ADB ASIAN DEVELOPMENT BANK

China, People's Republic of : Qinghai Delingha Concentrated Solar Thermal Power Project

Sovereign Project | 46058-002

Status: Closed

Project Name
Qinghai Delingha Concentrated Solar Thermal Power Project
Project Number
46058-002
Country / Economy
China, People's Republic of
Project Status
Closed
Project Type / Modality of Assistance
Loan
Source of Funding / Amount

Loan 3075-PRC: Qinghai Delinha Concentrated Solar Energy Plant Project

Ordinary capital resources
US$ 150.00 million

Loan: Qinghai Delinha Concentrated Solar Energy Plant Project

The Export-Import Bank of China
US$ 75.58 million

Strategic Agendas

Environmentally sustainable growth
Inclusive economic growth

Drivers of Change

Governance and capacity development
Partnerships

Sector / Subsector

Energy / Renewable energy generation - solar

Gender

No gender elements

Description

The proposed Qinghai Delinha Solar Thermal Plant Project (the Project) will construct 50 megawatt (MW) concentrating solar thermal power (CSP) plant in Qinghai Province. The Project is the first-of-its-kind utility scale CSP plant in the Peoples Republic of China (PRC). A project preparatory technical assistance (TA) will be undertaken for the due diligence of the Project.

Project Rationale and Linkage to Country/Regional Strategy

The power sector in the PRC has grown rapidly in tandem with the economic growth. Installed power capacity has expanded by about 70% in the past five years alone. Since the power sector relies heavily on coal-fired power generation which accounts for more than 75% of total power, the rapid expansion in capacity has caused large increase in carbon dioxide (CO2), the major greenhouse gas (GHG) responsible for climate change. Promoting more diversified energy mix with higher share of renewable energy is the core priority to decarbonize the countrys power sector to meet its carbon intensity reduction target which is set at 40%45% reduction by 2020 compared with 2005 levels. In 2005, the Renewable Energy Law of the PRC enacted to kick start large scale renewable energy development in the country. It provides a set of incentives to promote some non-hydro renewable technologies, specifies grid-feed in requirements and standard procedures, and establishes supervisory measures. In 2007, the National Development and Reform Commission (NDRC) issued the Medium- and Long-Term Development Plan for Renewable Energy in the PRC, which aims to increase the share of renewable energy in the total primary energy consumption to 15% by 2020. The Twelfth Five-Year Plan, 20112015, has set an intermediate targets to increase share of renewable energy to 11.4% in 2015, and to decrease carbon intensity by 17% by 2015 compared with 2005 levels to meet the larger 2020 targets.

During the Eleventh Five-Year Plan period (20062010), the PRC has witnessed a significant growth in domestic wind power and solar photovoltaic (PV) market. During this period, the installed capacity of wind power increased from 1.3 gigawatt (GW) to 41.8 GW. Solar PV installed capacity has also expanded but more modestly from 0.07 GW to 0.9 GW during the same period. But it surged by 2.9 GW in 2011. During the Twelfth Five-Year plan (20112015), the PRC has set a target of more than 5 GW for solar power. The rapid increase in wind power and solar PV capacity into the grid is posing new challenges to grid stability due to intermittent nature of power supplied by these plants. Moreover, due to uncertainty in their output, the grid company cannot schedule their dispatch economically and require back up power from alternative sources.

CSP is a state of the art renewable energy technology which provides stable solar power at any time of the day to allow the grid company to schedule their dispatch economically, thus improving grid operation. By 2011, utility scale CSP plants of 1.3 GW installed capacity were in commercial operation, mainly in Spain and in United

States. CSP converts direct solar irradiation into usable heat generating the medium to high quality steam that runs steam turbine for power generation. With thermal storage, CSP enables steam turbine to run at full load during night time or in case of insufficient direct solar irradiation during the day time, and supply reliable, predictable, and dispatchable electricity. The PRC has around 1,0502,450 kilowatt-hour per square meter (kWh/m2) of direct normal irradiation (DNI) over more than 700,000 square kilometer (km2) which is suitable for CSP installation and can potentially generate more than 51,000 terrawatt-hour (TWh) of electricity per year compared to PRCs total electricity generation of 4,228 TWh in 2010. But utility scale CSP remains at the early stage of development in PRC primarily due to limited hands-on experience with the technology. Other factors such as extreme cold climate and water scarcity condition prevalent in the suitable locations for CSP combined with lack of CSP specific development policy, and insufficient tariff support have inhibited or slowed investment in CSP thereby causing delays in CSP demonstration and deployment.

Asian Development Bank (ADB) has been promoting CSP in the PRC since 2009 through a capacity development TA. The TA has provided assistance in (i) developing road map for CSP plant development in Gansu and Qinghai provinces, (ii) preparing pre-feasibility study for CSP project in Gansu province, and (iii) implementing pilot CSP project in Beijing. By the end of 2011, the government of the PRC decided to construct four 50 MW utility scale demonstration CSP demonstration projects including the proposed project. It will provide valuable hands-on experience and mitigate some of the perceived and real technology risks associated with first-of-kind projects. Successful demonstration will lead to market acceptance and large scale CSP deployment in the PRC.

The proposed project location is one of the most suited locations due to higher DNI of about 2,000 kWh/m2 and over 3,100 daylight hours per year. The proposed project will utilize a parabolic trough CSP, which is one of the four major CSP technologies, with 50 MW of installed capacity with 7 hours thermal storage system. The Project will annually generate 199 gigawatt-hour (GWh) non-fluctuating and clean electricity, thereby avoiding annual CO2 emission by 100,000 tons. The electricity to be generated by the proposed project, will be fed into the existing transmission system at 330 kV by interconnecting at an existing grid substation located 8 kilometers from the project site. The proposed project is also designed to further lower the environmental

footprint and address one of the core issues of water scarcity by adopting air cooling system, which will reduce water consumption by one-third as compared with a conventional CSP plant with wet cooling system. Successful demonstration of the proposed project will provide valuable learning lessons and experiences to deploy CSP not only in the PRC but in the other countries with similar climate and geographical features. Being the first-of-its-kind, the proposed project has high certainty to be eligible for carbon finance through Clean Development Mechanism. ADBs Carbon Market Initiative will provide necessary support to mobilize carbon finance.

The proposed project is included in the Country Operations Business Plan (COBP 20122014), and is also in line with the (i) ADBs Energy Policy 2009, (ii) Medium- and Long-Term Development Plan for Renewable Energy of the PRC in 2007, and (iii) the Twelfth Five-Year Plan, 20112015 of the PRC. The proposed project also contributes to 3,000 MW solar power capacity addition target by 2013, under the ADBs Asia Solar Energy Initiative (ASEI) launched in May 2010.

Impact

Expanded share of CSP plants in renewable energy mix in the PRC

Project Outcome

Description of Outcome

Demonstrated feasibility and reliability of the utility-scale CSP plant with thermal storage system in Qinghai Province

Progress Toward Outcome

Final acceptance was received in March 2020. Project is completed as of 31 May 2020. Loan closing was on 16 March 2021.

Implementation Progress

Description of Project 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

Status of Implementation Progress (Outputs, Activities, and Issues)

Land levelling work has been completed since Nov 2014. CGN-SEDC proposed the engineering, procurement and constructon (EPC) procurement mode for key systems to mitigate technical risks and construction schedule management. Procurement of heat transfer fluid, molten salt, and solar field EPC have been completed. Construction progress at the site is currently on track. Heat transfer fluid, thermal energy storage, power block, and solar field (first 140 loops) subsystems have reached 90% progress as of Nov 2017. The plant started commercial testing in October 2018 and is expected to start commercial operations in May 2020.The owner's enginner (who will also conduct capacity development training) has been engaged in Q1 2015.

Geographical Location

Delhi

Safeguard Categories

Environment

B

Involuntary Resettlement

B

Indigenous Peoples

B

Summary of Environmental and Social Aspects

Environmental Aspects

Environment (category B). The potential adverse environmental impacts of the project include (i) soil erosion, noise, fugitive dust, solid waste, and safety risks during construction; and (ii) noise, solid waste and wastewater, and the leakage of synthetic oil HTF during operation. The initial environmental examination (IEE) concludes that the potential adverse environmental impacts can be adequately mitigated by measures outlined in the IEE, and the project will result in environmental and socioeconomic benefits that significantly outweigh potential negative impacts.

Involuntary Resettlement

Involuntary resettlement (category B). Land acquisition under the project will affect people of the Mongolian ethnic group, and a land acquisition and ethnic minority development plan has been prepared. The project will permanently acquire 246 hectares of jointly contracted grassland with a 50-year land usage right since 1985, which belongs to 153 people from 31 Mongolian ethnicity households. The land to be acquired is semiarid unused land, which is 0.7% of the total grazing area owned by the affected households and will not cause loss of income and fixed assets, and physical displacement. All affected households are entitled to cash compensation for loss of land, and in-kind assistance such as employment opportunities during the construction and operation of the project, portable solar photovoltaic sets and high insulation yurts (nomad tents), and livelihood skills development training. CGN and CGN-DSE shall ensure that (i) the land acquisition and ethnic minority development plan is implemented, and the compensation and in-kind assistance for affected people are carried out promptly and efficiently in accordance with the governments applicable laws and ADBs Safeguard Policy Statement; and (ii) the implementation of the land acquisition and ethnic minority development plan is monitored, evaluated, and reported to ADB.

Indigenous Peoples

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Stakeholder Communication, Participation, and Consultation

During Project Design

During Project Implementation

Business Opportunities

Consulting Services

Consulting service is out of ADB financing.

Procurement

All procurement of goods and works shall be carried out in accordance with ADB's Procurement Guidelines (2013, as amended from time to time).

Contact

Responsible ADB Officer

Zhang, Lei

Responsible ADB Department

East Asia Department

Responsible ADB Division

EASI, East Asia Department

Executing Agencies

China General Nuclear Power Corporation

Timetable

Concept Clearance

22 Jun 2012

Fact Finding

06 May 2013 to 17 May 2013

MRM

10 Jul 2013

Approval

02 Dec 2013

Last Review Mission

-

Last PDS Update

25 Mar 2021

Loan 3075-PRC

Milestones

Approval	Signing Date	Effectivity Date	Closing		
			Original	Revised	Actual
02 Dec 2013	23 Jan 2014	21 Apr 2014	31 May 2018	31 May 2020	16 Mar 2021

Financing Plan

:
Project Cost
Total (Amount in US$ million):
246.68

:
ADB
Total (Amount in US$ million):
150.00

:
Counterpart
Total (Amount in US$ million):
96.68

:
Cofinancing
Total (Amount in US$ million):
0.00

Loan Utilization

	Date	ADB	Others	Net Percentage

	Date	ADB	Others	Net Percentage
Cumulative Contract Awards	13 Sep 2022	123.30	0.00	100%
Cumulative Disbursements	13 Sep 2022	123.30	0.00	100%

Status of Covenants

Category	Sector	Safeguards	Social	Financial	Econom
Rating	-	Satisfactory	Satisfactory	Satisfactory	-

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