermediaries for the purpose of constructing more energy-efficient and environmentally superior brick kilns. The credit facility has two components: (i) to upgrade existing polluting brick kilns to a transitional design to preserve sector welfare while immediately reducing pollution, and (ii) to promote the most advanced brick kiln pilots to demonstrate their operational and commercial viabilities in Bangladesh. The combined efforts will help build more energy-efficient brick manufacturing capacities in Bangladesh to transform the sector to a modern and efficient industry.

Total Loan Amount: \$ 30 million (OCR); \$20 million (ADF)

Clean Energy Investment: \$ 50 million

Project Category: Demand-side energy efficiency

Energy Savings: 10,199 terajoules/year

Greenhouse Gas Emission Reduction: 980,000 tCO₂/year

Board Approval: 10 May 2012

Project Life: 40 years

Impact Improved environmental conditions in Bangladesh.

Outcome Replacement of polluting fixed chimney kilns (FCKs) with more energy-efficient kilns in Bangladesh's brick sector.

Outputs

- Designated credit facility, by catalyzing domestic resources, to finance upgrade to and construction of more energy-efficient brick kilns.
- Mitigated adverse working and social welfare conditions in ADB-funded brick kilns.

Division Public Management, Financial Sector and Trade Division, SARD

Project team

Team leaders A. Huang, Finance Specialist, SARD
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Z. M.M. Rahman, Senior Financial Sector Officer, Bangladesh Resident Mission, SARD
J. Romero-Torres, Financial Sector Specialist, SARD
J. Versantvoort, Senior Counsel, Office of the General Counsel
L. Zhang, Energy Specialist, SARD

Executing agency Ministry of Finance

Loan Number: 2966-BAN

Project Number: 42378-015

Power System Expansion and Efficiency Improvement

Investment Program-Tranche 1

Rationale

About 50% of the Bangladeshi population has access to power. Those who have access also face severe power shortages; the available power generating capacity in Bangladesh in June 2011 was 4,890 MW against estimated unconstrained demand of 6,765 MW, leaving a significant demand-supply gap. The government envisages investing \$9.5 billion for generation expansion during the five-year planning period and matching investment of about \$3 billion on transmission and distribution improvements, together with a sound financing plan. Investments envisaged in the sixth five-year plan are expected to increase the electrification rate to 68% by 2015, eliminate the supply demand gap and resolve reliability and supply quality issues.

Description

Tranche 1 of the proposed Power System Expansion and Efficiency Improvement Investment Program will address two key areas in the power sector aligning with the priorities identified in the Country Partnership Strategy: improving energy use efficiency of thermal power plants; and improving the transmission network capacity. The project interventions will include: (i) adding 235 MW capacity by conversion of four single cycle gas fired power plants to combine cycle plants at Khulna, Baghabari, Sylhet and Shahjibazar; (ii) construction of 180 km of 132 kV transmission lines and four 133/32 kV substations; and (iii) capacity building. The capacity building component includes training on investment planning, operations planning, energy auditing and monitoring, financial management and auditing, project preparation and appraisal, and operation and maintenance of solar irrigation pumps.

Total Loan Amount: \$185 million (OCR)

Clean Energy Investment: \$ 35.65 million

Project Category: Supply-side energy efficiency

Energy Savings: 10,643 terajoules/year
233 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 3,078,159 tCO₂/year

Board Approval: 12 December 2012

Project Life: 30 years

Impact Increased access to clean and reliable electricity supply in Bangladesh.

Outcome Improved efficiency in electricity generation, and transmission in Bangladesh.

Outputs

- Increased generation capacity.
- Increased transmission capacity.
- Enhanced capacity of power sector agencies.
- Project management system in place.

Division Energy Division, SARD

Project team

Team leader H. Gunatilake, Lead Energy Economist, SARD

Team members C.Galarpe, Senior Operations Assistant, SARD
J. Ghimire, Counsel, Office of the General Counsel
S. Janardanam, Financial Specialist, SARD
R. Murshed, Senior Project Officer, SARD
S. Sasaki, Environment Specialist, SARD
P. van Houten-Castillo, Social Development Specialist, SARD
P.Wijayatunga, Principal Portfolio Management Specialist, SARD
L. Zhang, Energy Specialist, SARD

Executing agencies North-West Power Generation Company Limited
Power Development Board of Bangladesh
Power Grid Company of Bangladesh Limited
Power Division, Ministry of Power, Energy, and Mineral Resources

Loan Number: 2914-IND
Project Number: 41627-053
Himachal Pradesh Clean Energy Development
Investment Program-Tranche 4

Rationale

The Indian power sector has a history of steadily increasing demand for, and chronic shortages of electricity. An adequate power supply contributes to poverty alleviation, yet over 30% of India's population lack access to electricity. Continued shortages significantly constrain commercial and industrial activities and reduce growth. Businesses and manufacturers must utilize more expensive back-up power supplies, often diesel fuel-based, which increases their costs and undercuts competitiveness. Insufficient domestic fuel resources and rising international coal and oil prices threaten India's already fragile energy security, such that maximizing clean indigenous energy sources is a government priority.

Himachal Pradesh is home to about one fourth of India's hydropower potential, and maximizing this potential is articulated in the Hydropower Policy, 2006 and the power sector roadmap of the Government of Himachal Pradesh (GOHP). Hydropower will benefit electricity consumers of Himachal Pradesh and throughout northern India as excess generated power flows to India's national grid. The primary alternative, namely coal-fired power generation and its associated coal mining and coal transport, have considerable adverse impacts on the environment as well as climate change, including substantial emissions of CO₂ and of suspended particulate matter.

Description

The Tranche 4 loan will partially finance the construction of the 450 MW Shongtong Karcham Hydroelectric Project, located in District Kinnaur of Himachal Pradesh, India. This hydroelectric facility consists of certain civil works, underground powerhouse, river diversion, intake and desilting, and electrical and interconnection works. The Tranche 4 loan will fund the entire civil works contract package. This project is run-of-river design with minimal storage and inundation of land. Additional Tranche 4 outputs include computer hardware, software and related information technology infrastructure installed in Himachal Pradesh Power Corporation Limited (HPPCL's) offices. Also, further training of HPPCL staff on project management, operations and maintenance is included.

Total Loan Amount: \$ 315 million (OCR)
Clean Energy Investment: \$ 315 million
Project Category: Renewable Energy
Renewable Energy Generation: 1,653 gigawatt-hours/year
Greenhouse Gas Emission Reduction: 1,239,750 tCO₂/year
Board Approval: 02 October 2012
Project Life: 80 years

Impact Increased hydropower production and contribution to climate change mitigation with improved project management and sector governance in Himachal Pradesh.

Outcome Improved capacity of HPPCL to generate and sell electricity from hydropower and manage its operations.

Outputs

- Shongtong Karcham Hydroelectric Project becomes operational on time and within budget.
- Data center and disaster recovery center installed in HPPCL corporate facilities and are operational.
- Capacity of HPPCL personnel on project management, operations and maintenance improved.

Division Energy Division, SARD

Project team

Team leader A. Jeffries, Senior Energy Specialist, SARD

Team members H. Kobayashi, Principal Portfolio Management Specialist, SARD
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S. Sasaki, Environment Specialist, SARD
P. Van Houten-Castillo, Social Development Specialist, SARD

Executing agency Multi-purpose Projects and Power Department of the Government of Himachal Pradesh

Loan Number: 2924-IND

Project Number: 37139-053

Uttarakhand Power Sector Investment Program-Project 4

Rationale

The proposed periodic financing request will fund the ongoing Uttarakhand Integrated Transmission Project (UITP). Parts of the UITP are being funded by Tranche 2 and Tranche 3 of the multi-tranche financing facility (MFF), and other funding agencies. The project falls under the Uttarakhand Power Sector Investment Program (UPSIP) roadmap, aimed at the evacuation of power from various hydropower projects in the Alaknanda river basin of Uttarakhand, where approximately 2,700 MW of hydropower plant will be commissioned by 2020–21.

Description

The project includes (i) the construction of two 315 MVA Gas Insulated Switchgears (GIS) Substation at Pipalkoti; and (ii) the construction of a 153-kilometer 400 kV Double Circuit Transmission Line from Sringer to Kashipur..

Total Loan Amount: \$150 million (OCR)

Clean Energy Investment: \$ 150 million

Project Category: Renewable Energy

Renewable Energy Generation: not applicable

Greenhouse Gas Emission Reduction: not applicable

Board Approval: 26 October 2012

Project Life: 40 years

Impact Enhanced hydropower development in Uttarakhand.

Outcome Strong and reliable bulk power evacuation system from Uttarakhand to the Northern Grid.

Output Uttarakhand Integrated Transmission System for Alaknanda basin completed.

Division Energy Division, SARD

Project team

Team leader T. Limbu, Energy Economist, SARD

Team members P. Houten-Castillo, Social Development Specialist, SARD
S. Janardanam, Finance Specialist (Energy), SARD
S. Sasaki, Environment Specialist, SARD
H. Zhang, Finance Specialist (Energy), SARD

Executing agency Government of Uttarakhand, Energy Department

Loan/Grant Number: 2892/2893/0303-SRI

Project Number: 43576-013

Clean Energy and Network Improvement Project

Rationale

Sri Lanka has achieved a substantial improvement in the energy sector, with a national electrification ratio of 91% in 2011 compared with 29% in 1990. The longer-term challenge for the country is to reduce its high dependence on expensive fossil fuel energy. The energy sector struggles to meet growing demand for electricity at sufficiently low cost and acceptable reliability levels. Demand growth has been generally met by expensive oil-fired thermal generation, which is not the solution to the country's energy security and environment protection in the long term. The share of thermal energy in the power generation mix has increased from 6% in 1995 to 54% in 2011. Diversification of the generation mix—including from renewable energy sources, improvement of network efficiency, and supply and demand side management—can help to address this issue.

To enable future planned power supply increases, meet growing demand in the regions, and integrate renewable energy sources into the grid, it is necessary to strengthen the transmission network, especially in conflict-affected areas of the Northern and Eastern provinces. Another challenge is to improve system reliability and reduce technical losses. An enhanced 33 kilovolt (kV) medium voltage network is needed to expand power supply in rural areas, where many poor households remain unconnected or have poor quality of electricity supplies. The new infrastructure will also support development of clean energy. Improvement of transmission and distribution infrastructure will address electricity needs in the post-conflict areas and directly contribute to their development. The government intends to improve the energy sector performance and continue pursuing financial, managerial, and institutional reforms in line with the Sri Lanka Electricity Act, 2009.

Description

The Project will contribute to a reliable, adequate, and affordable power supply for sustainable economic growth and poverty reduction in Sri Lanka. It involves (i) Construction/augmentation of transmission infrastructure in the Northern Province (ii) transmission and distribution network efficiency improvement (iii) installation of 1-MW solar power generation pilot.

Total Loan Amount: \$100 million (OCR); \$30 million (ADF)

Grant Amount: \$1.5 million (CEF/CEFPF)

Clean Energy Investment: \$8.17 million

Project Category: Supply-side energy efficiency/Renewable Energy

Renewable Energy Generation: 1.38 gigawatt-hours/year

Energy Savings: 85.6 gigawatt-hours/year

Greenhouse Gas Emission Reduction: 56,786 tCO₂/year

Board Approval: 18 September 2012

Project Life: 40 years (T & D)
25 years (solar)

Impacts Reliable, adequate, and affordable power supply for sustainable economic growth and poverty reduction.

Outcome Improved clean power supply, efficiency, and reliability in the delivery of electricity.

Outputs

- Transmission infrastructure strengthened in the Northern province.
- Efficiency of transmission and medium voltage distribution networks improved
- Solar rooftop power generation developed.
- Advisory and capacity building support provided for wind and solar power development on a PPP basis.

Division Energy Division, SARD

Project team

Team leader M. Khamudkhanov, Senior Energy Specialist, SARD

Team members S. Sasaki, Environment Specialist, SARD
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P. van Houten-Castillo, Social Development Specialist, SARD
P. Wijayatunga, Unit Head, Portfolio Management, Nepal Resident Mission, SARD
H. Zhang, Financial Specialist (Energy), SARD

Executing agency Ministry of Power and Energy

Southeast Asia Department

Loan/Grant Number: 2964/8261/0326-PHI

Project Number: 43207-013

Market Transformation Through Introduction of Energy-Efficient Electric Vehicles

Rationale

Energy efficient electric vehicles are a new technology with the promise to transform the way energy is used by today's internal combustion engine (ICE) vehicles. For net energy importing countries, such as the Philippines, electric vehicles can dramatically reduce the country's dependence on imported energy resources, which in turn will reduce short term price volatility and improve long term energy security. This technology has also created the opportunity to transition into an environment where vehicles no longer generate harmful air and noise pollution and can be powered by indigenous renewable energy resources such as solar, hydropower or geothermal. In April 2011, ADB successfully introduced, as a pilot project in the City of Mandaluyong, a basic form of locally made electric vehicles: 20 electric tricycles (e-Trikes) with Lithium Ion batteries. The proposed project will build on lessons from the pilot and scale-up the project for the entire Philippines; it plans to transform the sector enabling eventual replacement of the current inefficient ICE tricycles. The proposed project will also generate local employment by establishing new associated electric vehicle support industries in the Philippines.

Description

The proposed project will replace 100,000 gasoline tricycles (motorcycles with a passenger sidecar) with three wheel plug-in electric vehicles running on an electric motor and rechargeable battery (e-trikes). The project will initiate a transformation of the tricycle subsector by (i) improving the livelihoods of tricycle drivers through higher incomes and a better work environment; (ii) generating global environmental benefits and reducing the carbon footprint of the tricycle industry through the introduction of low-carbon, e-trike technology; and (iii) leveraging private sector participation in the e-trike market.

Total Loan/Grant Amount: \$300 million (OCR)
\$100 million (CTF Loan)
\$ 5 million (CTF Grant)

Clean Energy Investment: \$ 309.57 million

Project Category: Demand-side energy efficiency

Energy Savings: 5,539 terajoules/year

Greenhouse Gas Emission Reduction: 332,150 tCO₂/year

Board Approval: 11 December 2012

Project Life: 10 years

Impact Sustainable energy use by the transport sector.

Outcome Transformation of the public transportation through large-scale adoption of energy efficient electric vehicles, in particular e-trikes.

- Outputs**
- E-trike units: Complete e-trike units delivered to LGUs with standard 3-year warranty.
 - Battery supply chain: Lithium-ion battery supply chain, including support infrastructure, created.
 - Solar and grid connected charging stations: Solar and other charging stations available in selected areas to meet the public charging needs.
 - Material recovery: Collection of used batteries and old ICE tricycles: (i) recycling of lithium-ion batteries and (ii) body disposal.
 - Communication, social mobilization, and technology transfer.

Division Energy Division, SERD

Project team

Team leader S. Hasnie, Principal Energy Specialist, SERD

Team members J. Acharya, Senior Climate Change Specialist (Clean Energy), RSDD
R. Butler, Safeguards Specialist (Resettlement), SERD
A. Fernando, Project Analyst, SERD
J. Leather, Principal Transport Specialist, SERD
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D. McCauley, Head, Climate Change Program Coordination Unit, RSDD
G. Peralta, Senior Safeguards Specialist, SERD
J. Shah, Advisor, RSDD
M. Suga, Social Sector Specialist, SERD
E. Thomas, Social Development Specialist (Civil Society and Participation), SERD
S. Zaidansyah, Senior Counsel, Office of the General Counsel

Executing agency Department of Energy

Loan Number: 2956-VIE

Project Number: 39500-033

Ho Chi Minh City Urban Mass Rapid Transit Line 2 Investment Program—Tranche 2

Rationale

The MRT 2 project is a high priority project of the government, and one of the three priority mass rapid transit (MRT) lines identified in the approved urban transport master plan (UTMP) for Ho Chi Minh City (HCMC). The UTMP aims to establish a sustainable urban transport system for HCMC. Under the MFF policy framework, policy and regulatory measures to discourage the use of private transport modes will be adopted including implementation support through the proposed Clean Technology Fund (CTF)-funded project. The CTF project also will improve infrastructure works to integrate the MRT and public bus systems to improve the urban environment along the MRT2 corridor and reduce greenhouse gas emissions.

Description

The Project has the following components:

Component 1. MRT Line 2 System Development: Completing site preparation works and constructing an initial building at Tham Luong depot site and remaining depot infrastructure work.

Component 2. MRT Implementation Support: Providing consulting services to Management Authority for Urban Railways (MAUR) for:

- Project management and implementation support, including procurement, compliance with financier requirements, MRT management, operations and maintenance (O&M), and public transport management;
- Social development, gender issues and public awareness; and
- Integrated sustainable urban transport study, including; (a) demand forecasting, integrated fares and ticketing, (b) bus restructuring and intermodal facilities, and (c) sustainable transport policy.

Total Loan Amount: \$500 million (OCR)

Clean Energy Investment: \$100 million

Project Category: Demand-side energy efficiency

Energy Savings: no data

Greenhouse Gas Emission Reduction: no data

Board Approval: 27 November 2012

Project Life: 60 years

Impact Competitive MRT service along the project corridor.

Outcome MRT 2 operation and maintenance (O & M) systems are effectively implemented.

Outputs

- MRT system development.
- MRT implementation support.

Division Transport and Communications Division, SERD

Project team

Team leader R. Valkovic, Principal Transport Specialist, SERD

Team members

- P. Broch, Senior Transport Specialist, SERD
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- S. Kawazu, Senior counsel, Office of the General Counsel
- K. Leung, Finance Specialist, SERD
- T. Mella, Operations Officer, SERD
- L. Thang, Senior Project Officer (Transport), VRM
- A. Velasquez, Safeguard specialist (Environment), SERD

Executing agency Ho Chi Minh City People's Committee

Loan Number: 2968-VIE
Project Number: 45406-001
Low Carbon Agricultural Support Project

Rationale

Agriculture sector in Vietnam is the largest contributor (43%) to the national GHG emission. Over 40% of arable land is degraded because of heavy use of inorganic fertilizers and other unsustainable agricultural practices. Deforestation has been continuously increasing since about 56% of Vietnamese households still rely on the unsustainable harvest of firewood for their energy needs. The use of firewood for cooking creates indoor pollution, causing serious respiratory diseases, especially among rural women and children. The Government is promoting the use of abundant biomass sources, such as livestock manure and other agri-wastes, to produce biogas as a clean energy source for rural households.

The Government of Viet Nam intends to progressively adopt climate smart agricultural waste management practices (CSAWMP) by promoting the use of biogas plants (BPs) to treat agricultural and rural household waste. Properly constructed BPs have important benefits by (i) reducing human and livestock disease outbreaks; air, water and soil pollutants; and firewood consumption; (ii) increasing savings of time and money, quantity and quality of organic fertilizer use, and access to rural income-enhancing carbon credit schemes; and (iii) producing biogas that can be used as renewable clean energy (gas and electricity); as well as bio-slurry, a clean organic fertilizer.

Description

The Project will (i) support construction of about 36,000 small, 40 medium and 10 large biogas plants; (ii) empower biogas plant operators, masons, technicians, engineers, contractors, and biogas relevant agencies to follow good biogas value chain (BVC) management practices; (iii) promote the transition of BVC management from being led by government to being led by the private sector; and (iv) support the government's efforts to access existing and future markets for carbon credits.

Total Loan Amount: \$74 million (OCR)
Clean Energy Investment: \$ 74 million
Project Category: Renewable Energy
Renewable Energy Generation: No data
Greenhouse Gas Emission Reduction: 150,000 tCO₂/year
Board Approval: 12 December 2012
Project Life: 15 years

Impacts Less agriculture-related pollution.

Outcome Greater uptake of climate-smart agricultural waste management practices (CSAWMP).

Outputs

- Expanded use of livestock waste management infrastructure.
- Credit lines for biogas value chains.
- Enhanced CSAWMP technology transfer.
- Effective project management.

Division Environment, Natural Resources & Agriculture Division, SERD

Project team

Team leader A. Musa, Finance Specialist, SERD

Team members

- S. Aman-Wooster, Senior Social Development Specialist, SERD
- S. Ancha, Principal Climate Change Specialist, SERD
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- M. Chu, Senior Financial Sector Officer, SERD
- T. Dang, Young Professional, SERD
- V. Harishchandra, Rural Development Economist, SERD
- P. Ho, Senior Project Officer (Natural Resources and Agriculture), SERD
- G. Nguyen, Social Development Officer (Gender), SERD
- J. Pedersen, Procurement Specialist, Central Operations Services Office
- P. Ramachandran, Environment Specialist, SERD
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- E. Sasaki, Senior Financial Sector Specialist, SERD
- N. Thang, Associate Safeguards Officer (Resettlement), SERD
- R. Verdillo, Operations Assistant, SERD

Executing agency Ministry of Agriculture and Rural Development

Appendix 1 2012 Clean Energy Grant-Financed Projects

Grant Number	Country	Department and Division	Project Officer	Project Name	Sector and Clean Energy Category	Total Amount (\$million)	Clean Energy Investment (\$million)	Funding Sources
0294	KGZ	CWRD Energy Division	J. Liston	Power Sector Rehabilitation Project	Energy, Renewable Energy	40.00	27.90	ADF
326	PHI	SERD Energy Division	S. Hasnie	Market Transformation Through Introduction of Energy-Efficient Electric Vehicle Project	Energy, Renewable Energy	5.00	5.00	CTF
303	SRI	SARD Energy Division	M. Khamudkhanov	Clean Energy and Network Improvement Project	Energy, Renewable Energy	1.50	1.50	CEF/CEFPF

ADF = Asian Development Fund, CEF = Clean Energy Fund, CEFPF = Clean Energy Financing Partnership facility, CTF = Clean Technology Fund, CWRD = Central and West Asia Regional Department, SARD = South Asia Regional Department, SERD = Southeast Asia Regional Department.

Appendix 2 2012 Sovereign and Nonsovereign Projects with Clean Energy Components

Country	Loan/ Investment No.	Project Title	Total Amount (\$ million) ^a	Clean Energy Investment (\$ million) ^a
Sovereign Projects				
Energy Sector				
Kyrgyz Republic	2869	Power Sector Rehabilitation Project	15.00	12.10
China, People's Republic of	2885	Shanxi Energy Efficiency and Environment Improvement Project	100.00	41.13
China, People's Republic of	2898	Heilongjiang Energy Efficient District Heating Project	150.00	61.70
Philippines	2964	Market Transformation Through Introduction of Energy-Efficient Electric Vehicle Project	400.00	304.57
Sri Lanka	2892	Clean Energy and Network Improvement Project	100.00	5.13
Sri Lanka	2893	Clean Energy and Network Improvement Project	30.00	1.54
India	2914	Himachal Pradesh Clean Energy Development Investment Program-Tranche 4	315.00	315.00
India	2924	Uttarakhand Power Sector Investment Program- Project 4	150.00	150.00
Bangladesh	2966	Power System Expansion and Efficiency Improvement Investment Program-Tranche 1	185.00	35.65
Nonenergy Sector				
Viet Nam	2968	Low Carbon Agricultural Support Project	74.00	74.00
Bangladesh	2864	Greater Dhaka Sustainable Urban Transport Project	100.00	12.59
Bangladesh	2862/3	Greater Dhaka Sustainable Urban Transport Project	60.00	7.55
Monaco	2934	MFF: Urban Transport Development Investment Program-Tranche 1	29.70	2.10
Monaco	2935	MFF: Urban Transport Development Investment Program-Tranche 1	30.20	2.14
Viet Nam	2956	Ho Chi Minh City Urban Mass Rapid Transit Line 2 Investment Program-Tranche 2	500.00	100.00
China, People's Republic of	2962	Hunan Xiangjiang Inland Waterway Transport Project (Hydropower Component)	150.00	150.00
Bangladesh	2865	Financing Brick Kiln Efficiency Improvement Project	30.00	30.00
Bangladesh	2866	Financing Brick Kiln Efficiency Improvement Project	20.00	20.00
ARM	2860	Water Supply and Sanitation Sector Project (additional financing)	40.00	2.56
Subtotal			2,478.90	1,327.75

continued on next page

Country	Loan/ Investment No.	Project Title	Total Amount (\$ million) ^a	Clean Energy Investment (\$ million) ^a
Nonsovereign Projects				
Energy Sector				
India	7353/2853	ICICI Renewable Energy and Energy Efficiency Projects	100.00	100.00
India	7354/2854	Rajasthan Concentrating Solar Power Project (Rajasthan Sun Technique Energy Private Limited)	103.00	103.00
Thailand	7356/2875	Bangchak Solar Energy Company Limited (Provincial solar Power Project)	37.80	37.80
Thailand	7370/2912	Gulf JP UT Company Limited (Ayudhaya Natural Gas Project)	185.00	107.29
Thailand	7376/2945	Theppana Wind Farm Company Limited (Theppana Wind Power Project)	8.17	8.17
China, People's Republic of	7368/2899	China Everbright Biomass Energy Investment Limited (Agricultural Waste to Energy Project)	120.00	120.00
China, People's Republic of	7368/2900	China Everbright Environmental Energy Limited (Municipal Waste to Energy Project)	80.00	80.00
India	7361/2906 to 7366/2911	145-MW Grid-connected Solar Project (5 lon projects combined)	100.00	100.00
REG	7371/2919	Southeast Asia Energy Efficiency Project	40.00	40.00
Nonenergy Sector				
REG	7352	Climate Public-Private Partnership Fund (Customized Fund Investment Group)	100.00	100.00
China, People's Republic of	7377/2919	Dynagreen Environmental Protection Group Company (Dynagreen Waste-to-Energy Project)	200.00	200.00
Subtotal			1,073.97	996.26
Grants				
Energy Sector				
Kyrgyz Republic	0294	Power Sector Rehabilitation Project	40.00	27.90
Philippines	326	Market Transformation Through Introduction of Energy-Efficient Electric Vehicle Project	5.00	5.00
Sri Lanka	303	Clean Energy and Network Improvement Project	1.50	1.50
Nonenergy Sector (No clean energy grant project in nonenergy sector in 2012)				
Subtotal			46.50	34.40
Total			3,599.37	2,358.42

^a Total investment includes loans from ADB's Ordinary Capital Resources and Asian Development Fund, grants and guarantees from Ordinary Capital Resources, Asian Development Fund, Global Environment Facility, and Clean Energy Financing Partnership Facility.

2012 Clean Energy Investments Project Summaries

This report summarizes the investments in clean energy made by the operations departments of the Asian Development Bank (ADB) in 2012, condensing information from project databases and formal reports in an easy-to-reference format. This report was prepared by ADB's Clean Energy Program which provides the cohesive agenda that encompasses and guides ADB's lending and non-lending assistance, initiatives, and plan of action for sustainable growth in Asia and the Pacific.

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 two-thirds of the world's poor: 1.7 billion people who live on less than \$2 a day, with 828 million struggling on less than \$1.25 a day. 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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