2013 CLEAN ENERGY INVESTMENTS

PROJECT SUMMARIES

ASIAN DEVELOPMENT BANK

ADB

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Printed in the Philippines.

ISBN 978-92-9254-560-4 (Print), 978-92-9254-561-1 (PDF)
Publication Stock No. RPT146557-2

Cataloging-in-Publication Data

Asian Development Bank
2013 Clean energy investments: Project summaries.
Mandaluyong City, Philippines: Asian Development Bank, 2014.

1. Clean energy. 2. Renewable energy. 3. Energy efficiency. I. Asian Development Bank.

All data as of 31 December 2013.

Note:
In this report, "$" refers to US dollars.

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Abbreviations

ADB – Asian Development Bank
ADF – Asian Development Fund
BRT – bus rapid transit
CAREC – Central Asia Regional Economic Cooperation Program
CCGT – combined-cycle gas turbine
CCS – carbon capture and storage
CEFPF – Clean Energy Financing Partnership Facility
COSO – Central Operations Services Office
CTF – Clean Technology Fund
CSP – concentrated solar thermal power
CWRD – Central and West Asia Department
EARD – East Asia Department
GEF – Global Environment Facility
IGCC – integrated gasification combined-cycle
IMAR – Inner Mongolia Autonomous Region
kg – kilogram
km – kilometer
kV – kilovolt
LPG – liquefied petroleum gas
MW – megawatt
NMT – nonmotorized transport
OCO – Office of Cofinancing Operations
OCR – ordinary capital resources
OGC – Office of the General Counsel
OSFMD – Operations Services and Financial Management Department
PARD – Pacific Department
PLN – PT Perusahaan Listrik Negara (State Electricity Corporation)
PNG – Papua New Guinea
PPL – PNG Power Limited
PPP – public–private partnership
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
TA – technical assistance
tCO_2e – tons of carbon dioxide equivalent

Executive Summary

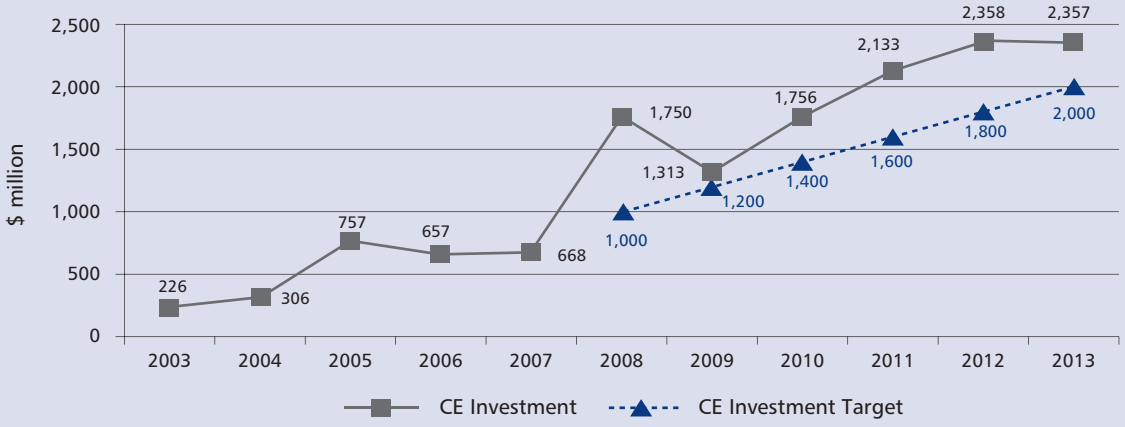
ADB Exceeds its Targeted Investment Goal for the Sixth Year in a Row

In 2013, the Asian Development Bank (ADB) achieved clean energy investments of $2.3 billion, meeting its target to achieve at least $2 billion annual investments by 2013. This achievement needs context though, going back to 2008, when ADB first made public its target for $2 billion annually in clean energy investment by 2013. This target was actually met two years ahead of schedule in 2011. ADB then revised its pledge—it would continue to meet a $2 billion goal annually until 2013. With the results of 2011–2013 recorded, ADB has kept its pledge, and its commitment to a policy of supporting clean energy development in as many sectors and ways as possible has been a notable success.

ADB's strategy, enshrined in ADB's 2009 Energy Policy, has 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. That interest is demonstrated by ADB exceeding its targeted level of investment every year since 2008.

Figure 1 below compares actual versus targeted investments. Actual investment greatly exceeded ADB's investment targets, which demonstrates how influential policies can be in catalyzing growth in clean energy.

Figure 1: Progress Toward ADB's $2 Billion Clean Energy Investments Target



In 2013, ADB's clean energy investments reached a total of $2.357 billion. The solid gray line in the figure above tracks ADB's annual clean energy investments, while the dotted blue line marks ADB's target of $1 billion from 2008 to 2012, and its $2 billion target starting in 2013
Source: ADB Database 2013.

2013 Global Energy Investment Declines for a Second Year

Global clean energy investments in 2013 were recorded at $254 billion, down from investments of $286.2 billion in 2012. Industry experts have attributed this fall in investment to regulatory uncertainty in major markets and to changes in policy, specifically the end of subsidy and incentive programs, especially in the major markets of Europe and the United States. However, there is encouraging news as some of the fall in investment can be traced to improved economics in solar and wind, but especially a continued sharp reduction in the cost of photovoltaic systems.

Worldwide volume of solar investments grew by around 20%, setting a new record, though the market itself reached a new low in Europe. Japan became the clear leader in terms of growth, in part due to new feed-in-tariffs for renewables to help the country find new sources of energy after the Fukushima nuclear disaster.

The People's Republic of China (PRC) remained the top destination for clean energy investment, though this decreased slightly from $63.8 billion in 2012 to $61.3 billion in 2013. The decrease in investment does not fully demonstrate the level of progress the PRC made towards implementing clean energy - in 2013, the PRC set a record by installing 12 gigawatt (GW) of solar photovoltaic. Prior to this, no country had installed more than 8 GW in a single year.

The global decline in investment affected nearly all clean energy sectors, though to differing degrees. Wind's decline was small $80.3 billion in 2013, from $80.9 billion in 2012, but solar investment dropped by almost $30 billion, to $114.7 billion from $142.9 billion. The same decrease was true for biomass and waste to energy and biofuels. However, energy efficiency and energy smart technologies such as the smart grid, energy storage, electric vehicles and general energy efficiency saw an increase of investment to $34.6 billion from $32.7 billion.

2013 ADB Investment Trends Show Increased Focus on Energy Efficiency and the Public Sector

In 2013, ADB pledged an increased focus on energy efficiency projects going forward, in order to help developing Asian and Pacific countries take advantage of the "low-hanging fruit" of energy efficiency interventions. This overall increase in efficiency and smart technology is encouraging for future ADB work in the area.

Coupled with price drops in equipment and the operation and maintenance of wind, and solar, more and more clean energy options are becoming available for developing countries.

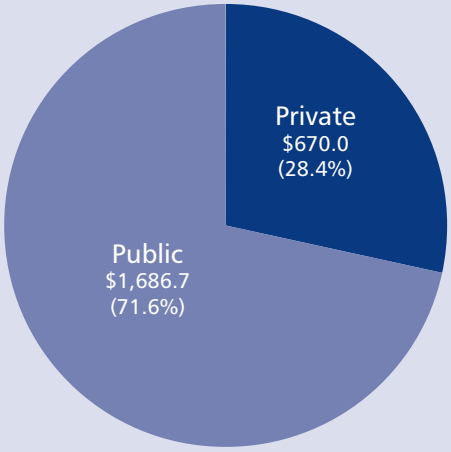
ADB's investment record supports this conclusion. Tried and true clean energy technologies continue to be supported, as countries are now better equipped to tap into their indigenous solar, wind and small hydro resources. ADB also supported innovative and new technologies, such as advancements in sustainable transport including a bus-rapid-transit system, as well as large-scale energy efficiency projects that had crossover in the water and agriculture sectors.

Of ADB's total clean energy investment of $2.3 billion, the majority (72%) were public sector or sovereign loans totaling $1.68 billion, while the remaining $670 million (28%) went to the private sector (Figure 2). Public sector investments were up this year compared to the previous year.

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 $1.4 billion in 2013, up by almost $100 million compared to 2012. Energy efficiency investments remained strong in 2013, with $853 billion invested. This represented a decrease from $973 million in 2012, but energy efficiency investments over the past few years have all been significantly higher since 2010 when $340 million was invested.

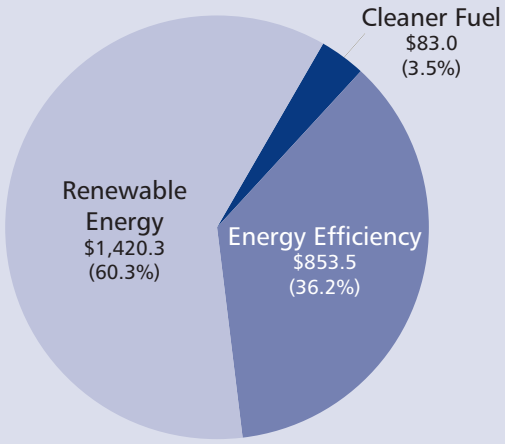
As shown in Figure 4, out of ADB's total clean energy investments, $1.88 billion was invested in the energy sector, while $475 million was directed to projects in non-energy sectors including transport and water.

Figure 2: Clean Energy Investments—Public versus Private Sector, 2013
($ million)



Source: ADB Database 2013.

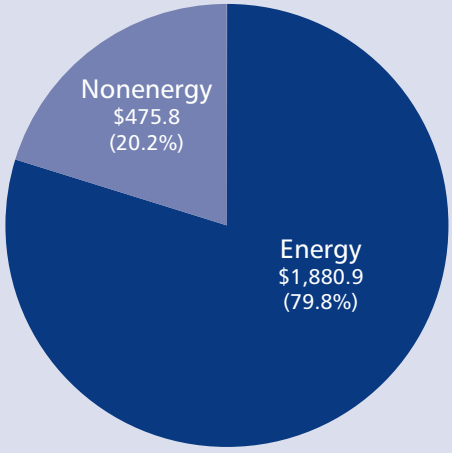
Figure 3: Clean Energy Investment by Clean Energy Project Type
($ million)



Source: ADB Database 2013.

In 2013, ADB's $2.3 billion clean energy investment is expected to produce the following significant gains: a total of 5.2 terawatt hours per year of clean electricity from renewable sources such as solar, wind and hydro; 1,987 gigawatt hours of electricity savings from energy efficiency; more than 4,600 terajoules per year from avoided consumption of direct fuel; abatement of 7 million tons of carbon dioxide equivalent (tCO_2e) per year; and installation of 1,390 megawatts of renewable energy generation capacity (see Figure 5).

Figure 4: Clean Energy Investment by Sector, 2013
($ million)

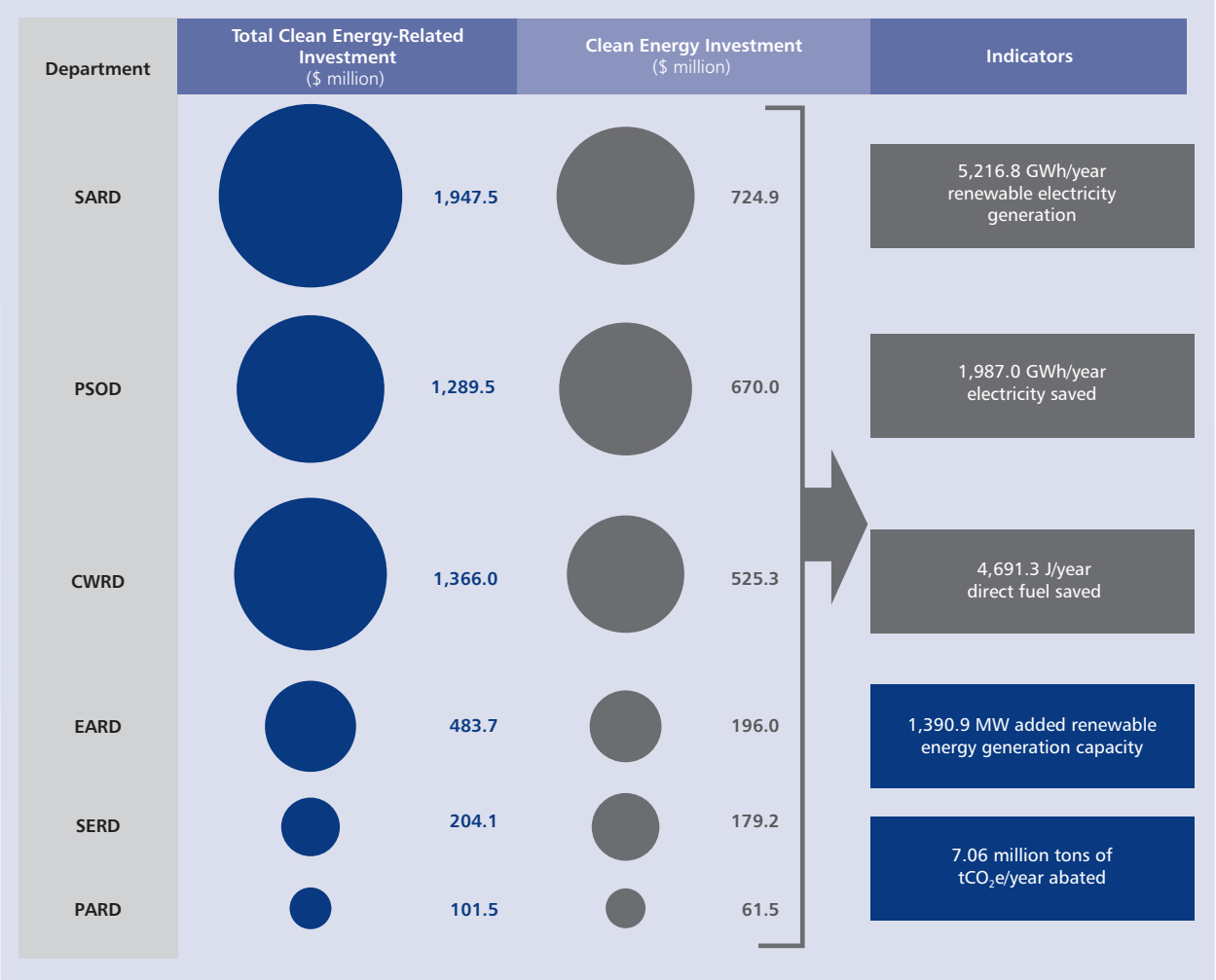


Source: ADB Database 2013.

An analysis of clean energy investment by operations department at ADB shows that the South Asia Department was the source of a leading share (30%) of investment at $725 million. This reflects high investment levels in India, though projects in Nepal and Bhutan were also significant. The Private Sector Operations Department claimed the second-largest share (28%) of investment at $670 million, followed by the Central and West Asia Department at $525 million (22%), the East Asia Department with $196 million (8%), the Southeast Asia Depratment with $179 million (7%) and finally the Pacific Department at $61.5 million (1%).

Of ADB's overall clean energy portfolio in 2013, there were 12 grant-financed investments totaling $194.6 million. The countries of Cambodia, India, Indonesia, Nepal, the PRC, Samoa, Tajikistan, Tonga and Viet Nam were all extended grant financing in a variety of projects, with the largest grant of $136 million going to a hydropower project in Tajikistan, while the majority of the rest were smaller grants on an average of $2 million, mainly for capacity building and institution strengthening. For more details on all ADB clean energy grants, see Appendix 1.

Figure 5: Indicators for Clean Energy Investments, 2013
($ million)



CO_2e = carbon dioxide equivalent, CWRD = Central and West Asia Department, EARD = East Asia Department, GWh = gigawatt hours, MW = megawatt, PARD = Pacific Department, PSOD = Private Sector Operations Department, SARD = South Asia Department, SERD = Southeast Asia Department, TJ = terajoule.
Note: Only projects with 5% or above clean energy investment are included.
Source: ADB Database 2013.

Central and West Asia Department

Loan Number: 3090/3091/3092-PAK
Project Number: 47094-001
Jamshoro Power Generation

Rationale

Pakistan is exploring all options to reduce power load shedding and power cost but has few medium-term options for affordable, dependable power supply. Natural gas was the main fuel used for Pakistan's base-load power plants, but the country's dwindling reserves of gas have resulted in increasing use of high-cost imported fuel oil for power generation. This has increased power generation costs and exacerbated the existing financial shortfall, both within the sector and the national economy. Compared to existing, inefficient heavy fuel oil-fired plants, the higher efficiency supercritical generation units and diversification away from imported fuel oil will enable Pakistan to increase its reliable supply of electricity and lower both costs and greenhouse gas emissions.

Although large hydropower is the least-cost solution, the high capital cost, the long implementation period, and complex safeguard issues mean this is a long-term option. Small and medium sized run-of-the-river hydropower plants have shorter construction periods but have seasonal and daily output variation which makes them unsuitable for base-load. Domestic gas-fired generation will decline from the current 26% with the depletion of existing gas fields, and competing demand from industry, transport, and retail customers unless domestic gas supplies are increased. The abundant wind and solar resources are being developed, but their outputs are variable and would not meet the base-load requirements.

Description

The project will (i) install a 600-MW (net) supercritical coal-fired unit, using an 80/20 blend of imported sub-bituminous coal and domestic lignite when available, and provide 5 years of operation and maintenance support; (ii) ensure compliance with the national environmental standards (install emission control devices for the existing units and remediating the site); (iii) enhance capacity of GENCO Holding Company Limited and Jamshoro Power Company Limited by providing financial, technical, and operational training; and (iv) introduce education on coal-fired plant operation. The infrastructure will support government's plan to have an additional 600-MW unit at the same site. The design includes a flue duct interface that will allow adding carbon capture and storage when the technology is available.

Total Loan Amount: $870 million (OCR)
$30 million (ADF)

Clean Energy Investment: $109.07 million

Project Category: Supply-side energy efficiency

Energy Savings: 3,996.7 terajoules/year

Greenhouse Gas Emission Reduction: 503,000 tCO_2e/year

Board Approval: 9 December 2013

Project Life: 30 years

Impact	Enhanced energy supply
Outcome	More efficient energy mix (through diversification from expensive heavy fuel oil)
Outputs	• Jamshoro thermal power station capacity increased • National environmental standards compliance ensured • Executing Agency and implementation agency staff capacity enhanced • Coal-fired power plant operation introduced in technical school curriculum
Division	Energy Division,CWRD
Project Team	
Team Leader	F. Kawawaki, Principal Energy Specialist, CWRD
Team Members	Z. Abbas, Environment Specialist, CWRD R. Butler, Senior Social Development Specialist (Safeguards), CWRD L. Lu, Energy Specialist, CWRD C. Png, Senior Counsel, OGC A. Tareen, Senior Project Officer (Energy), CWRD J. Taylor, Principal Procurement Specialist, OSFMD F. Tuliao, Operations Assistant, CWRD J. Wu, Finance Specialist (Energy), CWRD
Executing Agency	GENCO Holding Company Limited

Grant Number: 0376-TAJ
Project Number: 46418-001
Golovnaya 240-Megawatt Hydropower Plant Rehabilitation Project

Rationale

The power sector regional master plan, prepared in 2012 under the Central Asia Regional Economic Cooperation (CAREC) program, found that nearly 80% of Tajikistan's generation and transmission assets needed to be replaced in order to meet demand and eliminate the winter power deficit. The master plan identified rehabilitation of Golovnaya hydropower plant as a priority project.

Golovnaya hydropower plant is situated 80 kilometers south of Dushanbe. It has an installed generation capacity of 240 MW, making it the fourth largest hydropower plant in Tajikistan. Construction of the Golovnaya hydropower plant began in 1956 and the last unit was commissioned in 1964. Since then, no major improvements or modernization has been carried out to maintain the original performance in terms of efficiency, reliability and safety, or to reduce operation and maintenance costs, except on one power generation unit.

The condition of the plant's main electro- and hydro-mechanical equipment is now very poor. Since 2003, Golovnaya hydropower plant's annual generation has decreased due to this lack of maintenance. It currently spends the majority of the time under repair or emergency shutdown—out of 52,560 available working hours, it operated for only 24,720 hours (47% of the time).

In 2012, unit 4 completely failed and was rehabilitated. However, the remaining units will likely fail within the next 5 years if major rehabilitation is not undertaken immediately.

Description

The project will rehabilitate Golovnaya hydropower plant and its switchyards and will increase the generation capacity from 240 MW to 252 MW. The rehabilitation of the hydropower plant envisages full replacement of units 1, 2, and 5 and is expected to bring substantial improvements in power generation, including during the winter power deficit season.

Replacement of the turbines and generators enables 9% percentage point increase in efficiency, while reducing water discharge by 33%. The rehabilitation will also include the installation of two new transformers with oil containment facilities to prevent oil spills in the case of an emergency. The project will also install new control system for all six units, replace the spillway gate and sediment sluices; and rehabilitate electric and control equipment in 110/220 kV switchyards.

Total Grant Amount: $136 million

Clean Energy Investment: $136 million

Project Category: Renewable energy

Renewable Energy Generation: 52.56 GWh/year (additional generation after rehabilitation due to additional capacity/improvement in efficiency)

Greenhouse Gas Emission Reduction: 1,261 tCO_2e/year

Board Approval: 28 November 2013

Project Life: 50 years

Grant number: 0376-TAJ **Project number:** 46418-001

Impact	Increased supply of renewable energy to national and regional power systems
Outcome	Increased operational efficiency of Golovnaya hydropower plant
Output	Rehabilitated electric power generation and transmission equipment of the Golovnaya hydropower plant
Division	Energy Division, CWRD
Project Team	
Team Leader	L. Mtchedlishvili, Senior Energy Specialist, CWRD
Team Members	Z. Abdulalieva, Project Implementation Officer, CWRD B. Chansavat, Energy Specialist, CWRD F. Golez, Operations Assistant, CWRD N. Djenchuraev, Environment Specialist, CWRD V. Medina, Social Development Specialist, CWRD K. Mitsuhashi, Energy Specialist, CWRD D. Perkins, Counsel, OGC J. Stickings, Senior Social Development Specialist (Gender and Development), CWRD
Executing Agency	JSC Barki Tojik

Loan Number: 3025/2036-UZB
Project Number: 44458-013
Amu Bukhara Irrigation System Rehabilitation Project

Rationale

The Amu Bukhara Irrigation System (ABIS) was commissioned in 1965, and its main pump stations covering 250,000 hectares have exceeded their design life spans. The system's canals are now in poor condition. The supply of irrigation water has become more unreliable due to several major failures of ABIS pumping equipment. Continued breakdowns leading to future declines in pumping capacity seem likely. Expenditures on operation and maintenance have been high (SUM154 billion, including electricity costs of SUM122 billion, in 2011). Another factor in the declining water supplies has been the ABIS's inadequate regulatory structures and its inefficient water supply operations and management. Overall, the irrigation system now has low conveyance efficiency. 15%–20% of water does not reach farms from main canal intakes, and 15% of water does not reach main canal intakes from the intake of Amu Darya River. This resulting situation poses a serious threat to agricultural production and the livelihood of local communities.

The aging, energy-inefficient pump stations are also consuming overly large amounts of electricity—equivalent to about 60% of total energy consumption in Bukhara Province—and their greenhouse gas emissions in 2011 are estimated to be equivalent to 758,000–935,000 tCO_2e. Lastly, irrigation efficiency needs to improve, because overdrawing has led to deteriorated land quality and increased salinity. 12% of land in the Bukhara Province is unsuitable for agriculture, because overuse of irrigation water has led to salt accumulation in the soil.

Description

The proposed project is located in Bukhara Province and two districts in Navoi Province in the central part of Uzbekistan. It will build one new pumping station and rehabilitate four existing ones to make them more energy-efficient and climate resilient. The project will ensure a sustainable and reliable water supply for irrigated agriculture in the main command area of 250,000 ha in the ABIS and drinking water for 725,000 people.

Total Loan Amount: $174 million (OCR)
$46 million (ADF)

Clean Energy Investment: $170.23 million

Project Category: Demand side energy efficiency

Energy Savings: 337 GWh/year

Greenhouse Gas Emission Reduction: 180,000 tCO_2e/year

Board Approval: 25 September 2013

Project Life: 25 years

Impact	Sustained economic and social welfare improvement in communities dependent upon the ABIS
Outcome	Sustainable and reliable water supply in the ABIS command area
Outputs	• One new pump station built and four existing ones modernized and rehabilitated • Conveyance efficiency in the ABIS main canal increased • The capacity of basin irrigation system administration, irrigation system administrations, water consumer associations, and farmers to adapt to climate change increased • Project and ABIS managed efficiently
Division	Energy Division, CWRD
Project Team	
Team Leader	R. Takaku, Senior Water Resources Specialist, CWRD
Team Members	R. Jones, Natural Resources and Agriculture Economist, CWRD M. Khudayberdiyeva, Social Senior Development Officer (Gender) CWRD C. Losenno, Sector Climate Change Specialist, CWRD T. Nasirov, Portfolio Management Officer, CWRD L. Nazarbekova, Principal Counsel, OGC B. Tambunan, Lead Portfolio Management Specialist, CWRD D. Utami, Principal Safeguard Specialist, CWRD
Executing Agency	Ministry of Agriculture and Water Resources

Loan/Grant Number: 3058/3059-UZB
Project Number: 45120-003
Samarkand Solar Power Project

Rationale

Uzbekistan is one of the most energy- and carbon-intensive countries in the world. Both its energy and carbon intensity is over six times the world average. In 2005, it emitted 200 million tCO_2e with the energy sector attributing to 88% of those emissions. This situation therefore calls for drastically increasing energy efficiency and renewable energy deployment.

While Uzbekistan has high potentials for renewable energy, it supplies just under 11% of demand, and only from hydro resources (which are now fully tapped).

The remaining supply consists of 12.6 gigawatts (GW) of aging, fossil fuel power plants, many which would require huge investments to replace or rehabilitate.

While Uzbekistan is almost 100% electrified, its aging and overloaded power system causes a supply–demand gap, resulting in prolonged and frequent outages especially in rural areas. This affects quality of life, economic activities, and the delivery of social services. Some areas in Samarkand have grid electricity for only 1–2 hours in winter and 16–18 hours in summer. Energy supply is further threatened given the country's depleting fossil-fuel reserves.

With Uzbekistan's high solar irradiance and abundant land for solar development, solar energy is found the most suitable sustainable resource that could quickly bridge the supply-demand gap, diversify the mix, and reduce emissions. Recognizing this, the government's Welfare Improvement Strategy II mandates accelerated development of indigenous renewable energy, especially solar.

Description

The project will construct a 100 MW photovoltaic power plant, a transmission line, and support facilities in Samarkand Province. This physical component is divided into two contracts: (i) a turnkey contract for the engineering, procurement, and construction of the solar power plant including the provision of operation and maintenance services for 3 years; and (ii) a contract for the supply of goods for the transmission line. Uzbekenergo will prepare the site; install the transmission line; and construct the access road, perimeter fence, wells, and raw water supply facilities.

Total Loan Amount: $110 million (ADF)
Clean Energy Investment: $110 million
Project Category: Renewable energy
Renewable Energy Generation: 159 GWh/year
Greenhouse Gas Emission Reduction: 88,000 tCO_2e/year
Board Approval: 20 November 2013
Project Life: 25 years

Impact	Improved sustainability of the energy supply in Uzbekistan
Outcome	Increased renewable energy generation in Uzbekistan
Outputs	• Solar power plant, transmission, and support facilities operational • Institutional capacity of Uzbekenergo developed • Institutional capacity of solar energy stakeholders developed • Energy Division, CWRD
Project Team	
Team Leader	C. Tiangco, Energy Specialist, CWRD
Team Members	A. Carlota, Counsel, OGC F. Djumabaeva, Associate Project Analyst, CWRD M. Favis, Operations Analyst, CWRD F. Golez, Operations Assistant, CWRD M. Khudayberdiyeva, Senior Social Development Officer (Gender), CWRD P.L. Koh, Young Professional, CWRD K. Mitsuhashi, Energy Specialist, CWRD J.L. Syquia, Senior Procurement Specialist, OSFMD D. Utami, Principal Safeguards Specialist, CWRD
Executing Agency	Uzbekenergo

East Asia Department

Grant Number: 0364-PRC
Project Number: 44012-13
Hebei Energy Efficiency Improvement and Emission Reduction—Additional Financing to Loan 2835

Rationale

Although the on-going project implementation under Loan 2835 is on-track, there is an urgent need to strengthen the capacity in (i) dissemination and demonstration of state of the art technologies in the iron and steel industry which is the largest energy-consuming industry in Hebei Province, (ii) third party measurement and verification, (iii) real time monitoring of electricity consumption by large industries and application of smart grid technologies for electricity demand monitoring and control.

The proposed additional financing on capacity strengthening will complement the sustainable financing mechanism being established under the original project. The proposed additional financing is consistent with the development objectives of the original project and the Government of the PRC's Twelfth Five-Year Plan, 2011–2015 and country partnership strategy priorities of increased capacity of promoting efficient usage of energy resources and mitigating climate change.

Description

The activities financed under the additional financing are expected to enhance the efficacy and sustainability of the energy efficiency investments financed under the on-going loan by facilitating technology transfer and monitoring capacity to verify the energy savings achieved. The project involves (i) dissemination of innovative industrial energy saving technologies and mobilization of financing of energy saving projects using these technologies, (ii) capacity building of a third party monitoring and verification agencies in Hebei Province and promoting sound energy management practices thorugh market-based financial incentives, (iii) demonstration of smart grid technologies to achieve electricity savings in industrial sector.

Total Grant Amount $3.654 million (GEF)

Clean Energy Investment: $3.654 million

Project Category: Demand-side energy efficiency

Greenhouse Gas Emission Reduction: has been counted under Loan No. 2835

Board Approval: 09 October 2013

Project Life: 20 years

Grant number: 0364-PRC **Project number:** 44012-13

Impact	Improved energy efficiency and emission reduction in Hebei Province
Outcome	Increased investments in energy efficiency in Hebei Province
Outputs	• Industrial energy efficiency projects implemented • Energy Service companies' (ESCOs) projects implemented
Division	Energy Division, EARD
Project Team	
Team Leader	P. Perera, Principal Energy Specialist, EARD
Team Member	L. Lanlan, Economic Officer, PRC Resident Mission, EARD
Executing Agency	Hebei Provincial Government

Loan Number: 3014-PRC
Project Number: 45023-002
Hubei-Yichang Sustainable Urban Transport Project

Rationale

Yichang is a prefecture-level city, the second-largest city in Hubei Province after Wuhan, the provincial capital. Yichang has a total population of 4.1 million, of which 1.4 million is urban. The urban population is forecast to increase to 2.8 million by 2030 due to continuing migration.

The present public transport system of Yichang will not be able to cope with future travel demand, and the city's non motorized transport (NMT) facilities are unable to provide a safe environment for pedestrians and bicycle users. An affordable, efficient public transport system coupled with safe, attractive NMT should be introduced. In most medium-sized cities and many large cities, bus rapid transit (BRT) represents the best, most cost effective, and most flexible option for public transport.

As part of ongoing efforts to improve urban planning in Yichang, there is an opportunity to introduce safe, seamless NMT routes for cyclists and pedestrians. Investments in BRT and NMT could well boost the share of public transport and reverse the decline of NMT. There is potential for Yichang to become a model for BRT and NMT development in medium-sized cities in the PRC.

Description

The project will build a 23.91 km Dongshan Avenue BRT corridor including BRT depots, improved provision for pedestrian and bicycles facilities, and establishment of a parking management plan for the central business district and other traffic demand management measures.

The BRT corridor in Yichang will serve all the major districts and major public transport facilities, including the new high-speed railway station and provincial bus terminals. The BRT system will travel on dedicated center lanes. This will improve the overall traffic flow, reduced congestion and associated emissions as well as noise level along the main corridor in the city centre.

Total Loan Amount: $150 million (OCR)
Clean Energy Investment: $ 6.3 million
Project Category: Demand-side energy efficiency
Energy Savings: Data not available
Greenhouse Gas Emission Reduction: 107,250 tCO_2e/year
Board Approval: 21 August 2013
Project Life: 20 years

Impact	Efficient, inclusive, and sustainable transport system in Yichang
Outcome	Efficient passenger and freight transport
Outputs	• Bus rapid transit system • Nonmotorized transport measures • Road network improvement • Capacity building and quality assurance
Division	Transport and Communications Division, EARD
Project Team	
Team Leader	K. J. Kim, Transport Specialist, EARD
Team Members	X. Chen, Transport Specialist (Railways), EARD T. Bisht, Safeguards Specialist, EARD C. Chu, Senior Portfolio Management Officer, People's Republic of China Resident Mission, EARD L. Cuevas-Arce, Senior Operations Assistant, EARD D. Kim, Planning and Policy Specialist, Strategy and Policy Department S. Lewis-Workman, Senior Transport Economist, EARD G. O'Farrell, Environment Specialist, EARD P. Rhee, Counsel, OGC C. Roldan, Associate Project Analyst, EARD
Executing Agency	Yichang municipal government

Loan Number: 3075-PRC
Project Number: 46058-002
Qinghai Delingha Concentrated Solar Power Thermal Project

Rationale

The power sector in the PRC has grown rapidly in tandem with economic growth. Installed power capacity has expanded by about 70% in the past 5 years (2008–2012) alone. Since the power sector relies heavily on coal-fired power generation, which supplied more than 75% of the electricity in the PRC in 2012, the rapid expansion in capacity has also caused a large increase in CO_2 emission—the key greenhouse gas responsible for climate change.

Promoting a more diversified energy mix with a higher share of renewable energy is a core priority to decarbonize the country's power sector. In 2005, the PRC's Renewable Energy Law was enacted to stimulate large-scale renewable energy development. It was accompanied by a set of incentives and policy measures to promote non-hydro renewable technologies. It includes the National Development and Reform Commission's Medium and Long-Term Development Plan for Renewable Energy, which seeks to increase the share of renewable energy of total primary energy consumption to 15% by 2020. In 2009, the PRC also announced its target to reduce its carbon intensity (the amount of greenhouse gas emissions per unit of gross domestic product) by 40%–45% by 2020 compared with 2005 levels. The Twelfth Five-Year Plan, 2011–2015 set an intermediate target to increase the share of renewable energy to 11.4% and to reduce carbon intensity by 17% by 2015 compared with 2010 levels.

Qinghai, which is located in the northeastern part of the Qinghai–Xizang Plateau in the western part of the PRC, is particularly suited for concentrated solar thermal power (CSP) plants because of its rich solar resources of over 2,100 kWh/m^2 of annual direct normal radiation. It is ranked first in solar power capacity concentration throughout the PRC.

Description

The project involves the construction of a 50-MW CSP plant. The project site is one of the typical locations within Qinghai Province that has 2,187 kWh/m^2 of annual direct normal radiation. The project will utilize parabolic trough, which is one of the four major CSP technologies with a 7-hour thermal storage system. The electricity generated will feed into the existing 110 kilovolt substation in Delingha City.

Total Loan Amount: $150 million (OCR)
Clean Energy Investment: $150 million
Project Category: Renewable energy
Renewable Energy Generation: 197 GWh/year
Greenhouse Gas Emission Reduction: 154,446 tCO_2e/year
Board Approval: 2 December 2013
Project Life: 25 years

Impact	Expanded share of CSP in renewable energy mix in the PRC
Outcome	Demonstrated feasibility and reliability of the utility-scale CSP plant with thermal storage system in Qinghai Province
Outputs	• The construction of a first-of-its kind utility-scale CSP plant in Qinghai Province constructed • Capacity development and training in CSP construction, and operation and management
Division	Energy Division, EARD
Project Team	
Team Leader	S. Yamamura, Energy Specialist, EARD
Team Members	S. Bulanhagui, Project Officer, EARD S. Kawazu, Senior Counsel, OGC N. W. Kim, Environment Specialist, EARD W.Y. Lee, Energy Specialist, EARD X. Liu, Senior Project Officer (Energy), People's Republic of China Resident Mission, EARD T. Oi, Senior Energy Specialist, EARD A. Seiler, Financial Specialist (Energy), EARD
Executing Agency	China General Nuclear Power Corporation

Loan Number: 3082-PRC
Project Number: 43332-043
Railway Energy Efficiency and Safety Enhancement Investment Program—Tranche 4

Rationale

Since the open door policy and economic reforms were initiated, the People's Republic of China (PRC) has sustained high levels of economic growth which resulted in a rapid increase in the demand for transportation. Despite the PRC's efforts to increase the country's transport capacity, serious constraints and bottlenecks remain, especially in the railway sector. Given its developmental role, the government has emphasized railway development in the less-developed western region with a view to reducing disparities in regional economic development between the coastal and western areas. In its development plan, the government is aiming to expand the railway network from 91,000 kilometers (km) in 2010 to 120,000 km by 2015; and from 36,000 km to 50,000 km in the less-developed western region.

With railway network extension, energy efficiency, environmental sustainability and safety enhancement have been important elements of the ADB policy dialogue with the China Railway Corporation (CRC), formerly the Ministry of Railways. These were identified as the three most important areas of sustainable development in the Eleventh and Twelfth Five- Year Plans (11FYP and 12FYP).

In 2009, ADB approved a multitranche financing facility in the amount of $1.0 billion to the government for the Railway Energy Efficiency and Safety Enhancement Investment Program from ADB's ordinary capital resources. This is the fourth tranche of this multitranche financing facility.

Description

Tranche 4 involves the introduction of environmental protection and railway safety enhancement equipment. These include anti-seismic bridge bearings, enhanced railway fasteners, heavy duty switches, and signaling system facilities. These pieces of equipment will be more environment-friendly and safer than currently used in southwestern PRC railways and will have significant environmental and safety benefits.

Total Loan Amount: $180 million (OCR)
Clean Energy Investment: $36 million
Project Category: Demand-side energy efficiency
Energy Savings: 298.33 terajoules/year
Greenhouse Gas Emission Reduction: 22,106 tCO_2e/year
Board Approval: 4 December 2013
Project Life: 40 years

Impact	Improved transport system in the southwestern region that supports sustainable socioeconomic development and the western region development strategy
Outcome	An energy-efficient, safe, reliable, affordable, and environment-friendly railway transport system is developed in the region
Outputs	• Environmental protection • Railway safety enhancement
Division	Transport and Communication Division, EARD
Project Team	
Team Leader	X. Chen, Senior Transport Specialist (Railways), EARD
Team Members	T. Bisht, Safeguards Specialist, EARD F. Connell, Principal Counsel, Office of General Counsel G. O'Farrell, Environment Specialist, EARD W. Zhang, Senior Transport Officer, PRCM L. Cuevas-Arce, Senior Operations Assistant, EARD M. Macrohon, Associate Project Analyst, EARD
Executing Agency	China Railway Corporation

Pacific Department

Loan Number: 3004/3005-FSM
Project Number: 44469-013
Yap Renewable Energy Development Project

Rationale

This project seeks to reduce Yap's dependency on imported diesel by expanding renewable power generation and improving supply-side efficiencies of power delivery.

Yap Island Proper, situated within the Federated States of Micronesia, is currently 100% dependent on imported diesel for power generation. Due to the remoteness and high diesel transportation costs, power tariffs are high and the Yap economy is especially vulnerable to fuel price shocks. For instance, in 2008, the value of imported diesel fuel was the highest single import cost item, representing 15% of gross domestic product. Moreover, 80% of all imported diesel is used for power generation.

Inefficiency of power generation is also an issue. Diesel generators are oversized, resulting in low supply-side efficiencies. Yap Island Proper's installed capacity of its power grid system is 8.3 megawatt (MW), yet its peak load is only 2.4 MW.

Description

The project will be undertaken on the main island of Yap and will include (i) construction of about 1.4 MW wind power, (ii) construction of about 300-kilowatt grid-connected solar power, (iii) installation of a 1.8 MW diesel generator to improve the efficiency of the current grid, and (iv) capacity building within the power utility and communities.

Total Loan Amount: $4.68 million (OCR)
$4.36 million (ADF)

Clean Energy Investment: $6.35 million

Project Category: Renewable energy

Renewable Energy Generation: 2.58 GWh/year

Energy Savings: 1.1 GWh/year

Greenhouse Gas Emission Reduction: 3,000 tCO_2e/year

Board Approval: 20 June 2013

Project Life: 25 years

Impacts	Energy security of Yap has improved
Outcome	Yap State Public Service Commission's (YSPC) supply of clean and renewable energy to Yap increased
Outputs	• Wind power and solar power generation installed by YSPSC • Efficiency of diesel power generation improved • Project management services made more efficient
Division	Transport, Energy and Natural Resources Division, PARD
Project Team	
Team Leader	A. Maxwell, Senior Energy Specialist, PARD
Team Members	P. Hattle, Energy Specialist, PARD S. Lee, Principal Social Development Specialist (Gender and Development), PARD N. Sapkota, Safeguards Specialist, PARD A. Syed, Counsel, OGC M. Tonizzo, Young Professional, PARD
Executing Agency	Yap State Public Services Corporation

Loan Number: 2998/2999-PNG
Project Number: 43197-013
Port Moresby Grid Development Project

Rationale

The proposed project aims to reduce fossil fuel consumption, increase access, and improve network reliability of the Port Moresby Power grid. In Papua New Guinea (PNG), power grids are restricted to urban areas, and supply is often unreliable and represents a high percentage of household expenditure. In Port Moresby, the capital of PNG, power outages are becoming increasingly frequent due to insufficient generation and undersized and poorly maintained transmission and distribution systems. Because of the unreliability of the power supply, there is considerable self-generation and back-up generation capacity in the urban areas, which is maintained and operated at high cost and low efficiencies. Lack of access to affordable, reliable power is limiting economic growth in urban areas and constraining growth in smaller urban centers.

Load forecasts for the Port Moresby power grid have increased significantly in recent years. Demand is also expected to rise significantly, fueled by high economic growth associated with the proposed liquefied natural gas plant and growing mining and industrial sectors. Supporting this economic growth will require additional large generation, upgrading the existing grid to support that additional load, and extending supply to new industrial and residential areas. System upgrades are required to lower system losses and to improve grid efficiencies. This will result in downward pressure on tariffs due to operational efficiencies. The components of the project include upgrading and construction of substations, construction of transmission lines, and construction of distribution networks.

Description

The project will assist PNG Power Limited (PPL) in expanding renewable energy generation, connecting currently unserved customers, and significantly improving the quality of electricity supply. The project will (i) upgrade and rehabilitate two hydropower plants (Rouna 1 and Sirinumu toe-of-dam); (ii) extend the grid to approximately 3,000 additional households, including strengthening the distribution network; and (iii) construct a new substation (Kilakila) and upgrade the existing substations.

Total Loan Amount: $51.7 million (OCR)
$15 million (ADF)

Clean Energy Investment: $29.4 million

Project Category: Supply-side energy efficiency

Energy Savings: 3.1 gigawatt-hours/year

Renewable Energy Generation: 12.86 GWh/year

Greenhouse Gas Emission Reduction: 12,000 tCO_2e/year

Board Approval: 26 April 2013

Project Life: 40 years

Impact	PPL customers (residential and business) undertake more economic activities
Outcome	Improved power supply for Port Moresby
Outputs	• Hydropower capacity upgraded and rehabilitated • Port Moresby distribution grid updated • Substation capacity upgraded • Project management improved and capacity building conducted
Division	Transport, Energy and Natural Resources Division, PARD
Project Team	
Team Leader	A. Maxwell, Senior Energy Specialist, PARD
Team Members	J. Ghimire, Counsel, OGC S. Lee, Principal Social Development Specialist (Gender and Development), PARD N. Sapkota, Safeguards Specialist, PARD M. Tonizzo, Young Professional, PARD J. Williams, Senior Environment Specialist, PARD
Executing Agency	Independent Public Business Corporation

Grant Number: 0370/0371/0373-SAM
Project Number: 46044-002
Renewable Energy Development and Power Sector Rehabilitation Project

Rationale

Samoa is heavily reliant on imported fossil fuels, hence it is highly vulnerable to rising international oil prices. In 2012, total fuel imports amounted to about 95 million liters, or 10% of Samoa's total gross domestic product (GDP). This heavy reliance is reflected in Samoa's electricity generation matrix, in which 60% is generated from diesel, 38.9% hydropower, 1% biofuel (coconut oil), and 0.1% solar. For Electric Power Corporation (EPC), Samoa's sole power utility, imported fuel is by far the single largest expense item, representing 74% of total generation costs and 51% of overall costs.

Fossil fuel reliance poses a major constraint to the provision of sustainable and reliable electricity services at affordable prices, necessary to promote economic growth. Developing indigenous and renewable energy sources is a viable solution for achieving energy sector priorities, as it will deliver socially acceptable, technically feasible, and affordable electricity services.

Rehabilitation of the power generation and distribution systems is also necessary. Samoa is vulnerable to natural disasters, which will likely intensify due to climate change. Its vulnerability was evidenced by the after effects of Cyclone Evan, which seriously damaged Upolu island's power system, when it made landfall on 13 December 2012.

Description

The proposed project will support the government's efforts to reduce Samoa's reliance on imported fossil fuels for power generation by providing a secure, sustainable, and clean source of electricity. The project will construct, install, and rehabilitate small hydropower plants with an overall capacity of 5.5 MW on Upolu and Savai'i. The proposed project will enhance EPC's operation and maintenance programs through a capacity building and knowledge transfer program to last up to 2 years after commissioning of the small hydropower plants. Technical designs will ensure climate and disaster resiliency.

Total Grant Amount: $18.21 million (ADF)
$1.00 million (CEFPF)

Clean Energy Investment: $19.21 million

Project Category: Renewable energy

Energy Savings: 130.46 terajoules/year

Renewable Energy Generation: 3.79 GWh/year

Greenhouse Gas Emission Reduction: 8,094 tCO_2/year

Board Approval: 15 November 2013

Project Life: 40 years

Grant number: 0370/0371/0373-SAM **Project number:** 46044-002

Impact	Increased energy security
Outcome	Customers will have access to a higher share of electricity generated by hydropower
Outputs	• EPC rehabilitates and reconnects to the grid 4.69 MW of hydropower capacity • EPC builds and connects to the grid 0.81 MW of hydropower capacity • Operations and maintenance knowledge transfer program completed • Project implemented efficiently
Division	Energy Division, PARD
Project Team	
Team Leader	P. Hattle, Energy Specialist, PARD
Team Members	L. Canete, Climate Change Specialist, RSDD S. Lee, Principal Social Development Specialist(Gender and Development), PARD M. Melei, Country Specialist, PARD R. Salvo, Operations Officer, PARD N. Sapkota, Safeguards Specialist, PARD Y. Seo, Counsel, OGC J. Williams, Senior Environment Specialist, PARD
Executing Agency	Ministry of Finance

Grant Number: 0347/0348-TON
Project Number: 43452-022
Outer Island Renewable Energy Project

Rationale

Tonga depends on imported diesel to produce 92% of its electricity needs and consumed an estimated 15 million liters for power generation in 2011. This represented about 10% of total gross domestic product and about 15% of total imports. About 98% of the total electricity supplied in Tonga during that year was grid-connected and generated from diesel.

Tonga's dependence on imported diesel renders it extremely vulnerable to oil price increases. Power tariffs are inherently high in Tonga because of the high costs of transporting imported diesel to the remote Pacific nation and between its scattered islands.

The government's energy policies reflect its desire to reduce the country's dependence on diesel and lower the cost of electricity, through renewable energy development. In 2008, the government approved the Renewable Energy Act, a regulatory instrument to promote the use of renewable energy technologies. Under its 2009 National Strategic Planning Framework, it also created the 2010–2020 Tonga Energy Road Map for the general development, reform, and improvement for the energy sector. The Tonga Energy Road Map aims to generate 50% of Tonga's grid-based electricity from renewable energy resources and to reduce the country's diesel consumption by 50% by 2020.

This project seeks to further support the government's efforts to reduce Tonga's heavy reliance on imported diesel, through implementing solar power. The project will also optimize the energy planning of Tonga Power Limited, a state utility, to exert downward pressure on tariffs for private and commercial consumers.

Description

The proposed project will construct and install solar power systems with an overall distributed capacity of 1.25 megawatt-peak (MWp) on nine outer islands in Tonga. This capacity will be provided as follows: (i) a total of 0.8 MWp on Eua, Vava'u, and Ha'apai; (ii) a total of 0.28 MWp on the four Ha'apai outer islands of 'Uiha, Nomuka, Ha'ano, and Ha'afeva; (iii) 0.15 MWp on Niuatoputapu; and (iv) 0.02 MWp on Niuafo'ou.

Total Grant Amount: $2 million (ADF)
$4.5 million (Australian Agency for International Development)

Clean Energy Investment: $6.5 million

Project Category: Renewable Energy

Renewable Energy Generation: 2.1 GWh/year

Energy Savings: 20 terajoules/year

Greenhouse Gas Emission Reduction: 1,700 tCO_2e/year

Board Approval: 27 June 2013

Project Life: 25 years

Grant number: 0347/0348-TON **Project number:** 43452-022

Impact	Reduction of Tonga's dependence on imported fossil fuel for power generation
Outcome	On-grid and off-grid generation systems are optimized and provide increased consumer access to electricity generated by solar power at a reduced cost
Outputs	• The project will construct and install solar power systems with a total capacity of 1.25 MWp on 9 outer islands of Tonga • Operation and maintenance knowledge transferred through training • Project implemented and managed efficiently
Division	Transport, Energy and Natural Resources Division, PARD
Project Team	
Team Leader	P. Hattle, Energy Specialist, PARD
Team Members	S. Lee, Principal Social Development Specialist (Gender and Development), PARD T. Leono, Project Analyst, PARD M. Melei, Country Specialist, PARD N. Sapkota, Safeguards Specialist, PARD A. Syed, Counsel, OGC J. Williams, Senior Environment Specialist, PARD
Executing Agency	Ministry of Finance and National Planning

Private Sector Operations Department

Approval Number: 7385-ARM
Project Number: 46941-014
International Energy Corporation (IEC)

Rationale

Armenia suffers from obsolete power generation infrastructure. The hydropower plants in the country do not meet international technical, economic, or environmental performance standards. Despite its favorable topography and hydrology, Armenia suffers from underinvestment in hydropower generation capacity. To overcome these problems, the government launched an initiative to promote private sector investment in the country's energy infrastructure, including hydropower.

The International Energy Corporation owns and operates the Sevan–Hrazdan Cascade Hydropower System, which supplies about 10% of the country's electricity. The system has a significant role in supporting the balance of the electric grid, and also provides more affordable energy than thermal power plants. IEC will rehabilitate and modernize this hydropower plant under this project.

Description

The project involves the rehabilitation and modernization of four hydropower plants, the diversion channels for three plants, and associated electrical equipment replacement at the substations. The planned rehabilitation will be completed in 2017. The project aims to restore the capacity of the hydropower plants by 44.7 MW, improve their reliability and safety, and reduce operational and maintenance expenses. The project will also reduce water leakage from the diversion channels and could increase power generated by the system. After repair of the diversion channels, it is estimated that water leakage will decrease by 50 million–85 million cubic meters annually, which will bring additional generation of 18–30 GWh of electricity.

Total Loan Amount: $25 million (OCR)
Clean Energy Investment: $25 million
Project Category: Supply-side energy efficiency
Renewable Energy Generation: 42 GWh/year (additional RE generation due to improvement in efficiency)
Greenhouse Gas Emission Reduction: 18,312 tCO_2e/year
Board Approval: 3 April 2013
Project Life: 40 years

Approval number: 7385-ARM **Project number:** 46941-014

Impacts	• Increased supply of renewable energy through rehabilitation as well as new investment • Increased private sector participation in the power sector
Outcome	Increased efficiency, reliability, safety, and environmental performance of the Sevan–Hrazdan Cascade Hydropower System
Output	Rehabilitation and modernization of the Sevan–Hrazdan Cascade Hydropower System
Division	Infrastructure Finance Division 1, PSOD
Project Team	
Team Leader	T. Koike, Principal Investment Specialist, PSOD
Team Members	A. Barseghyan, Senior Country Coordination Officer, Armenia Resident Mission, CWRD S. Durrani-Jamal, Senior Economist, OGC C. Gin, Principal Counsel, OGC M. Manabat, Senior Investment Officer, PSOD J. Munsayac, Safeguards Specialist, PSOD M. Pascua, Senior Safeguards Officer, PSOD M. Pateguana, Investment Specialist, PSOD

Approval Number: 7397-INO
Project Number: 42916-014

Sarulla Geothermal Power Development Project
Sarulla Power Asset Limited
Kyuden Sarulla Private Limited
Orsarulla Incorporated
PT Medco Geopower Sarulla

Rationale

In the face of increasing demand for electricity, the Government of Indonesia recognizes the imperative of sustainable growth. It aims to increase the share of renewable energy in the country's primary energy mix from 5% in 2010 to 25% by 2025. It also seeks to achieve a reduction in greenhouse gas emissions of 26% by 2020.

Indonesia is endowed with several renewable energy option, including wind, solar, geothermal, and biomass. However, geothermal energy is particularly suited to support Indonesia's more sustainable future for the following reasons:

(i) Due to its location at the edge of the Pacific plate, Indonesia has extensive geothermal resources estimated at about 29 gigawatts and equivalent to 40% of the global geothermal resource base.
(ii) Geothermal power plants are very reliable and demonstrate high capacity factors. Thus, they can provide a sizeable portion of base load power, unlike intermittent renewable energy sources like wind or solar, and contribute to a more secure energy mix.
(iii) Geothermal power plants typically emit less than 10% of the greenhouse gas emitted by fossil-fueled thermal plants, and thereby provide an effective means for Indonesia to achieve both domestic and international climate change mitigation objectives.
(iv) Power generation costs of large geothermal power plants in Java and Sumatra are less than the country's total average power generation cost.

Description

The project will develop the steam resources in the Sarulla concession area and construct, operate, and maintain three geothermal power generation units with a total capacity of about 320 megawatts (MW). The project will include a 14 kilometer transmission line from Namora-I-Langit to a 150 kilovolt (kV) substation to be built by PLN near Silangkitang, and connected to the Sumatra grid through a 275 kV transmission line.

Total Loan Amount: $250 million (OCR)
$80 million (Clean Technology Fund)
$20 million (Canadian Climate Fund for Private Sector in Asia under the CEFPF)

Clean Energy Investment: $350 million

Project Category: Renewable energy

Renewable Energy Generation: 2,529 GWh/year

Greenhouse Gas Emission Reduction: 1,300,000 tCO_2e/year

Board Approval: 5 December 2013

Project Life: 30 years

Approval number: 7397-INO **Project number:** 42916-014

Impacts	• Increased geothermal power generation in Indonesia • Increased private sector investment in geothermal resource development • Increased electrification rates in Indonesia
Outcome	Geothermal power generation in North Sumatra expanded
Output	New geothermal power plants constructed and commissioned
Division	Infrastructure Finance Division 2
Project Team	
Team Leader	J. Surtani, Senior Investment Specialist, PSOD
Team Members	I. Aguilar, Safeguards Officer, PSOD P. Bracey, Principal Investment Specialist, PSOD B. Dunn, Senior Environment Specialist, RSDD S. Durrani-Jamal, Senior Economist, PSOD C. Gin, Principal Counsel, OGC C. Indrananto, External Relations Officer, Indonesia Resident Mission, SERD M. Manabat, Senior Investment Officer, PSOD J. Munsayac, Safeguards Specialist, PSOD A. Porras, Senior Safeguards Officer, PSOD M. Principe, Senior Social Development Officer, PSOD D. Purka, Principal Investment Specialist, RSDD L. Rahman, Investment Specialist, PSOD I. Simbolon, Principal Social Development Specialist, RSDD N. Soewarno, Senior Investment Officer, Indonesia Resident Mission, SERD M. Tsuji, Principal Safeguards Specialist, PSOD

Approval Number: 7396-IND
Project Number: 47928-014
Petronet Liquefied Natural Gas Limited

Rationale

India faces chronic energy shortages, which have been one of the major constraints to efficient economic growth. Developing liquefied natural gas (LNG) infrastructure is therefore critical for India's energy security and for the power industry. This second expansion of the Dahej LNG Terminal capitalizes on the success of Dahej's successful first- and second-phase terminals financed by the Asian Development Bank (ADB), and aims to help address energy shortage in India.

Natural gas is increasingly a choice for cleaner fuel in India but domestic production remains insufficient to meet growing demand. This unmet demand is being filled by imported LNG. As the market leader, Petronet LNG, the borrower, is ideally placed to lead this much-needed LNG expansion in India.

Description

The project will involve the expansion to 15 mmtpa (million metric tons per annum) of the existing Dahej LNG terminal, which has a current capacity of 10 mmtpa. The project will, to a large extent, use the existing facilities. Additional facilities will include two storage tanks and regasification facilities, and installation of associated utilities and facilities. The project site is located at Dahej in the Gulf of Khambhat in Gujarat. The project design is based on a take-or-pay toll, with Petronet LNG acting as a tolling agent. The offtakers—GAIL (India) Limited (GAIL), Gujarat State Petronet Limited (GSPL), Indian Oil Corporation Limited (IOCL), and Bharat Petroleum Corporation Limited (BPCL)—will be responsible for the purchase and sale of the gas. Petronet LNG will regasify the LNG and sell the output to GAIL, IOCL, BPCL, and GSPL. In turn, GAIL, IOCL, and BPCL will sell the gas to end users.

Total Loan Amount: $150 million (OCR)
Clean Energy Investment: $16.17 million
Project Category: Cleaner Fuel
Greenhouse Gas Emission Reduction: 3.15 tCO_2e/year
Board Approval: 5 December 2013
Project Life: 40 years

Approval number: 7396-IND **Project number:** 47928-014

Impact	Diversified energy base in India in an environmentally sustainable manner
Outcome	Increased supply of natural gas to power plants, fertilizers plants, the transport sector, and domestic consumers
Output	Expansion of LNG terminal and associated utilities and facilities completed
Division	Infrastructure Finance Division 1, PSOD
Project Team	
Team Leaders	M. Pateguana, Investment Specialist, PSOD S. Shah, Principal Investment Specialist, PSOD
Team Members	S. Durrani-Jamal, Senior Economist, PSOD C. Gin, Principal Counsel, OGC J. Gomez, Safeguards Officer (Environment), PSOD B. Raemaekers, Senior Guarantee and Syndication Specialist, PSOD V. Ramasubramanian, Safeguards Specialist, PSOD J. Ventura, Senior Investment Officer, PSOD

Approval Number: 7398-IND
Project Number: 47924-014
BSES Rajdhani Power Limited

Rationale

The electricity distribution sector in India has been characterized by chronic underinvestment, inadequate cost recovery, and inefficient operations—resulting in very high technical and commercial losses. As a whole, aggregate technical and commercial (ATC) losses were 26.15% in FY2011, with some state distribution companies experiences losses as high as 67.74%. Financially and operationally viable distribution entities are the foundation of sustainable power sector reform. Efficiency improvements in distribution will reduce the electricity demand–supply gap in India and reduce the investment required in the upstream sector of electricity generation.

ADB's assistance will help implement the next round of system improvement measures to reduce ATC losses by 3.5%, in line with the targets stipulated by Delhi Electricity Regulatory Commission. Lessons learned from this financing will also help ADB structure funding instruments for other distribution companies in India and support the country's power sector reform programs.

Description

The project will reduce technical losses by 2.3% by rehabilitating and/or augmenting 486 distribution transformers, 266 kilometers (km) of 11 kilovolt (kV) distribution lines, and 16 km of extra high voltage lines. It will add 123 new substations, 285 new distribution transformers, 221 km of new 11 kV distribution lines, and 21 km of new extra high voltage lines as well as additional equipment to improve the automated system for billing and settlements. Commercial losses are expected to be curtailed to 1.2% through an expanded public awareness campaign complemented by strict vigilance and enforcement.

Total Loan Amount: $80 million (OCR)
Clean Energy Investment: $12.80 million
Project Category: Supply-side energy efficiency
Energy Savings: 529 GWh/year
Greenhouse Gas Emission Reduction: 491,972 tCO_2e/year
Board Approval: 10 December 2013
Project Life: 30 years

Impacts	• Improved efficiency of India's electricity distribution networks • Promotion of private sector investment in the electricity distribution sector in India
Outcome	An expanded and increasingly efficient power supply by BSES Rajdhani Power Limited in south and west Delhi
Output	Improved electricity distribution network in south and west Delhi
Division	Infrastructure Finance Division 1, PSOD
Project Team	
Team Leader	A. Patil, Senior Investment Specialist, PSOD
Team Members	P. Bailet, Senior Counsel, OGC I. Chauche, Investment Specialist, PSOD E. David, Associate Investment Officer, PSOD S. Durrani-Jamal, Senior Economist, PSOD M. Manabat, Senior Investment Officer, PSOD S. Noda, Senior Safeguards Specialist, PSOD V. Ramasubramanian, Safeguards Specialist, PSOD

Loan Number: 7386-IND
Project Number: 46919-014
NSL Renewable Power Private Limited
(Hydro and Wind Power Development Project)

Rationale

India is in chronic need of additional power generation capacity. At least until 2017, power supply is to remain 10%-12% short of demand largely because capacity additions have not kept up with increases in demand.

The government's draft 12th Five-Year Plan, 2012–2017, targets 100GW of additional power generation capacity. It includes 28 GW of capacity that were not completed under the previous Five Year Plan, 10.2 GW of which consisted of hydro power capacity additions

To help implement these hydropower and other renewable energy projects, the government has implemented a policy goal of maintaining renewable energy at its current level of 31% of total installed capacity, until 2023. Hydropower and wind are to play major roles in maintaining that energy mix, as they each will represent roughly 40% of renewable energy capacity additions over the 12th Five-Year Plan.

That goal recognizes the need to stop the decline of renewable power, to ensure the country's energy security and combat climate change. The share of renewable power has has decreased from 44% of total installed capacity in 1970 to 31% in 2011.

The private sector is expected to play an increasing role in accelerating the pace of investment in renewable energy, particularly in hydropower. As of December 2011, the private sector's share in the country's hydropower installed capacity was only 7%, compared to 21% in thermal power.

Description

The project encompasses the development by NSL Renewable Power Private Limited (NRPPL) of at least 175 MW of renewable energy projects by 2017. The 100 MW Tidong hydropower project in Himachal Pradesh and the 75 MW Chilarewadi wind project in Maharashtra are included as identified subprojects in the scope of the project. The company may identify other wind subprojects in India after approval by ADB's Board of Directors and utilize part of the proposed ADB funding for these subprojects.

Total Loan Amount: $30 million (OCR)

Clean Energy Investment: $30 million

Project Category: Renewable Energy

Renewable Energy Generation: 530 GWh/year

Greenhouse Gas Emission Reduction: 492,900 tCO_2e/year

Board Approval: 12 April 2013

Project Life: Hydro, 40 years
Wind, 25 years

Impacts	• Continued development of renewable energy in India • Greater private sector participation in the Indian renewable energy sector
Outcome	Increased production of renewable energy
Output	Hydro and wind power projects developed and commissioned
Division	Infrastructure Finance Division 1, PSOD
Project Team	
Team Leader	M. Lemoine, Investment Specialist, PSOD
Team Members	E. David, Associate Investment Officer, PSOD S. Durrani-Jamal, Senior Economist, PSOD J. Gomez, Safeguards Officer, PSOD M. Manabat, Senior Investment Officer, PSOD N. Moller, Senior Counsel, OGC J. Munsayac, Safeguards Specialist, PSOD R. Samiano, Safeguards Officer, PSOD M. Tsuji, Principal Safeguards Specialist, PSOD

Loan Number: 7381-IND
Project Number: 46931-014
SIMPA Off-Grid Pay-As-You-Go Solar Power Project

Rationale

The investment in this solar energy project aims to contribute to increased access to electricity in rural India.

Access to basic electricity services is necessary to realize India's development goals, as it improves education, health, and productivity outcomes. For instance, electricity access allows for children to study beyond sunset, and allows for nighttime income-producing activities. Solar energy use also has utility in replacing smoky fuel use in the home, such as kerosene, thereby improving air quality and respiratory health.

If successfully implemented across India, this project can potentially be replicated across other developing member countries. A positive outcome for this project can also lead to increasing private equity and venture capital funding for other off-grid energy services in India.

Description

ADB will partner with Simpa Networks to allow it to expand operations and raise capital from other private equity firms.

Simpa Networks provides simple, affordable and accessible solar energy to underserved consumers in India. Its strategy involves a pay-as-you-go meter, that can be embedded into a solar home system (SHS). The metering device locks energy flowing out of the battery connected to the SHS, which the consumer can unlock by purchasing energy credits via mobile phone short messaging services (SMS). A device on the metering device also displays the energy credit balance available for use, so that the customer can better manage their energy credits/usage.

Total Loan Amount: $2 million (OCR)
Clean Energy Investment: $2 million
Project Category: Renewable energy
Renewable Energy Generation: 3.12 GWh/year
Greenhouse Gas Emission Reduction: 2,900 tCO_2e/year
Board Approval: 15 January 2013
Project Life: 25 years

Impacts	• Increased access to electricity supply for rural population. • Increased funding for innovative technological solutions for delivery of off-grid energy services.
Outcome	Increased access to clean energy, enabled by a financially viable energy services company.
Outputs	• Installation of sustainable solar home systems. • Completion and operation of solar energy-powered microgrids.
Division	Infrastructure Finance Division 1, PSOD
Project Team	
Team Leader	A. Patil, Investment Specialist, PSOD
Team Members	J. Acharya, Climate Change Specialist (Clean Energy), RSDD P. Bailet, Senior Counsel, OGC S. Durrani-Jamal, Senior Economist, PSOD S. Gupta, Principal Investment Specialist, PSOD C. Lazarte, Operations Assistant, PSOD M. Manabat, Senior Investment Officer, PSOD J. Munsayac, Safeguards Specialist, PSOD A. Porras, Safeguards Officer, PSOD M. Principe, Social Development Officer (Safeguards), PSOD M. Tsuji, Principal Safeguards Specialist, PSOD

Approval Numbers: 7400-IND
Project Number: 47920-014
Welspun Renewables Energy Limited (Solar and Wind Power Development)

Rationale

This project seeks to scale up private sector participation in India's solar and wind power sectors, by providing an equity investment in Welspun Renewables Energy Limited.

Renewable energy development seeks to rectify India's dire need of additional power generation. At least until 2017, India will experience a power shortage of 10%-12% each year. It is also in line with the country's Twelfth Five-Year Plan, 2012–2017, which seeks to maintain the share of renewable power at its current level of 31% of total installed capacity until 2023.

The private sector has already displayed interest in further developing the solar and wind sectors, due to favorable government policies. For example, the Jawaharlal Nehru National Solar Mission, launched in 2010, sets a target for 20 gigawatts of grid-connected solar power capacity by 2020. In the wind sector, the seven states with the highest wind power potentials increased their wind feed-in tariffs for 2012–2013.

This project will thus capitalize on that interest, by helping Welspun Renewables Energy Limited reach at least 600 megawatts (MW) of operational projects by March 2016.

Description

The project enables the funding of Welspun Renewable Energy Limited's equity injection in a portfolio of solar photovoltaic and wind power projects with a total capacity of approximately 300 MW to be commissioned from December 2013 to March 2016. Although the exact composition of the portfolio might change as a result of public bid awards and other business considerations, Welspun Renewable Energy Limited expects its portfolio to grow by at least 200 MW of solar power projects and 100 MW of wind power projects from December 2013 to March 2016.

Total Loan Amount: $50 million (OCR)

Clean Energy Investment: $50 million

Project Category: Renewable energy

Renewable Energy Generation: 540 GWh/year

Greenhouse Gas Emission Reduction: 502,200 tCO_2e/year

Board Approval: 12 December 2013

Project Life: 25 years (solar)
20 years (wind)

Approval numbers: 7400-IND **Project number:** 47920-014

Impacts	• Continued development of renewable energy in India • Greater private sector participation in the Indian renewable energy sector
Outcome	Demonstrated viability and sustainability of renewable energy projects in the private sector
Output	A portfolio of solar and wind power projects in India constructed and commissioned
Division	Infrastructure Finance Division 1
Project Team	
Team Leaders	M. Lemoine, Senior Investment Specialist, PSOD J. Leusink, Investment Specialist, PSOD
Team Members	J. Chenoweth, Counsel, OGC H. Cruda, Senior Safeguards Specialist, PSOD E. David, Associate Investment Officer, PSOD J. Munsayac, Safeguards Specialist, PSOD A. Porras, Safeguards Officer, PSOD R. Samiano, Safeguards Officer, PSOD R. Tabanao, Project Analyst, PSOD K. Taniguchi, Senior Economist, PSOD

Approval Numbers: 7392-PRC
Project Number: 47904-014
Beijing Enterprises Water Group Limited/BEWG Environmental Group Company Limited (Wastewater Treatment and Reuse Project)

Rationale

With rapid urbanization, the PRC has been encountering water challenges. More than 400 cities report water shortages, with an average daily shortfall of 16 million cubic meters (m^3). Per capita freshwater resources in the PRC are scarce at about 2,200 m^3 versus the global average of 9,200 m^3. Annual per capita water endowments have been declining at an alarming rate, and are expected to decline by an additional 10% by 2025. Extensive water pollution further reduces availability of freshwater. In 2012, 31% of 10 major river systems and 39% of 62 primary lakes could not fulfill the water quality requirement for drinking water. The quality of as much as 57% of the total national groundwater is classified "bad" or "very bad." Public health consequences are significantly affecting lives, livelihoods, and productivity.

Wastewater, if properly treated, can effectively reduce pollution and become a new reliable source to address water scarcity. With adequate technologies, wastewater can be treated to meet specific needs and purposes, such as industry use, including machine cooling, cleansing, and boiler operation. More freshwater can be allocated for uses that require higher quality, such as for drinking, thereby contributing to more sustainable resource allocation. It is also a more efficient option to address water needs in areas with growing water consumption, both on a per capita and total basis, without adding new infrastructure for a freshwater treatment facility.

Description

The project is designed as the least-cost solution to facilitate reuse of treated wastewater by upgrading multiple wastewater treatment plants to meet grade 1A standard. The treated wastewater can then be reused for industry cooling and urban environment purposes. The project involves the acquisition, upgrade and/or expansion, and operation of wastewater treatment plants with technology options for meeting reuse water quality for up to 1.8 million tons per day during 2014–2016. In municipalities that do not yet have appropriate associated infrastructure for wastewater reuse, Beijing Enterprises Water Group Limited will first upgrade wastewater treatment facilities to meet the water quality standards for reuse before any actual sales of the treated wastewater.

Total Grant Amount: $120 million (OCR)
$120 million (B-Loan)
$0.50million (grant, CEFPF)

Clean Energy Investment: $30.22 million

Project Category: Demand-side energy efficiency

Energy Savings: 85.62 GWh/year

Greenhouse Gas Emission Reduction: 76,000 tCO_2e/year

Board Approval: 20 September 2013

Project Life: 25 years

Approval numbers: 7392-PRC **Project number:** 47904-014

Impacts	• Enhanced urban environment and reduced pollution • Sustainable source of water for industry and urban environment use • Increased private sector investment in wastewater management
Outcomes	• Improved quality of treated wastewater • Policy dialogue based on technical assistance recommendations
Outputs	• Installation and operation of wastewater treatment and reuse plants • Improved capacity for energy efficiency in the wastewater treatment and reuse
Division	Infrastructure Finance Division 2
Project Team	
Team Leader	H. Kimura, Principal Investment Specialist, PSOD
Team Members	J. F. Gomez, Safeguards Officer (Environment), PSOD A. Hirose, Assistant General Counsel, OGC M. A. C. Manabat, Senior Investment Officer, PSOD M. C. Pascua, Senior Safeguards Officer, PSOD A. Porras, Safeguards Officer, PSOD M. Principe, Senior Social Development Officer, PSOD J. Qi, Investment Officer, PSOD V. Ramasubramanian, Safeguards Specialist, PSOD D. C. Song, Senior Guarantees and Syndications Specialist, PSOD R. R. Tabanao, Project Analyst, PSOD Y. Wang, Investment Officer, PRC Resident Mission

Approval Numbers: 7380/2986-PRC
Project Number: 46928-014
Far East Horizon Ltd.

Rationale

Congestion and air pollution from motor vehicle use in the PRC is a major problem. Many urban centers have such unmanageably dense concentrations of motor vehicles to the point where their emissions have become harmful to human health. As a result, the national and municipal governments have agreed that the development of public transport is needed to avert a potential transport crisis in the PRC's urban areas. By encouraging urban residents to shift from the use of private cars to public transport, governments can alleviate congestion and air pollution, including the emissions of greenhouse gases that contribute to global climate change.

Since 2006, the national and local governments have made the promotion of public transport a strategic priority and have increased their efforts to providing flexible, low-cost, efficient bus transport. Many cities have set ambitious targets for replacing and adding to existing bus fleets. Increasingly, local governments are also promoting clean buses by building the compressed natural gas and liquefied natural gas fueling stations and electric bus charging stations needed to run them and providing financial incentives to encourage the switch from high emission vehicles.

This expansion of clean bus transport has been limited by significant financing constraints, however. Local bus operators typically have high debt–asset ratios and, without the government subsidies they receive, would operate at a loss. Banks are also usually unwilling or unable to approve the large amounts of credit needed to meet the operators' ambitious plans to add new buses and replace existing fleets.

Financial leasing can be an effective way to supplement bank finance and address this funding bottleneck. Leasing allows bus operators to tap additional financing that has longer tenors and potentially more competitive rates than bank loans.

Description

The program will fund the leasing of buses running on cleaner fuels, buses that are energy-efficient or use new energy sources, and conventional buses that meet the most advanced environmental regulatory thresholds for emissions. Compliance with emission standards covering bus engines is mandatory in the PRC and the program is expected to have minimal environmental or social impacts. Clean buses leased as a result of the program will have to meet the PRC's permit, testing, and registration requirements and follow national and local vehicle emission standards and regulations.

Total Loan Amount: $275 million (OCR)
Clean Energy Investment: $66.80 million
Project Category: Cleaner Fuel
Greenhouse Gas Emission Reduction: 1,310,000 tCO_2e/year
Board Approval: 15 January 2013
Project Life: 12 years

Approval numbers: 7380/2986-PRC **Project number:** 46928-014

Impact	Increase in clean bus transport services in the PRC
Outcome	Deployment of clean buses in the urban, suburban, and intercity public transport markets increased
Output	Clean bus leasing operations of financial leasing companies expanded
Division	Capital Markets and Financial Sectors Division, PSOD
Project Team	
Team Leaders	B. Huang, Investment Specialist, PSOD M. Jensen, Investment Specialist, PSOD
Team Members	C. Gin, Principal Counsel, OGC M. Pascua, Senior Safeguards Officer, PSOD M. Principe, Social Development Officer, PSOD K. Sakamoto, Transport Economist, RSDD D. Song, Senior Guarantees and Syndications Specialist, PSOD R. Tabanao, Project Analyst, PSOD G. Xiao, Senior Project Officer (Transport), EARD K. Zheng, Senior Investment Specialist, PSOD

Loan Number: 7384/2992-THA
Project Number: 46934-01
Solarco Company Limited
(Central Thailand Solar Power Project)

Rationale

As of September 2012, Thailand had 32,000 MW of installed power generation capacity. The country's electricity production depends heavily on conventional fuels, with 66% produced using natural gas and 20% using coal and lignite. Natural gas has traditionally provided a reliable and low-cost source of energy, but growing demand and dwindling natural gas reserves from the Gulf of Thailand mean the country must diversify and secure alternative fuel sources for power generation. Fortunately, Thailand has abundant renewable energy sources—biomass, biogas, mini-hydro, solar, and wind. Using these domestic sources of renewable energy can boost Thailand's energy security, save foreign exchange, and protect the country from global price fluctuations in energy markets.

To complement its renewable energy strategy, the Ministry of Energy advocates decentralized power generation mainly by supporting the country's small power producer (SPP) and very small power producer (VSPP) programs. The SPP program allows private developers to build, own, and operate 10–90 MW power projects and enter into power purchase agreements (PPAs) with the Electricity Generating Authority of Thailand (EGAT). Under the VSPP program, producers of up to 10 MW may sell power to the Metropolitan Electricity Authority or the Provincial Electricity Authority (PEA). Renewable energy SPPs and VSPPs are eligible for a feed-in tariff (or "adder") in addition to the wholesale electricity price.

Description

The project comprises a solar power project with three main sites in Nakhonpathom and Suphanburi provinces with total contracted capacity of 57 MW using photovoltaic (PV) technology. The project will be developed and implemented under six standard power purchase agreements (PPA) (each for 9.5 MW of contract capacity) with PEA. The PPAs are automatically renewable every 5 years and, in addition to the wholesale tariff, include an adder of THB8 per kilowatt-hour applicable for 10 years from the date of commercial operation. The project is a public–private partnership under the VSPP program, which buys renewable energy from power plants for up to 10 MW per PPA to provide clean electricity to the grid. The project will be developed under two engineering, procurement, and construction arrangements, with the commercial operations planned for the fourth quarter of 2013.

Total Loan Amount: $52 million (OCR)
$35 million (CTF)

Clean Energy Investment: $87 million

Project Category: Renewable Energy

Renewable Energy Generation: 90 GWh/year

Greenhouse Gas Emission Reduction: 66,576 tCO_2/year

Board Approval: 28 February 2013

Project Life: 25 years

Impacts	• Diversified energy mix through the addition of renewable energy capacity • Increased private sector participation in solar power production
Outcome	Demonstrated viability and sustainability of utility-scale private sector solar power project
Output	57 MW utility-scale solar power project constructed and commissioned
Division	Private Sector Infrastructure 2, PSOD
Project Team	
Team Leader	D. Wiedmer, Senior Investment Specialist, PSOD
Team Members	S. Durrani-Jamal, Senior Economist, PSOD R. Lockhart, Investment Specialist, PSOD M. Manabat, Senior Investment Officer, PSOD N. Moller, Senior Counsel, OGC K. Paocharoen, Investment Officer, PSOD A. Porras, Safeguards Officer, PSOD D. Purka, Principal Investment Specialist, RSDD L. Rahman, Young Professional, PSOD R. Samiano, Safeguards Officer, PSOD

South Asia Department

Loan Number: 3051-BAN
Project Number: 42173-013
Dhaka Environmentally Sustainable Water Supply Project

Rationale

Dhaka Water Supply and Sewerage Authority (DWASA) has been relying heavily on groundwater as a source of water supply, but current abstraction is beyond sustainable yields. Groundwater resources are depleting, and the water table is falling by 2–3 meters per year, which makes the lifetime of deep tube wells shorter, with 40–60 deep tube wells becoming inoperable each year.

The main existing source of surface water is also being polluted rapidly. Out of the total 2,400 million liters per day (MLD) currently provided by DWASA, 450 MLD is provided by the Saidabad water treatment plant, which abstracts surface water from the nearby Sitalakhya River.

DWASA is implementing distribution network improvements for water supply with ADB financing. The ongoing investments are rehabilitating and strengthening the water supply systems based on the long-term policy and investment road map, complemented by capacity building of DWASA to manage the water supply systems competently. Six contract packages have been awarded to reduce nonrevenue water (NRW) to 15% in each district metered area in five out of 11 zones of the DWASA service area by 2015–2016.

These efficiency gains and policy reforms need to be scaled up and sustained, including NRW reductions in other zones. While the overall efficiency of the system is being improved, developing a new source of raw water for long-term water security in Dhaka is essential because of the large increase in demand associated with a growing population, the need for moving toward continuous water supply, and the need for reducing dependence on groundwater and ensuring the sustainable operation of existing surface water supply systems.

Description

This project aims to provide a more reliable and secure supply of water for Dhaka by developing a new surface water supply scheme. The scheme will augment supply by developing water intake at the Meghna River, water transmission and distribution networks, and a water treatment plant with a capacity of 500 million liters per day. The project will also improve efficiency of the existing distribution network and reduce the ratio of NWR. The improvements to water quality and efficiency will positively impact services that support low-income communities.

Total Loan Amount: $250 million (ADF)
Clean Energy Investment: $49.33 million
Project Category: Demand-side energy efficiency
Energy Savings: 2.44 GWh/year
Greenhouse Gas Emission Reduction: 1,562 tCO_2e/year
Board Approval: 22 October 2013
Project Life: 25 years

Impact	Improved access to and quality of sustainable water supply services in Dhaka
Outcome	More reliable and improved security of water supply in Dhaka
Outputs	• New surface water supply system developed • Distribution network strengthened • Project management and administration adequately supported
Division	Urban Development and Water Division, SARD
Project Team	
Team Leader	N. Saito, Principal Urban Development Specialist, SARD
Team Members	S. Barbin, Project Analyst, SARD J. Ghimire, Counsel, OGC M.R. Islam, Senior Project Officer, Bangladesh Resident Mission, SARD S. Rahman, Senior Economics Officer, Bangladesh Resident Mission, SARD E. Ravancho, Operations Assistant, SARD I. Setyawati, Safeguards Specialist, SARD S. Shafiq, Financial Management Specialist, SARD R. Slangen, Urban Development Specialist, SARD F. Sultana, Senior Social Development Officer (Gender), Bangladesh Resident Mission, SARD
Executing Agency	Dhaka Water Supply and Sewerage Authority

Loan Number: 3097-BAN
Project Number: 32234-053
Railway Sector Investment Program—Tranche 3

Rationale

A framework financing agreement for the Railway Sector Investment Program (RSIP) was signed on 7 September 2006 between the People's Republic of Bangladesh and the Asian Development Bank (ADB). The RSIP was approved on 10 October 2006 by ADB's Board of Directors as a multitranche financing facility (MFF) for $430 million. The government's investment plan for the sector aims to implement the following two projects: (i) policy, organizational, and capacity-building reforms that would allow Bangladesh Railway to become more commercially focused, as well as improve governance and accountability; and (ii) an investment project aimed at overcoming investment bottlenecks. The MFF is structured such that the reform project will provide continuous support to implement the agreed reform agenda, whilst the investment program will be supported by a series of four tranches.

The third periodic financing request was received on 30 May 2013. The government requested for a loan of $100 million to finance 50 broad gauge passenger carriages and 100 meter gauge passenger carriages for Bangladesh Railway's main line network. Bangladesh Railway has submitted an appraisal report and an updated economic and financial analysis. The procurement of passenger carriages is within the key development objectives identified under the MFF and will increase the transport capacity of Bangladesh Railway in critical sections with high demand for passenger transport. The procurement of passenger carriages satisfies the conditions as set forth in the framework financing agreement.

Description

This third tranche will improve railway transport capacity in the mainline network of Bangladesh Railway. This involves the commissioning of new 50 broad gauge passenger carriages and 100 meter gauge passenger carriages for Bangladesh Railway's main line network.

Total Loan Amount: $100 million (OCR)
Clean Energy Investment: $20 million
Project Category: Demand-side energy efficiency
Energy Savings: no data
Greenhouse Gas Emission Reduction: no data
Board Approval: 09 December 2013
Project Life: 40 years

Impact	Efficient and safe railway transport in Bangladesh
Outcome	Improved railway transport capacity in the main line network of Bangladesh Railway
Output	New passenger carriages commissioned
Division	Transport and Communication Division, SARD
Project Team	
Team Leader	M. Roesner, Senior Transport Specialist, SARD
Team Members	Md. S. Alam, Safeguards Officer (Resettlement), SARD A. Faisal, Project Officer (Environment), SARD Md. N. Islam, Senior Project Officer (Transport), SARD T. Kawabata, Young Professional, SARD A. Kim, Counsel, OGC S. Tanaka, Transport Specialist, SARD K. Yangzom, Environment Specialist, SARD S. Zhao, Social Development Specialist, SARD
Executing Agency	Bangladesh Railway

Loan Number: 3046-BAN
Project Number: 42180-013
Second Public–Private Infrastructure Development Facility

Rationale

The Government of Bangladesh emphasizes the need to triple investment in infrastructure development, from 2% to 6% of GDP, with substantial private sector participation through public-private partnerships (PPPs). The proposed Second Public–Private Infrastructure Development Facility (PPIDF II) will build on the efforts of the Public–Private Infrastructure Development Facility (PPIDF I) by helping to provide long-term debt financing and catalyze private sector participation through the Infrastructure Development Company Limited (IDCOL). This will support poverty reduction through enhanced investment, economic growth, and increased employment opportunities. The design of the project will attract commercial financing for infrastructure subprojects, thereby reducing the pressure on the government budget. An additional objective of the project is to help provide the rural population and small- to medium-sized enterprises in off-grid areas with access to electricity generated using solar and other renewable technologies.

Description

PPIDF II has two components, and only component 2 can be described as clean energy project. Component 2 will route the proceeds from the sovereign Asian Development Fund (ADF) loan of up to $10 million through IDCOL for further expansion of its successful solar home system (SHS) program which has so far provided financing of more than 2 million SHS through a microfinance-based, direct sales program in rural off-grid areas to provide households and small businesses with a renewable source of energy. Component 2 will channel funding from IDCOL through participating organizations to the end-users which are typically households in off-grid areas.

Total Loan Amount: $10 million (ADF)
Clean Energy Investment: $10 million
Project Category: Renewable energy
Renewable Energy Generation: 4.86 GWh/year
Greenhouse Gas Emission Reduction: 57,500 tCO_2e/year
Board Approval: 17 October 2013
Project Life: 25 years

Impact	Enhanced development of infrastructure, including renewable energy facilities
Outcome	Increased private sector participation in infrastructure development including in renewable energy facilities
Outputs	• Increased availability of long term debt financing for innovative infrastructure subprojects • Increased availability and accessibility of financing for SHS
Division	Public Management, Financial Sector and Trade Division, SARD
Project Team	
Team Leaders	P. Marro, Principal Financial Sector Specialist, SARD Z. Rahman, Senior Financial Sector Officer, SARD
Team Members	N. Bertsch, Financial Sector Specialist, SARD A. Gacutan, Senior Operations Assistant, SARD R. Sabur, Senior Safeguards Specialist, SARD J. Versantvoort, Principal Counsel, OGC
Executing Agency	Ministry of Finance and Economic Relations Division

Loan/Grant Number: 3024-BHU
Project Number: 37399-043
Green Power Development Project—Additional Financing

Rationale

The Government of Bhutan has requested additional financing from ADB to complete its Green Power Development Project. The project has two components; (i) a rural electrification component, and (ii) construction of the Dagachhu hydropower plant. The government has already completed the rural electrification component, and has additional construction work remaining on the hydropower project.

With regards to the hydropower project, the government did not anticipate especially poor geological conditions, which raised the cost of underground tunneling excavation work. Labor and materials costs also increased. In total, costs increased by 16.6%, which went beyond the amount of financing ADB originally provided for this project.

Despite the poor geological conditions and increased costs, the project remains technically sound and financially and economically viable. The sponsors are fully satisfied with the technical performance of the contractors.

Description

The Government of Bhutan is requesting additional financing of $39 million to complete the Dagachhu hydropower plant, which is 95% complete. The original loan closed 31 December 2013. By that time, more than 98% of the overall finance extended by ADB was disbursed, except for a small amount set aside for interest during construction.

Total Loan Amount (additional): $39 million (ADF)
Clean Energy Investment: $39 million
Project Category: Renewable energy
Renewable Energy Generation: reported under Loan Numbers 2463/2464 (2008)
Greenhouse Gas Emission Reduction: reported under Loan Numbers 2463/2464 (2008)
Board Approval: 30 September 2013
Project Life: 40 years

Loan/grant number: 3024-BHU **Project number:** 37399-043

Impact	Cross-border power trade and increased domestic electricity access sustain inclusive economic growth of Bhutan
Outcome	Coverage of sustainable clean power supply expanded
Outputs	• Hydropower plant constructed • Rural electrification extended • Druk Green Power Corporation management system improved
Division	Energy Division, SARD
Project Team	
Team Leader	K. Ogino, Principal Energy Specialist, SARD
Team Members	M. Ajmera, Social Development Specialist, SARD C. Damandl, Senior Counsel, OGC S. Fukushima, Energy Specialist, SARD M. C. Galarpe, Senior Operations Assistant, SARD S. Sasaki, Environment Specialist, SARD T. Shiihara, Portfolio Management Specialist, SARD
Executing Agency	Druk Green Power Corporation

Loan Number: 3048-IND
Project Number: 47083-002
Accelerating Infrastructure Investment Facility in India—Tranche 1

Rationale

Infrastructure is important for India's economic growth. Weak infrastructure impedes economic development and poverty reduction efforts. Strengthening and expanding infrastructures require financing and India is facing challenges in this area. Some of these challenges include (i) unfavorable investment climate, (ii) increasing asset–liability mismatch for banks, (iii) banks are approaching exposure limits to borrowers and infrastructure sectors, (iv) the asset quality of banks deteriorated considerably during the half year ending September 2012, and (v) unfavorable markets hindering the raising of equity.

The infrastructure investment funding gap during the Twelfth Five-Year Plan is estimated to be about $113 billion. The government is sourcing the shortfall from the private sector.

Against the backdrop of these challenges, the government identified the need for further reforms to enhance private sector participation in infrastructure. These include strengthening public–private partnership (PPP) support; promoting project finance schemes in infrastructure development; and developing new sources of take-out project bond financing, including infrastructure debt funds.

The infrastructure investment has two pillars: (i) positioning India Infrastructure Finance Company Limited (IIFCL) to play a larger role in infrastructure financing with newly introduced financial products and modalities; and (ii) building on the strong relationship and successful performance of previous ADB facilities with IIFCL support for PPPs. The facility involves a sovereign loan to IIFCL to support three main areas: (i) direct lending, including to renewable and clean energy; (ii) take-out financing; and (iii) subordinate debt, all in line with the scheme.

Description

The project will enhance the availability of long-term finance for PPP subprojects and improve project management. The indicative pipeline of subprojects will be subject to due diligence to ensure conformity with ADB requirements. Subprojects will be financed for roads, railways, airports, energy (including renewable energy), and urban infrastructure. For tranche 1, 12–14 subprojects from the pipeline for the facility will be taken up for financing. These subprojects include a 175 MW wind farm. Increased use of subordinate debt and take-out finance modalities may be envisaged based on market requirements.

Total Loan Amount: $400 million (OCR)
Clean Energy Investment: $24.73 million
Project Category: Renewable energy
Renewable Energy Generation: 459.9 GWh/year
Greenhouse Gas Emission Reduction: 410,921 tCO_2e/year
Board Approval: 21 October 2013
Project Life: 25 years

Impact	Increased availability of infrastructure
Outcome	Facilitated private sector investment in infrastructure PPPs
Outputs	• Enhanced availability of long-term finance for PPP subprojects • Improved project management
Division	Public Management, Financial Sector and Trade Division, SARD
Project Team	
Team Leaders	C. Kim, Lead Finance Specialist, SARD V. Rao, Principal Financial Sector Specialist, SARD
Team Members	D. Lambert, Senior Finance Specialist, SARD G. Mahajan, Senior Environment Officer, India Resident Mission, SARD R. Sabur, Senior Safeguards Specialist, SARD S. Singh, Senior Project Officer (Finance), India Resident Mission, SARD V.S. Rekha, Principal Counsel, OGC
Executing Agency	India Infrastructure Finance Company Limited

Loan Number: 3001-IND
Project Number: 43464-026
Himachal Pradesh Clean Energy Transmission Investment Program—Tranche 2

Rationale

The Indian power sector has a chronic history of electricity shortages, which has further been exacerbated by steadily increasing power demand. This lack of an adequate and reliable power supply impedes the government's efforts to provide electricity access to the 30% of the population who live without it, and also impeded commercial and industrial growth.

Himachal Pradesh is home to about one-fourth of India's hydropower potential. Maximizing this potential is articulated in the Hydropower Policy, 2007 of the Government of Himachal Pradesh, which targets its comparative advantage in hydropower with the goal to become the "hydropower state" of the country. Hydropower will benefit electricity consumers in Himachal Pradesh and throughout northern India as the excess generated power will flow to India's national grid.

The state's power sector road map encourages investment in hydropower generation—the majority of which are run-of-river type—and articulates that Himachal Pradesh must invest in its electric transmission infrastructure so that the additional hydropower can be efficiently transmitted within and outside the state. As Himachal Pradesh is one of the few states in India with 100% electrification at the village level, additional hydropower capacity will not just serve the state's growing demand, but will serve the national grid through interstate power flows. As a subset of the overall sector road map, and with support from the ADB, H.P. Power Transmission Corporation Ltd (HPPTCL) has prepared a power system master plan to articulate a transmission network expansion plan for Himachal Pradesh. This plan, endorsed by India's Central Electricity Authority, provides a sound basis for investment in transmission facilities, and is expected to engender confidence among existing and potential private hydropower developers that sufficient transmission capacity will be available to evacuate power from hydropower facilities to markets outside of Himachal Pradesh.

Description

The financing covers: (i) transmission capacity investments including nine substations and six transmission lines within Himachal Pradesh, (ii) installation of an enterprise resource planning system information technology (IT) hardware and software package covering financial and operational management capabilities) and additional IT hardware in HPPTCL corporate facilities, and (iii) enhanced capacity including project implementation consultant support and a training program for HPPTCL personnel on project management, and transmission utility operations.

Total Loan Amount: $110 million (OCR)
Clean Energy Investment: $110 million
Project Category: Renewable energy
Renewable Energy Generation: not applicable
Greenhouse Gas Emission Reduction: not applicable
Board Approval: 7 May 2013
Project Life: 30 years

Impact	Increased electricity transmission in Himachal Pradesh
Outcome	Improved capacity of HPPTCL to transmit electricity from hydropower generation sources within and outside of Himachal Pradesh.
Outputs	• New Transmission system assets are operational • Enterprise resource planning system, phase II and additional IT hardware installed in HPPTCL corporate facilities and are operational • Capacity of HPPTCL personnel on project management, and transmission utility operations improved
Division	Energy Division, SARD
Project Team	
Team Leader	A. Jeffries, Principal Energy Specialist, SARD
Team Members	H. Kobayashi, Principal Portfolio Management Specialist, SARD S. Sasaki, Environment Specialist, SARD T. Shiihara, Portfolio Management Specialist, SARD P. Van Houten-Castillo, Social Development Specialist, SARD J. Versantvoort, Senior Counsel, OGC
Executing Agency	H.P. Power Transmission Corporation Limited

Loan Number: 3062-IND
Project Number: 46417-001
Jaipur Metro Rail Line 1—Phase B Project

Rationale

Jaipur, the capital of the Indian state of Rajasthan, is in need of improved public transport services. Its current public transport infrastructure is inadequate, both in terms of capacity and service. This problem will exacerbate as Jaipur's population grows, from 3.1 million in 2011 to a projected 8.1 million by 2031.

The lack of public transport options in Jaipur has led to an increase in private vehicle ownership, which in turn aggravates congestion and pollution. In 2009, the modal share for public transport stood at 19%, which is one of the lowest ratios in cities with more than 3 million inhabitants in India. The Jaipur Development Authority responded by developing a comprehensive mobility plan for up to year 2031. It includes a plan for improving the mobility of people, through optimizing public transport networks. Identified solutions include bus fleet augmentation, bus rapid transit systems, and a high-capacity rail system (metro).

The plan is comprehensive, and integrates land use with transport networks. For instance, it prioritizes development within certain mobility corridors, which in turn can optimize the mobility of people through mass transport, while decreasing vehicular traffic in these areas.

The city bus fleet has been augmented with modern buses and the bus rapid transit system is being introduced. However, the main road corridors cannot accommodate segregated bus lanes, while the city s radial development pattern is generating high demand for trips to and from the central business and commercial districts. To meet the increasing mobility requirement and avoid further congestion, high-capacity metro lines were recommended along the city's two backbone arterial corridors.

Description

The project is to build Line 1-Phase B of the metro rail network in the city of Jaipur, India, consisting of underground rail infrastructure of 2.3 kilometers (km) and two stations. It will extend Line 1-Phase A, which is being undertaken by the government of Rajasthan, and is critical to ensuring that the combined overall impact is optimized and benefits are reaped in a timely manner. The project also includes support to study and update a future development plan for Line 2. The metro rail network is expected to provide mass rapid transit capacity for the city's major mobility corridors, aiming to reverse the rising shift to private cars and achieve a vision of an improved public transport system in Jaipur—optimizing general mobility, enhancing quality of life, and making the city more pleasant to live and work in.

Total Loan Amount: $176 million (OCR)
Clean Energy Investment: $35.2 million
Project Category: Demand-side energy efficiency
Energy Savings: 62.08 terajoules/year
Greenhouse Gas Emission Reduction: 4,600 tCO_2e/year
Board Approval: 20 November 2013
Project Life: 40 years

Impact	Improved public transport in Jaipur
Outcome	Improved mass rapid transit system in Jaipur
Outputs	• Line 1-Phase B, comprising the underground rail infrastructure of 2.3 km and two stations • Line 2 plans updated, including a detailed project report
Division	Transport and Communications Division, SARD
Project Team	
Team Leader	D.K. Lee, Principal Transport Specialist, SA
Team Members	M. Ajmera, Social Development Specialist, SARD T. Kawabata, Young Professional, SARD N.P. Kulkarni, Senior Programs Officer, SARD R.V. Peri, Principal Transport Specialist, SARD V.S. Rekha, Principal Counsel, OGC K. Yangzom, Environment Specialist, SARD
Executing Agencies	State Government of Rajasthan acting through Urban Development and Housing Department and Jaipur Metro Rail Corporation

Loan Number: 3053-IND
Project Number: 42266-023
Kolkata Environmental Improvement Investment Program—Tranche 1

Rationale

Water supply and sewerage services in Kolkata have excelled the national average, particularly in terms of quality, continuity, and coverage. The city also has a good, low-cost sewage treatment system. However, service provision is not uniform across the city and is increasingly strained by economic expansion. Service is better in the city center than in the periphery. This is both a problem and an opportunity. The problem is that the number of vulnerable households has grown rapidly in the periphery as the population has declined in the center, which is subserviced. The opportunity arises from the Kolkata Municipal Corporation's (KMC) ability to generate revenues from a still-large population with higher income in the center, with which to fund investment in the periphery. The city has worked hard to narrow service disparities. Efforts started with two loans provided in 2000 and 2006 for the Kolkata Environmental Improvement Project, which financed the renovation of 564 kilometers of the sewer drain network and the rehabilitation of three sewage treatment plants, raising the percentage of the population with direct sewer connection from 31% in 2001 to 43% in 2011. The service coverage for water supply is higher than for sewerage, but disparities between central and peripheral areas remain, particularly in service continuity. Unless addressed rapidly, these disparities will widen as population shifts from the center to the periphery.

Description

The investment program aims to minimize the operational inefficiencies under Tranche 1. It will restore the production capacities of the two existing water treatment plants, replace the inefficient electromechanical equipment, augment transmission mains, and update the assets database for better monitoring and planning. Tranche 1 will also reduce water loss in distribution, and aim to achieve 24-hour continuous water supply from one hydraulically discrete area to another. It will first support KMC in setting up a water loss management unit and engage a specialized contractor in a pilot area.

Also included in Tranche 1 are extension of sewerage to peripheral areas and development of financial and project management capacity of project management units.

Total Loan Amount: $100 million (OCR)
Clean Energy Investment: $10.42 million
Project Category: Demand-side energy efficiency
Energy Savings: 13.28 GWh/year
Greenhouse Gas Emission Reduction: 11,866 tCO_2e/year
Board Approval: 22 October 2013
Project Life: 25 years

Impact	Improved water supply, sewerage, and drainage services quality and operational sustainability in select areas of KMC
Outcome	Improved operational efficiency and coverage of water supply, sewerage, and drainage services in selected areas of KMC
Outputs	• Inefficient water supply assets rehabilitated • Sewerage extension to peripheral areas continued • Financial and project management capacity further developed
Division	Urban Development and Water Division, SARD
Project Team	
Team Leaders	T. Gallego-Lizon, Principal Urban Development Specialist, SARD H. Ikemoto, Senior Urban Development Specialist, SARD
Team Members	V. S. Rekha, Principal Counsel, OGC R. Slangen, Urban Development Specialist (Safeguards), SARD A. Srivastava, Senior Project Officer, SARD F. Tornieri, Senior Social Development Specialist (Gender and Development), SARD J. Zheng, Urban Development Specialist (Financial), SARD
Executing Agency	Kolkata Municipal Corporation

Loan Number: 3066-IND
Project Number: 47100-004
Madhya Pradesh Power Transmission and Distribution System Improvement Project

Rationale

The peak availability in the Madhya Pradesh power sector was 9,692 megawatts (MW) while the estimated unrestricted peak demand was 10,308 MW, resulting in an unmet peak demand of 616 MW in FY2012. The state has 8.2 million electricity customers, of which 6.1 million are household customers. Expansion of the distribution system with new power connections to households, increased consumption from existing customers, and the fast economic growth of the state are expected to increase the demand for electricity rapidly. Demand for electricity grew at about 13% per annum during FY2009–FY2012 and is predicted to grow by over 11% per annum during FY2012–FY2016. By FY2016, the transmission and distribution (T&D) system should deliver about 7,000 MW of additional power to customers. An estimated 20% T&D capacity gap may result by 2017 if T&D capacity is not enhanced. The proposed investments in T&D aim at removing existing bottlenecks and expanding the T&D system capacity to meet growing demand.

Distribution losses had been very high, especially in rural areas where distribution lines are overloaded. Unmetered connections and theft caused distribution losses to be as high as 46% in FY2004. These losses have fallen to about 27% in FY2012 because of a series of interventions in the sector by government and ADB, and are predicted to be about 17% by FY2014. Subsidized electricity served to agricultural water pumping also requires rationing to minimize financial losses to distribution companies.

Description

The project will upgrade and expand transmission and distribution system and build capacity of the executing agency staff. Specifically, the project includes the following:

(a) for transmission system: (i) about 1,800 circuit-km of transmission lines; (ii) two new and three upgraded 400 kV substations; (iii) four new and five upgraded 220 kV substations; (iv) 26 new 132 kV substations;
(b) for distribution system: (i) about 3,125 circuit-km of distribution lines installed; and (ii) 149 new and 328 upgraded 33/11 kV substations;
(c) for capacity building: about 10 trained trainers and about 100 trained officials from executing agencies on project management, procurement, monitoring and evaluation, financial management, and safeguards, as well as training center hostel, laboratory, and associated facilities.

Total Loan Amount: $350 million (OCR)
Clean Energy Investment: $93.06 million
Project Category: Supply-side energy efficiency
Energy Savings: 878 GWh/year
Greenhouse Gas Emission Reduction: 684,840 tCO_2e/year
Board Approval: 27 November 2013
Project Life: 40 years

Impact	Adequate and reliable power supply in Madhya Pradesh
Outcome	Increased capacity and operational efficiency in the electricity transmission and distribution system in Madhya Pradesh
Outputs	• Transmission system upgraded and expanded • Distribution system upgraded and expanded • Built capacity of executing agency staff • Project management system in place
Division	Energy Division, SARD
Project Team	
Team Leader	H. Gunatilake, Lead Energy Economist, SARD
Team Members	M. Ajmera, Social Development Specialist, SARD A.F.O. Bernaldo, Associate Project Analyst, SARD A.Y. Kim, Counsel, OGC H. Kobayashi, Principal Energy Specialist, SARD S. Sasaki, Environment Specialist, SARD T. Shihara, Energy Specialist, SARD
Executing Agencies	Madhya Pradesh Power Transmission Company and the distribution companies (Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company, Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company, and Madhya Pradesh Paschim Kshetra Vidyut Vitaran Company)

Loan Number: 3052-IND
Project Number: 45224-003
Rajasthan Renewable Energy Transmission Program—Tranche 1

Rationale

Due to its tropical location, some regions in India benefit from solar irradiation ranging from 4–7 kilowatt-hours per square meter. The solar irradiation available in the western regions, particularly in the desert regions of Rajasthan, is at the higher end of this spectrum. India also has significant wind potential in its western region. These advantages have led to India's decision to invest in renewable energy particularly in the state of Rajasthan.

For Rajasthan, the total installed renewable energy capacity of wind and solar is expected to reach 8,000 MW by 2018. In Rajasthan, the state's renewable energy investment plan includes establishment of renewable energy parks, solar and wind generation projects, transmission and smart grid facilities, associated infrastructure, and community power schemes. The renewable energy park model conceives replicable private sector projects being set up at a single location to generate and sell renewable energy.

The Government of India and Rajasthan requested support from ADB for the development of renewable energy projects in Rajasthan, including in its planned solar parks, as well as financing through an multitranche financing facility to set up transmission and associated infrastructure to manage integration of renewable energy.

Description

The state's investment plan for renewable energy targets installation of about 8,000 MW of solar and wind projects by 2018. The Program will support transmission facilities for evacuation of renewable energy to the state and national grid. Tranche 1 involves the installation/upgrading of 1440 km of 400-KV line, 355 km of 220-kV line, 57 km of 132-kV line.

Total Loan/Grant Amount: $62 million (OCR)
$88 million (CTF)
$2 million (CTF-TA Grant)

Clean Energy Investment: $152 million

Project Category: Renewable energy

Renewable Energy Generation: not applicable

Greenhouse Gas Emission Reduction: not applicable

Board Approval: 22 October 2013

Project Life: 40 years

Loan number: 3052-IND **Project number:** 45224-003

Impact	Accelerated development of renewable energy sources in Rajasthan and India
Outcome	Cleaner electricity mix with more efficient and effective generation and transmission system achieved
Outputs	• Bulk power transmission system in Rajasthan expanded • Institutional capacity for renewable energy parks and transmission system developed
Division	Energy Division, SARD
Project Team	
Team Leader	L. George, Energy Specialist, SARD
Team Members	J. Acharya, Senior Climate Change Specialist, RSDD M. Ajmera, Social Development Specialist, SARD J. de Jesus, Operations Assistant, SARD S. Fukushima, Energy Specialist, SARD H. Gunatilake, Principal Energy Economist, SARD S. Janardanam, Finance Specialist (Energy), SARD V. S. Rekha, Principal Counsel, Office of General Counsel N. Sakai, Senior Climate Change Specialist, SARD S. Sasaki, Environmental Specialist, SARD P. Van Houten-Castillo, Social Development Specialist, SARD
Executing Agencies	Rajasthan Rajya Vidyut Prasaran Nigam Limited Energy Department of Rajasthan

Grant Number: 0361-NEP
Project Number: 47036-001
Project Preparatory Facility for Energy

Rationale

Nepal has a theoretical potential hydropower capacity of 83,000 megawatts (MW), 42,000 MW of which is considered economically feasible to develop. Making full use of its hydropower potential can transform Nepal economically. Poor planning, weak regulations, ineffective institutions and legal frameworks, and a very poor tariff regime have held back investments, limited the role of the private sector, and left the country unable to properly tap this vast hydropower resource. As a result, it experiences acute shortages of power. Demand for electricity increased by 46% from 2007 to 2011, while installed capacity rose by only 16%. Of total installed capacity of 719 MW in 2012, hydropower accounted for 660 MW, or only 1.6% of the full, economically feasible potential.

The government has prepared a 10-year roadmap for hydropower development during 2009–2019, with the aim of generating an additional 10,000 MW of hydropower. Nepal needs to develop large-scale reservoir hydropower projects to meet this target but has been unable so far to attract private investment for such undertakings. Some private capital has gone instead into run-of-river generation projects owned by independent power producers and oriented toward the domestic market.

Description

The Facility will prepare (i) feasibility studies, including initial environmental examinations (IEEs), environmental impact assessments (EIAs) and social impact assessments (SIAs) of Sun Koshi 2 (1,110 MW, storage type) and Sun Koshi 3 (536 MW, storage type) projects; (ii) an update of the feasibility study, including IEE/EIA/SIA, and detailed engineering studies of Dudh Koshi (300 MW, storage type) project; (iii) a feasibility study including IEE or EIA and SIA for a second India–Nepal 400-kilovolt cross-border transmission line as agreed upon between India and Nepal; (iv) feasibility studies of any other suitable hydropower or transmission projects. It will also provide support consultants and panels of experts for project implementation and other public-private partnership project development services to develop hydropower project with potential to export hydropower to India.

Total Grant Amount: $21 million (ADF)
Clean Energy Investment: $21 million
Project Category: Renewable energy
Renewable Energy Generation: not applicable
Greenhouse Gas Emission Reduction: not applicable
Board Approval: 24 September 2013
Project Life: not applicable

Grant number: 0361-NEP **Project number:** 47036-001

Impact	Infrastructure for hydropower developed
Outcome	High-quality due diligence provided to support investments to transform the power sector
Outputs	• Feasibility and detailed engineering studies carried out • PPP project development services provided
Division	Energy Division, SARD
Project Team	
Team Leader	T. Limbu, Energy Economist, SARD
Team Members	M. Ajmera, Social Development Specialist, SARD H. Lozari, Senior Finance Officer, SARD P. Manandhar, Project Officer (Energy), SARD S. Sasaki, Environment Specialist, SARD Y. Seo, Counsel, OGC S. Shafiq, Financial Management Specialist, SARD D. B. Singh, Senior Environment Officer, SARD S. Subba, Senior Social Development Officer (Gender), SARD L. Subedi, Senior Social Development Officer (Safeguards), SARD L. Weidner, Senior Public–Private Partnerships Specialist, SARD P. Wijayatunga, Principal Portfolio Specialist, SARD C. Cruz, Senior Operations Assistant, SARD
Executing Agency	Department of Electricity Development of the Ministry of Energy

Loan Number: 2990/2991-NEP
Project Number: 43281-013
Tanahu Hydropower Project

Rationale

Nepal faces a mounting energy crisis. Supplies fall well short of demand, the main utility operating the system is highly inefficient, the policy environment is weak, and the role of the private sector is far too small. The supply gap is growing, especially during the dry season in winter (November through April). Kathmandu, the main consumption center, has blackouts of 14–18 hours a day during this season and load shedding almost every day year-round. Supplies in the rest of the country fare even worse, although an additional problem here is a very low electrification rate. In the meantime, demand for electricity has been growing at 10% annually. This supply gap forces consumers to use diesel generators. These are expensive and very polluting. Rising diesel imports affect the balance of payments, and the doubling of diesel prices over the past 3 years also hurts the income base of people and businesses. The supply problem is becoming one of the biggest obstacles to economic growth. It curtails investment and trade, productivity, job creation, and the quality of life of most citizens. The proposed project is one of a series of similar investments to help overcome this supply problem.

Description

The project has three main components: (i) a medium-sized hydropower plant of 140 megawatts (MW) with significant water storage facilities and associated transmission lines to evacuate the generated power; (ii) rural electrification and community development in the project area, and (iii) a reform and restructuring plan for the national utility, the Nepal Electricity Authority (NEA). The project site is in the Seti River in the Tanahu district, about 150 kilometers west of Kathmandu.

Total Loan Amount: $150 million (ADF)
TA Grant: $1.50 million (Japan Fund for Poverty Reduction)
Clean Energy Investment: $151.5 million
Project Category: Renewable energy
Renewable Energy Generation: 588 GWh/year
Greenhouse Gas Emission Reduction: 99,766 tCO_2/year
Board Approval: 21 February 2013
Project Life: 40 years

Impact	Expanded access to clean and sustainable energy in Nepal
Outcome	Increased efficiency and supply of reliable hydropower energy
Outputs	• Hydropower plant and transmission system made operational • Rural electrification increased • Community development program in the project area implemented • NEA restructured • Other sector reforms undertaken • Equity sales scheme for hydropower development initiated
Division	Energy Division, SARD
Project Team	
Team Leader	K. Ogino, Principal Energy Specialist, SARD
Team Members	M. C. Galarpe, Senior Operations Assistant, SARD T. Limbu, Energy Economist, SARD R. Sabur, Senior Safeguards Specialist, SARD S. Sasaki, Environment Specialist, SARD D. B. Singh, Senior Environment Officer, SARD S. Subba, Social Development Officer (Gender), SARD L. Subedi, Social Development Officer (Safeguards), SARD P. van Houten-Castillo, Social Development Specialist, SARD J. Versantvoort, Senior Counsel, OGC H. Zhang, Finance Specialist (Energy), SARD L. Zhang, Energy Specialist, SARD
Executing Agencies	Tanahu Hydropower Limited Nepal Electricity Authority, NEA

Loan Number: 3020/3030-SRI
Project Number: 45148-007
Greater Colombo Water and Wastewater Management Improvement Investment Program—Tranche 2

Rationale

The Greater Colombo area is in urgent need of rehabilitating and expanding its water supply and wastewater facilities.

Colombo's piped water system suffers from low and fluctuating system pressure, with some service areas receiving only 6 to 10 hours of service per day. Part of the issue lies in the distribution network needing upgrades, as many parts were built more than 100 years ago. Efficiency also suffers as a result, with the ratio of nonrevenue water roughly at 49%.

Description

Tranche 2, like Tranche 1, focuses on reducing non-revenue water (NRW) and improving water service efficiency in Greater Colombo. Tranche 2 will continue investments in water supply, NRW reduction in the south part of Colombo city, and water supply service improvements for National Water Supply and Drainage Board. It will also support the Colombo Municipal Council to complete the project preparation activities for the wastewater investments under Projects 3 and 4.

Total Loan Amount: $70 million (OCR)
$18 million (ADF)

Clean Energy Investment: $8.62 million

Project Category: Demand-side energy efficiency

Energy savings: 4.19 GWh/year

Greenhouse Gas Emission Reduction: 2,900 tCO_2e/year

Board Approval: 26 September 2013

Project Life: 25 years

Impact	Improved water supply and wastewater service and management in Greater Colombo
Outcome	Improved system efficiency and financial sustainability of water supply and wastewater services in Greater Colombo
Outputs	• Rehabilitated and expanded water supply system, and reduced NRW in Greater Colombo • Completed designs and improved preparedness for wastewater investments • Strengthen institutional structure and capacity of service providers • Tranche 2 successfully managed and implemented
Division	Urban Development and Water Division, SARD
Project Team	
Team Leader	M. Fan, Senior Urban Development Specialist, SARD
Team Members	P. Cawrse, Urban Development Specialist, SARD K. Dahanayake, Project Officer, SARD M. de Mesa David, Operations Assistant, SARD K. Emzita, Principal Counsel, OGC N. Gunasekera, Social Development and Gender Specialist, SARD N. Pokhrel, Urban Development Specialist, SARD I. Setyawati, Safeguards Specialist , SARD J. Zheng, Urban Development Specialist, SARD
Executing Agencies	Ministry of Local Government and Provincial Councils Ministry of Water Supply and Drainage

Southeast Asia Department

Grant Number: 0336-CAM
Project Number: 45303-001
Rural Energy Project

Rationale

Cambodia's national electrification rate at 26% fares extremely low in Southeast Asia. The situation is dire in the rural areas where the electrification rate is only 11% and where more than 11 million people still use charged automobile batteries for electricity, and kerosene lamps and candles for lighting. In Cambodia, 93% of the population relies on combustion of traditional biomass for cooking, Where traditional biomass is burned, it is reported that women and children are exposed to air pollution levels in the form of particulates that can reach 20 times the maximum recommended levels. Burning wood for cooking also degrades the local environment through cutting of trees, and adds to the emission of greenhouse gases. The project is fully aligned with the National Strategic Development Plan Update 2009–2013 of the Government of Cambodia, which calls for the development of the energy sector through expansion of the electricity network to achieve the overarching objective of reducing poverty to 19.5% by 2015.

Description

The project addresses both power and non-power energy supply in rural Cambodia through (i) electrifying up to 13,700 households in Svay Rieng Province by extending the 22 kilovolt medium-voltage sub-transmission line and the low-voltage distribution network and installing meters; (ii) promoting the use of up to 90,000 improved cookstoves with higher efficiency in rural areas of Kampong Cham Province; and (iii) developing the capacity of Electricity Authority of Cambodia which is the regulatory body overseeing the power sector.

Total Grant Amount: $6.11 million (AusAid)
Clean Energy Investment: $0.221 million
Project Category: Demand-side energy efficiency
Energy Savings: 183.7 terajoules per year
Greenhouse Gas Emission Reduction: 4,400 tCO_2e/year
Board Approval: 15 January 2013
Project Life: 10 years (cookstoves)

Grant number: 0336-CAM **Project number:** 45303-001

Impact	Increased access to economical and reliable energy supply by rural communities
Outcome	Expanded supplies of reliable grid electricity and Neang Kongrey Stoves
Outputs	• Expanded medium-voltage and low-voltage networks in Svay Rieng Province • Established manufacturing and distribution network for Neang Kongrey Stoves in Kampong Cham Province • Developed regulatory capacity of Electricité du Cambodge
Division	Energy Division, SERD
Project Team	
Team Leader	T. Kadono, Energy Specialist, SERD
Team Members	R. Butler, Safeguards Specialist (Resettlement), SERD C. Gautrot, Senior Counsel, OGC U. Hoque, Social Development Specialist (Gender and Development), SERD N. Ouk, Senior Project Officer, SERD M.E. Paterno, Finance Specialist, SERD G. Peralta, Senior Safeguards Specialist (Environment), SERD D. Schmidt, Energy Specialist, SERD M. Suga, Social Sector Specialist, SERD
Executing Agency	Electricité du Cambodge (EDC)

Loan/Grant Number: 3015/8272/0354-INO
Project Number: 41074-013
West Kalimantan Power Grid Strengthening Project

Rationale

The West Kalimantan system demand will grow to about 600 MW by 2020, from about 200 MW in 2012. West Kalimantan urgently needs additional electricity supply to meet growing needs.

West Kalimantan considers access to cross-border power supply a priority to meet rising demand and at reduced costs. The proposed interconnection with Sarawak at a negotiated import price of $0.10 per kilowatt-hour (kWh) (compared to the average cost of power generation at $0.25 kWh) will enable Indonesia's PLN to import 230 MW equivalent of power generation to the West Kalimantan grid by January 2015. This will enable PLN to enhance its least-cost generation plan by combining hydropower imports from Sarawak with other Indonesian base-load generation from oil or coal.

Because West Kalimantan relies almost entirely on oil and Sarawak largely on hydropower, the interconnection will reduce PLN carbon footprint in West Kalimantan.

Description

The project will (i) construct about 83 km of 275 kV double circuit transmission line between Bengkayang and the border with Sarawak, with a new 275/150/20 kV substation in Bengkayang; (ii) construct about 145 km of 150 kV double circuit Bengkayang–Ngabang–Tayan distribution line, with a new 150/250 kV substation in Ngabang and a four-line distribution feeder extension for the 150 kV Tayan substation and Bengkayang substation; and (iii) install new connections to 8,000 households in West Kalimantan. These 8,000 households will also benefit from training on energy efficiency, provision of energy-efficient lighting, and improved local community centers (hospitals and schools). With access to electricity, these households will have access to other economic opportunities, improve their livelihood, and stop using kerosene or oil lamps for lighting.

Total Loan/Grant Amount: $49.5 million (OCR)
$49.5 million (Agence Française de Développement-cofinancing)
$2 million (CEFPF)

Clean Energy Investment: $101 million

Project Category: Renewable energy

Renewable Energy Generation: not applicable

Greenhouse Gas Emission Reduction: 400,000 tCO_2e/year

Board Approval: 27 August 2013

Project Life: 40 years

Loan/grant number: 3015/8272/0354-INO **Project number:** 41074-013

Impact	Sustainable power supply in West Kalimantan
Outcome	Cost of operating West Kalimantan power system reduced
Outputs	• Construction of Sarawak–West Kalimantan interconnection network • Construction of new distribution network in West Kalimantan • New connections to households in West Kalimantan
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 D. Bui, Senior Energy Economist, SERD R. Butler, Senior Social Development Specialist (Safeguards),CWRD A. Fernando, Associate Operations Officer, SERD N. Mardiniah, Safeguards Officer (Resettlement), IRM, SERD B. Mudiantoro, Project Officer (Infrastructure), IRM, SERD M. Paterno, Finance Specialist, SERD G. Peralta, Senior Safeguards Specialist (Environment), SERD M. Samoza, Project Officer, SERD M. Suga, Social Development Specialist, SERD P. Tharakan, Climate Change Specialist (Mitigation), SERD S. Zaidansyah, Senior Counsel, OGC L. Zou, Senior Financial Management Specialist, East Asia Department K. Uematsu, Safeguards Specialist (Resettlement), SERD
Executing Agency	PT (Persero) Perusahaan Listrik Negara (State Electricity Corporation)

Loan Number: 3041-LAO
Project Number: 45301-002
Water Supply and Sanitation Sector Project

Rationale

Lao PDR has thus far received three ADB loans for improving water sector performance for provincial nam papa (PNP) systems. The government applied the loans toward implementing appropriate technologies, improving construction standards, improving operational and financial performance, improving affordability, and increasing water supply and sanitation coverage.

Despite these impressive sector developments, non-revenue water (NRW) reduction needs to be prioritized, as high water losses in distribution networks adversely affect the efficiency and financial sustainability of water utilities and result in higher tariffs. In 2011, NRW for all 16 PNPs was estimated at 11.6 million cubic meters per year (m3/year) or 28% of water production. These figures understate the actual problem, as about half of the PNP systems provide intermittent supply. NRW would be much higher if the systems are pressurized.

The project emphasizes efficient water use and helps participating PNPs reduce NRW in provincial water supply systems while providing capital investments for the provincial system and one small town system in the same province. The project encourages PNPs to improve their services and partnership with communities regarding water conservation and water loss reduction through a PNP customer relations manager. The focus on NRW management will ensure that beneficiaries do not pay for PNP water losses. The free connection policy will minimize apparent losses (commercial) by reducing the incentive for illegal or unauthorized connections.

Description

The project will improve the performance of PNPs, and expand access to safe piped water supply and sanitation for urban residents in small towns in the Lao PDR. It involves holding hygiene promotion events, preparation and implementation of water safety plans, preparation of asset register for participating PNPs, updating of PNPs corporate plans, expansion of at least 5 water systems in provincial capitals, installation of 175 km of water supply distribution pipelines, completion of NRW programs in at least 5 PNPs, construction of at least 6 new water systems, adoption of water conservation programs and sanitation practices in villages and development of an operation and maintenance plan for each village environmental improvement.

Total Loan Amount: $35 million (ADF)
Clean Energy Investment: $15.94 million
Project Category: Demand-side energy efficiency
Energy Savings: 1.1 GWh/year
Greenhouse Gas Emission Reduction: 596 tCO_2e/year
Board Approval: 9 October 2013
Project Life: 25 years

Impact	Expanded access to quality and reliable piped water supply and sanitation services for the urban population in the Lao PDR
Outcome	Improved performance of participating provincial nam papas (provincial water utilities) in delivering sustainable water supply and sanitation services
Outputs	• Improved sector coordination and policy implementation • Improved NRW management and water supply development • Developed new water supply systems in small towns • Enhanced community action in urban water supply and sanitation • Strengthened capacity for project implementation and O&M
Division	Urban Development and Water Division SERD
Project Team	
Team Leader	A. Jain, Senior Social Sector Specialist, SERD
Team Members	L. Balicanot, Project Analyst, SERD A. B. Frielink, Principal Country Economist, SERD A. Garrovillas, Associate Project Officer, SERD J. Herradura, Financing Partnerships Officer, Office of Cofinancing Operations (OCO) O. Jetwattana, Senior Project Officer, SERD S. Kotagiri, Social Development Specialist (Resettlement), SERD S. Leuangkhamsing, Senior Economics Officer, SERD P. Phommachanh, Project Officer (Energy), SERD P. Rhee, Counsel, OGC S. Sandhu, Senior Environment Specialist, SERD S. Schipani, Social Sector Specialist, SERD A. Senador, Operations Assistant, SERD K. N. Shin, Principal Financing Partnerships Specialist, OCO M. White, Urban Development Specialist (Water Supply and Sanitation), SERD
Executing Agency	Ministry of Public Works and Transport

Loan Number: 3084-MYA
Project Number: 46390-003
Power Distribution Improvement Project

Rationale

Strengthening power supply capacity is critical for reducing poverty and enhancing the medium- and long-term development prospects of Myanmar. Persistent power brownouts during the dry season adversely impact economic and social activities. Electrification is urgently required; without it large areas of the country will be severely hampered in their efforts to advance economically.

Myanmar's network has high transmission and distribution losses. Technical and nontechnical losses of the distribution system were as high as 23% in 2003 and decreasing to 18.2% in 2012. Therefore, improvement of the distribution network is urgently needed.

Description

The project will be rehabilitating (i) distribution network in five townships in Yangon region, (ii) distribution network in four districts in Mandalay region, (iii) distribution network in five districts in Sagaing region, and (iv) distribution network in two townships in Magway region. For each project region, support to capacity building will be provided to enhance staff capability in Ministry of Electric Power, Yangon City Electricity Supply Board, and Electricity Supply Enterprise on rehabilitation and operation of power distribution system, procurement, and financial management during implementation. The rehabilitation works include (i) upgrading existing 66/11 kV and 33/11 kV substations, (ii) replacing existing 33 kV and 11 kV distribution lines, (iii) replacing existing 11/0.4 kV transformers, (iv) replacing existing bare low voltage distribution lines with more efficient aerial-bundled conductor distribution lines, and (v) replacing existing revenue meters with digital revenue meters.

Total Loan Amount: $60 million (ADF)
Clean Energy Investment: $60 million
Project Category: Supply-side energy efficiency
Energy Savings: 122 GWh/year
Greenhouse Gas Emission Reduction: 31,990 tCO_2e/year
Board Approval: 6 December 2013
Project Life: 40 years

Impact	Reduced power distribution loss and improved energy efficiency
Outcome	Improved infrastructure to provide reliable and sustainable electricity to the selected townships and districts
Outputs	• Rehabilitated distribution network in five townships in Yangon region • Rehabilitated distribution network in four districts in Mandalay region • Rehabilitated distribution network in five districts in Sagaing region • Rehabilitated distribution network in two townships in Magway region
Division	Energy Division, SERD
Project Team	
Team Leader	J.I. Kim, Lead Energy Specialist, SERD
Team Members	D. T. Bui, Senior Energy Economist, SERD O. Domagas, Financial Control Specialist, Controller's Department A. Fox, Principal Procurement Specialist, Operations Services and Financial Management Department (OSFMD) E. Gagnon, Principal Procurement Specialist, OSFMD H. Iwasaki, Principal Infrastructure Specialist, SERD C. Jung, Energy Specialist, SERD A. Musa, Financial Management Specialist, SERD M. Paterno, Finance Specialist, SERD G. Peralta, Senior Safeguards Specialist (Environment), SERD P. Rhee, Counsel, OGC C. Samaniego, Senior Operations Assistant, SERD M. Samoza, Project Officer, SERD M. Suga, Social Sector Specialist, SERD
Executing Agency	Ministry of Electric Power

Grant Number: 0365-VIE
Project Number: 46265-001
Energy Efficiency for Ho Chi Minh City Water Supply

Rationale

Ho Chi Minh City (HCMC) is Viet Nam's largest city and its most important commercial and industrial center. With current population growth of about 1.1% per year, HCMC will have about 10 million people by 2020. While Viet Nam's gross domestic product is growing at more than 8% annually that of HCMC is growing substantially faster, at around 11% annually. This growth rate is seriously straining the city's infrastructure, including the water supply system. Set up in 1874, Saigon Water Corporation (SAWACO) is Viet Nam's oldest water company and is responsible for water supply in HCMC. Six distribution companies, incorporated as joint-stock companies and 51% owned by SAWACO, and two other companies, fully owned by SAWACO, are in charge of water distribution in HCMC.

During the project preparation technical assistance of HCMC Water Supply Project, SAWACO conducted an energy audit of its operations. The audit report showed that investment of about $5 million would result in energy savings of 25,000 megawatt-hours per year, translating to about $1.3 million per year. Following the results of the audit, SAWACO invested in some energy efficient components, identified in the energy audit as having a short payback period, especially to equip the treated water pumps with variable frequency drives. SAWACO requested ADB assistance for additional investments for overall improvement of the water pumping scheme, including reduction of technical water losses and grid electricity consumption, through a $2 million grant from the ACEF under the Clean Energy Financing Partnership Facility.

Description

The project involves investment for energy efficiency that includes (a) frequency converters for the three raw water pumps at Tan Hiep treatment plant, including control for the pumps to maintain a target pressure; (b) a mobile monitoring laboratory; and (c) quality calibration technology and central air-conditioning systems that use new technology to reduce water and carbon footprints and greenhouse gas emissions at the Thu Duc water treatment plant. It also involves capacity development through consulting services on monitoring and evaluation of the investment. It will also support information, communication, and education for capacity building and an awareness campaign in energy savings for SAWACO's 3,000 staff and its management.

Total Grant Amount: $2 million (CEFPF)
Clean Energy Investment: $2 million
Project Category: Demand-side energy efficiency
Energy savings: 10 GWh/year
Greenhouse Gas Emission Reduction: 7,500 tCO_2e/year
Board Approval: 17 October 2013
Project Life: 12 years

Grant number: 0365-VIE **Project number:** 46265-001

Impact	Improved operational performance of SAWACO
Outcome	Energy efficiency in SAWACO operations improved
Outputs	• Capacity building of SAWACO in energy efficiency • Investment in energy savings
Division	Urban Development and Water Division, SERD
Project Team	
Team Leader	H. Jenny, Principal Urban Development Specialist, SERD
Team Members	L. Adams, Social Development Specialist, SERD T. Culla, Associate Social Development Officer, SERD A. Garrovillas, Associate Project Officer, SERD B. Konysbayev, Senior Counsel, OGC S. Kotagiri, Social Development Specialist, SERD L. Le, Operations Assistant, SERD S. Sandhu, Senior Environment Specialist, SERD A. Senador, Operations Assistant, SERD S. Tansengco-Schapero, Senior Financial Specialist, SERD
Executing Agency	HCMC People's Committee

Appendix 1: 2013 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
336	CAM	SERD/Energy Division	T. Kadono	Rural Energy Project	Energy/Demand-side energy efficiency	6.11	0.22	AusAid
8486	IND	SARD/Energy Division	L. George	Rajasthan Renewable Energy Transmission Investment Program-Tranche 1	Energy/Renewable energy	2.00	2.00	CTF
354	INO	SERD/Energy Division	S. Hasnie	West Kalimantan Power Grid Strengthening Project	Energy/Renewable energy	2.00	2.00	CEFPF
361	NEP	SARD/Energy Division	T. Limbu	Project Preparatory Facility for Energy	Energy/Renewable energy	21.00	21.00	ADF
2990/2991	NEP	SARD/Energy Division	K. Ogino	Tanahu Hydropower Project-TA Grant	Energy/Renewable energy	1.50	1.50	JFPR
364	PRC	EARD/Energy Division	P. Perera	Hebei Energy Efficiency Improvement and Emission Reduction-Additional Financing to Loan 2835	Energy/Supply-side energy efficiency	3.65	3.65	GEF
370/371/373	SAM	PARD/Energy Division	P. Hattle	Renewable Energy Development & Power Sector Rehabilitation Project	Energy/Renewable energy	19.21	19.21	CEFPF
376	TAJ	CWRD/Energy Division	L. Mtchedishvili	Golovnaya 240-MW Hydropower Plant Rehabilitation Project	Energy/Renewable energy	136.00	136.00	ADF
347	TON	PARD/Energy Division	P. Hattle	Outer Island Renewable Energy Project	Energy/Renewable energy	2.00	2.00	ADF
348	TON	PARD/Energy Division	P. Hattle	Outer Island Renewable Energy Project	Energy/Renewable energy	4.50	4.50	AusAid
7392	PRC	PSOD/Infrastructure Finance Division 2	H. Kimura	Beijing Enterprises Water Group Limited and BEWG Environmental Group Company Limited (Wastewater Treatment and Reuse Project)	Energy/Demand-side energy efficiency	0.50	0.50	CEFPF
365	VIE	SERD/Energy Division	H. Jenny	Energy Efficiency for Ho Chi Minh City Water Supply	Energy/Demand-side energy efficiency	2.00	2.00	CEFPF
				Total		**200.47**	**194.59**	

ADF = Asian Develoment Fund, AusAid = Australian Agency for International Developement, CEFPF = Clean Energy Financing Partnership Facility, CTF = Clean Technology Fund, CWRD = Central and West Asia Department, EARD = East Asia Department, GEF = Global Environmental Facility, JFPR = Japan Fund for Poverty Reduction, PARD=Pacific Department, PSOD = Private Sector Operations Department, SARD = South Asia Department, SERD = Southeast Asia Department.

Appendix 2: 2013 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				
BAN	3046	Second Public-Private Infrastructure Development Facility	10.00	10.00
BHU	3024	Green Power Development Project-Additional Financing	39.00	39.00
FSM	3004/5	Yap Renewable Energy Development	9.04	6.35
IND	3001	Himachal Pradesh Clean Energy Transmission Investment Program-Tranche 2	110.00	110.00
IND	3052/8275	Rajasthan Renewable Energy Transmission Investment Program	150.00	150.00
IND	3066	Madhya Pradesh Power Transmission and Distribution System Improvement Project	350.00	93.06
INO	3015	West Kalimantan Power Grid Strengthening Project	99.00	99.00
MYA	3084	Power Distribution Improvement Project	60.00	60.00
NEP	2990/1	Tanahu Hydropower Project	150.00	150.00
PAK	3090/91/92	Jamshoro Power Generation	900.00	109.07
PNG	2998/9	Port Moresby Power Grid Development Project	66.70	29.40
PRC	3075	Qinghai Delingha Concentrated Solar Power Thermal Project	150.00	150.00
UZB	3058/9	Samarkand Solar Power Project	110.00	110.00
Nonenergy Sector				
BAN	3051	Dhaka Environmentally Sustainable Water Supply Project	250.00	49.33
BAN	3097	Railway Sector Investment Program-Tranche 3	100.00	20.00
IND	3048	Accelerating Infrastructure Investment Facility-Tranche 1	400.00	24.73
IND	3062	Jaipur Metro Rail Line 1- Phase B Project	176.00	35.20
IND	3053	Kolkata Environmental Improvement Investment Program-Tranche 1	100.00	10.42
LAO	3041	Water Supply and Sanitation Sector Project	35.00	15.94
PRC	3014	Hubei-Yichang Sustainable Urban Transport Project	150.00	6.30
PRC	3082	Railway Energy Efficiency and Safety Enhancement Investment Program-Tranche 4	180.00	36.00
SRI	3029/30	Greater Colombo Water and Wastewater Management Improvement Investment Program-Tranche 2	88.00	8.62
UZB	3025/6	Amu Bukhara Irrigation System Rehabilitation Project	220.00	170.23
Subtotal			3,902.74	1,492.66

continued on next page

Appendix 2 *continued*

Country	Loan/ Investment No.	Project Title	Total Amount ($ million)[a]	Clean Energy Investment ($ million)[a]
Nonsovereign Projects				
Energy Sector				
ARM	7385	International Energy Corporation (Sevan-Hrazdan Cascade Hydropower System Rehabilitation Project)	25.00	25.00
IND	7396	Petronet Liquefied Natural Gas Limited	150.00	16.17
IND	7398	BSES Rajdhani Power Limited	80.00	12.80
IND	7386	NSL Renewable Power Private Limited (Hydro and Wind Power Development Project)	30.00	30.00
IND	7381	Simpa Networks Off-grid Pay-as-you-go Solar Power Project	2.00	2.00
IND	7400	Welspun Renewables Energy Limited (Solar and Wind Power Development)	50.00	50.00
INO	7397	Sarulla Geothermal Power Development Project	350.00	350.00
THA	7384/2992	Solarco Company Limited (Central Thailand Solar Power Project)	87.00	87.00
Nonenergy Sector				
PRC	7380/2986	Far East Horizon Ltd.	275.00	66.80
PRC	7392	Beijing Enterprises Water Group Limited and BEWG Environmental Group Company Limited (Wastewater Treatment and Reuse Project)	240.00	29.72
Subtotal			1,289.00	669.50
Grants				
Energy Sector				
Cambodia	336	Rural Energy Project	6.11	0.22
India	8486	Rajasthan Renewable Energy Transmission Investment Program	2.00	2.00
Indonesia	354	West Kalimantan Power Grid Strengthening Project	2.00	2.00
Nepal	361	Project Preparatory Facility for Energy	21.00	21.00
Nepal	2990/2991	Tanahu Hydropower Project-TA Grant	1.50	1.50
China, People's Republic of	364	Hebei Energy Efficiency Improvement and Emission Reduction-Additional Financing to Loan 2835	3.65	3.65
Samoa	370/371/373	Renewable Energy Development & Power Sector Rehabilitation Project	19.21	19.21
Tajikistan	376	Golovnaya 240-MW Hydropower Plant Rehabilitation Project	136.00	136.00
Tonga	0347/0348	Outer Island Renewable Energy Project	6.50	6.50
Nonenergy Sector				
China, People's Republic of	7392	Beijing Enterprises Water Group Limited and BEWG Environmental Group Company Limited (Wastewater Treatment and Reuse Project)	0.50	0.50
Viet Nam	365	Energy Efficiency for Ho Chi Minh City Water Supply	2.00	2.00
Subtotal			200.47	194.59
Total			5,392.21	2,356.74

[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.

2013 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 2013, 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 approximately two-thirds of the world's poor: 1.6 billion people who live on less than $2 a day, with 733 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.

ADB

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