



Project Administration Manual

Project Number: 46058
November 2013

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

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Project Administration Manual Purpose and Process

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with Government and Asian Development Bank (ADB) policies and procedures. The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

China General Nuclear Power Corporation (CGN), CGN Solar Energy Development Co. Ltd. (CGN-SEDC), and CGN Delingha Solar Energy Co., Ltd. (CGN-DSE) are wholly responsible for the implementation of ADB financed project, as agreed jointly between the borrower and ADB, and in accordance with Government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by CGN, CGN-SEDC, and CGN-DSE of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At Loan Negotiations the borrower and ADB shall agree to the PAM and ensure consistency with the Loan agreement. Such agreement shall be reflected in the minutes of the Loan Negotiations. In the event of any discrepancy or contradiction between the PAM and the Loan Agreement, the provisions of the Loan Agreement shall prevail.

After ADB Board approval of the project's report and recommendations of the President (RRP) changes in implementation arrangements are subject to agreement and approval pursuant to relevant Government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval they will be subsequently incorporated in the PAM.

Abbreviations

ADB	=	Asian Development Bank
CGN-DSE	=	CGN Delingha Solar Energy Co. Ltd.
CGN	=	China General Nuclear Power Corporation
CGN-SEDC	=	CGN Solar Energy Development Co. Ltd.
CSP	=	Concentrated solar thermal power
EMP	=	environmental management plan
China Exim Bank	=	Export-Import Bank of China
GW	=	gigawatt
HTF	=	Heat transfer fluid
IEE	=	initial environmental examination
Kwh/m ²	=	kilowatt hour per square meter
LIBOR	=	London interbank offered rate
LAEMDP	=	land acquisition and ethnic minority development plan
MW	=	megawatt
MOF	=	Ministry of Finance
OE	=	owner's engineer
O&M	=	operation and maintenance
PAM	=	project administration manual
PPCU	=	project public complaints unit
PRC	=	People's Republic of China
SOE	=	statement of expenditure
SPS	=	Safeguard Policy Statement
TES	=	thermal energy system

I. PROJECT DESCRIPTION

A. Background and Rationale

1. 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.¹ 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 carbon dioxide (CO₂) emission—the key greenhouse gas responsible for climate change.² 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. In 2007, the National Development and Reform Commission issued the Medium and Long-Term Development Plan for Renewable Energy in the PRC to increase the share of renewable energy in the 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%³ and to reduce carbon intensity by 17%⁴ by 2015 compared with 2010 levels.

2. During the Eleventh Five-Year Plan period (2006–2010), the PRC achieved rapid growth in wind power and solar photovoltaic capacity. During this period, the installed capacity of wind power increased from 1.3 gigawatts (GW) to 41.8 GW, and solar photovoltaic capacity increased from 70 MW to 900 MW. The Twelfth Five-Year Plan set a target of 21 GW of solar photovoltaic capacity; by 2012, the total solar photovoltaic capacity surged to 3.2 GW. The rapid growth of wind power and solar photovoltaic capacity poses new challenges for grid integration of the intermittent power supplied by these plants. Since the electricity output of these plants cannot be predicted accurately, the grid company finds it extremely difficult to schedule their output dispatch economically, and this is causing grid curtailment.⁵

3. CSP is a state-of-the-art renewable energy technology that converts direct normal irradiation (DNI) into usable heat, generating medium- to high-temperature saturated steam that runs the steam turbine for power generation. Because of this thermal cycle, CSP plants can be combined easily with low-cost thermal energy storage, allowing it to generate electricity even at night. Thus, CSP plants produce reliable, predictable, and dispatchable electricity at any time of the day to allow the grid company to schedule their dispatch economically. This unique feature enables it to overcome grid integration issues posed by unpredictable wind and solar

¹ National Energy Administration. 2012. *Report on China's Energy Development for 2012*. Beijing: Economic Science Press.

² According to International Energy Agency (2012), CO₂ emission from the power sector accounts for around 50% of CO₂ emission in the PRC.

³ Share of renewable energy in the total primary consumption has steadily expanded from 6.95% (or 197 million tons of standard coal equivalent) in 2007 to 10.3% (or 378 million tons of standard coal equivalent) in 2012.

⁴ Carbon intensity (kilogram of CO₂/CNY) decreased from 0.28 in 2005 to 0.24 in 2010, which is about a 14.2% reduction as compared with 2005 levels.

⁵ Grid curtailment refers to the non-absorption of electricity generated from power plants by the power grid. Solar photovoltaic and wind power generation above a threshold such as 20% requires increased grid flexibility to fully utilize the variable and uncertain output from these plants. In addition, the PRC's interregional grid interconnection is relatively underdeveloped, which constrains wind power utilization in concentrated areas such as Inner Mongolia Autonomous Region, causing the curtailment of wind power as high as 45% compared to less than 10% in Europe.

photovoltaic plants. In 2012, more than 2.4 GW capacity of utility-scale CSP plants were in operation and additional 2.36 GW capacity plants are under construction, mainly in Spain and the United States.⁶

4. The CSP plants typically require DNI of at least 1,800 kilowatt-hours per square meter (kWh/m²) per year. Based on this requirement, more than 700,000 square kilometers is suitable for CSP installation in the PRC, which can potentially generate more than 51,000 terawatt-hours of electricity per year compared to its total electricity generation of 4,980 terawatt-hours in 2012.⁷ But CSP development has been rather slow in the PRC because of many factors, such as the (i) limited in-country manufacturing capacity, (ii) higher capital cost of CSP plants, (iii) negligible hands-on experience with the technology, (iv) location of suitable sites far from population centers, and (v) extreme cold weather. Thus, CSP development has been languishing in the PRC, undermining the substantial potential benefits this technology can provide to decarbonize the PRC's power mix. The lack of a CSP-specific development policy, in particular the absence of a feed-in tariff for CSP technologies, has inhibited or slowed investment thereby causing further delays in CSP demonstration and deployment.⁸

5. The Asian Development Bank (ADB) has been promoting CSP in the PRC since 2009 through capacity development technical assistance (TA).⁹ The successful implementation of the TA lowered the barriers for demonstrating CSP in the PRC. In 2011, the Government of the PRC decided to construct four utility-scale CSP demonstration projects. The proposed project is one of these four.¹⁰ These demonstration projects will provide valuable hands-on experience and mitigate some of the perceived and real technology risks associated with first-of-its-kind projects, which will develop confidence in the technology and lead to its wider development. These projects are expected to contribute to the knowledge and insight of the government to formulate appropriate policy incentives for the large-scale deployment of CSP in the PRC. ADB financing for the project will provide the much-needed package assistance of low-cost financing, policy advice, and capacity development, which will ensure the sustainability of the project in the short term and lead to the wider deployment of CSP plants in the PRC in the medium term.¹¹

6. Qinghai province which is located in the north-eastern part of the Qinghai-Xizang plateau in the western part of the PRC with around 2,100 kWh/m²/year of rich solar irradiation resource is the fastest growing region for solar power in the PRC. Its solar photovoltaic installed capacity reached to 2,010 MW in 2012 which was 62.5% of the total solar photovoltaic installed capacity in the PRC. Qinghai province will continuously be one of the major regions for solar power in the PRC. The Qinghai provincial government targets to expand solar energy install capacity by 4

⁶ Utility-scale refers to grid-connected CSP plants with an installed capacity of 10 MW or higher. Spain and the United States offer some of the best sites for CSP installation.

⁷ ADB. 2011. *Concentrating Solar Thermal Power Development*. Consultant's final report. Manila (TA 7402-PRC).

⁸ A solar feed-in tariff of CNY1.0 per kilowatt-hour was introduced in 2011, which targeted solar photovoltaic plants. This feed-in tariff does not reflect the unique benefits of CSP (para. 3) and does not provide incentives to accelerate investment in CSP. The government is contemplating issuing a feed-in tariff for CSP within 2014.

⁹ ADB. 2009. *Technical Assistance to the People's Republic of China for Concentrating Solar Thermal Power Development*. Manila (TA 7402-PRC). The TA has (i) developed a road map for CSP plant development in Gansu and Qinghai provinces, (ii) prepared a pre-feasibility study for a CSP project in Gansu province, and (iii) implemented a 1 MW CSP pilot project in Beijing.

¹⁰ The other three projects are (i) a 50 MW parabolic trough CSP in the Inner Mongolia Autonomous Region, (ii) a 50 MW parabolic trough CSP in Gansu Province, and (iii) a 92.5 MW integrated solar combined cycle (parabolic trough CSP coupled with natural gas combined cycle) in the Ningsha Hui Autonomous Region. The Gansu CSP project is included in the ADB. 2013. *Country Operations Business Plan: People's Republic of China, 2013–2015*. Manila.

¹¹ A policy recommendation on feed-in tariff and regulatory assistance to further support CSP demonstration and deployment will be submitted to the government in November 2013.

gigawatt (GW) including 300 MW of CSP by 2015, and by 10 GW including 2 GW of CSP by 2020, which will be around 20% of total solar power capacity in PRC.

7. The project site is one of the typical locations within Qinghai that has 2,187 kWh/m² of annual DNI. The project will utilize parabolic trough CSP,¹² which is one of the four major CSP technologies, with 50 MW of installed capacity and a 7-hour thermal storage system.¹³ The project will avoid 154,446 tons of CO₂ emissions annually. The electricity generated by the project will be fed into the existing 110-kilovolt substation in Delingha.

B. Impact and Outcome

8. The impact will be the expanded share of CSP in the renewable energy mix in the PRC. The outcome will be the demonstrated feasibility and reliability of the utility-scale CSP plant with a thermal storage system in Qinghai Province.

C. Outputs

9. The project will have two outputs: (i) the construction of a first-of-its-kind utility-scale CSP plant with thermal storage in Qinghai Province; and (ii) capacity development and training in CSP design, construction, and operation and management.

¹² Parabolic trough CSP is the most mature and commercially proven technology used in 95% of all utility-scale CSP plants in the world. The parabolic trough CSP is composed of (i) a solar field system, which concentrates DNI to generate around 400°C of thermal energy; (ii) a heat transfer system; (iii) a thermal energy storage system, which stores excess heat from the solar field system to supply heat for power production during nights or cloudy days; and (iv) a power block, which generates electricity using saturated steam produced by thermal energy from the solar field and thermal storage system to drive a steam turbine generator.

¹³ Thermal storage hours for parabolic trough CSP plants in operation or under construction that have a similar system configuration have a maximum 7.5 hour thermal storage system.

D. Project Readiness Activities

Indicative Activities	2013						2014						Who is responsible
	7	8	9	10	11	12	1	2	3	4	5	6	
Establish project implementation arrangements													CGN, CGN-SEDC, CGN-DSE
Advance contracting actions													CGN, CGN-SEDC, CGN-DSE
Retroactive financing													CGN, CGN-SEDC, CGN-DSE
Prepare FCUP													CGN, CGN-SEDC, CGN-DSE
Review and approval of FCUP													MOF, NDRC
State Council approval for loan negotiations													MOF, CGN
Loan Negotiations													ADB, MOF, CGN
ADB Board consideration													ADB
Loan signing													ADB, MOF
Government legal opinion provided													MOF, MOFA
Loan effectiveness													ADB, MOF

ADB = Asian Development Bank, CGN = China General Nuclear Power Corporation, CGN-SEDC = CGN Solar Development Co. Ltd., FCUP = Foreign Capital Utilization Plan, MOF = Ministry of Finance, MOFA = Ministry of Foreign Affairs, NDRC = National Development and Reform Commission, CGN-DSE = CGN Delingha Solar Development Co. Ltd.

E. Overall Project Implementation Plan

		2013				2014				2015				2016				2017			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Construction of 50 MW parabolic trough CSP																					
1.1	Engineering design				■	■	■	■	■	■	■	■									
1.2	Bidding and contract awards				■	■	■	■	■	■	■	■	■								
1.3	Construction supervision					■	■	■	■	■	■	■	■	■	■	■	■	■			
1.3	Civil works					■	■	■	■	■	■	■	■	■	■	■	■				
1.4	Solar field system					■	■	■	■	■	■	■	■								
1.5	HTF system					■	■	■	■	■	■	■	■								
1.6	TES system					■	■	■	■	■	■	■	■								
1.7	Power generation system					■	■	■	■	■	■	■	■	■	■	■	■	■			
1.8	Test run																■	■	■	■	
1.9	Commercial Operation																				
1.10	Defect Liability																				■
2. Capacity Development																					
2.1	Development of training manual												■	■	■	■					
2.2	Capacity development training																■	■	■	■	
3. Management activities																					
3.1	Set up project implementation unit	■	■	■	■																
3.2	Implement EMP and LAEMDP					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
8.7	Inception/Annual reviews/Midterm review				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
8.8	Project completion report																				■

CSP: concentrated solar Thermal Power, EMP = environmental management plan, HTF: heat transfer fluid, LAEMDP: land acquisition and ethnic minority development plan, TES: thermal energy storage, Q = quarter, SAP = social action plan, RP = resettlement plan.

II. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Implementation Organizations – Roles and Responsibilities

Project implementation Organizations	Management Roles and Responsibilities
<ul style="list-style-type: none"> • CGN 	<ul style="list-style-type: none"> ➤ Project executing agency ➤ Take overall responsibility for project implementation ➤ Establish and maintain imprest account (together with China Exim Bank) ➤ Conclude on-lending agreement with China Exim Bank ➤ Conclude on-lending agreement with CGN-DSE ➤ Submit withdrawal application to ADB ➤ Retaining necessary financial information and evidences related to payment and claim ➤ Submit required annual audit reports and financial statements of project account to ADB
<ul style="list-style-type: none"> • CGN Management Group 	<ul style="list-style-type: none"> ➤ Headed by vice president in charge of solar energy business, and head of departments in CGN. ➤ Meet regularly, discuss and take action, if necessary, to ensure smooth overall project implementation
<ul style="list-style-type: none"> • CGN-DSE 	<ul style="list-style-type: none"> ➤ Project implementing agency ➤ Supervise day-to-day activities of the project ➤ Establish and maintain sub-account (together with China Exim Bank) ➤ Report the project implementation progress and compliance through CGN-SEDC to ADB ➤ Engage owner's engineer and O&M service contractor ➤ Conduct environment, land acquisition, and social monitoring ➤ Submit the project progress reports including social monitoring, and environment monitoring reports to ADB ➤ Submit bidding documents, bid evaluation reports, contracts, and other necessary documentations to CGN-SEDC under the assistance of tendering agent. ➤ Check invoices from contractors and prepare withdrawal applications to be submitted to ADB, through , CGN, and China Exim Bank
<ul style="list-style-type: none"> • CGN-SEDC 	<ul style="list-style-type: none"> ➤ Provide guidance of the day-to-day activities of the project and assistance to CGN-DSE to ensure smooth project implementation. ➤ Endorse bidding documents, bid evaluation reports, contracts, and other necessary documentations and submit them to ADB for necessary approval.
<ul style="list-style-type: none"> • China Exim Bank 	<ul style="list-style-type: none"> ➤ On-lending agency ➤ Conclude on-lending agreement with CGN ➤ Jointly sign withdrawal application with CGN ➤ Managing co-financed portion
<ul style="list-style-type: none"> • ADB 	<ul style="list-style-type: none"> ➤ Monitor and support project implementation compliance to obligation and responsibilities in accordance with ADB's policies and procedures

ADB = Asian Development Bank, CGN = China General Nuclear Power Corporation, CGN-SEDC = CGN Solar Energy Development Co. Ltd., CGN-DSE = CGN Delingha Solar Energy Co. Ltd. China Exim Bank = Export-Import Bank of China, O&M = operation and maintenance

B. Key Persons Involved in Implementation

Executing Agency

CGN	Mr. Tan JianSheng Senior Vice President 19F, Science Building, No. 1001 Shangbu Zhong Road, Shenzhen, People's Republic of China (PRC) Tel: (86 755) 83671448 Fax: (86 755) 83699900
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Implementing Agency

CGN-DSE	Mr. Xu Shiping General Manager Room 804-805, Chengzhong District, Xining, Qinghai Tel: 0971 6361176 Fax: 0971 6317432
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CGN-SEDC	Mr. Han Qinghao General Manager 21 F, Guangyao Dongfang Center No. 100, Xi San Huan, North Road Haidian District, Beijing, PRC Tel: (86 10) 68720063 Fax: (86 10) 68460583
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Onlending Agency

China Exim Bank	Mrs. Li Ronghui Deputy General Manager, Onlending Department No. 30, Fuxingmen Nei Street Tel: (86 10) 83578536 Fax: (8610) 83578568
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ADB

Energy Division
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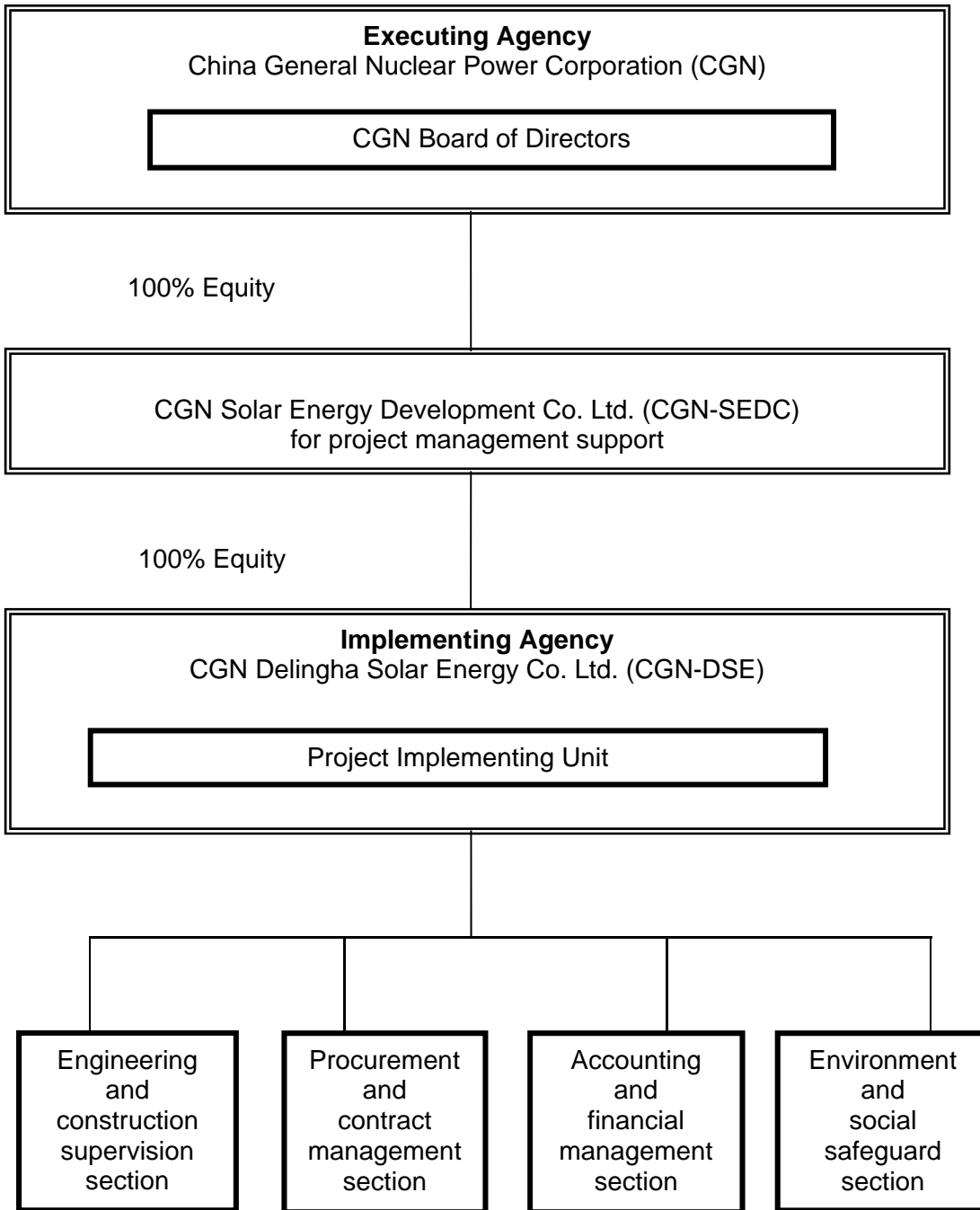
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ADB = Asian Development Bank, CGN = China General Nuclear Power Corporation, CGN-SEDC = CGN Solar Energy Development Co.,Ltd., CGN-DSE = CGN Delingha Solar Energy Co. Ltd. China Exim Bank = Export-Import Bank of China

C. Project Organization Structure



III. COSTS AND FINANCING

10. The project is estimated at \$322.26 million, including taxes and duties of \$31.33 million. The total cost also includes physical and price contingencies and financing charges during implementation. The tentative project investment plan is summarized below.

Table 1: Project Investment Plan
(\$ million)

Item	Amount ^a
A. Base Cost^a	
1. Civil works	11.80
2. Solar field	132.81
3. Heat transfer fluid system	13.62
4. Thermal energy storage system	38.68
5. Power generation system	24.09
6. Auxiliary equipment and materials	18.03
7. Other costs	27.53
8. Engineering services	7.68
Subtotal (A)	274.24
B. Contingencies^b	36.72
C. Financing Charges During Implementation^c	11.31
Total (A+B+C)	322.26

Note: Numbers may not sum precisely because of rounding.

^a In October 2013 prices. Includes tax and duties estimated at \$31.33 million, of which \$14.94 million will be for Asian Development Bank-financed components. Tax and duties are not considered to be excessive and are in compliance with the country cost-sharing ceiling and financing parameters for the People's Republic of China, approved on 16 March 2011.

^b Physical contingencies (\$13.71 million) estimated at 5.0% of base cost. Price contingencies (\$23.01 million) are based on estimated domestic and international inflation rates during construction.

^c Includes interest and commitment charges. Interest during construction for the Asian Development Bank loan has been computed at the 5-year forward London interbank offered rate plus a spread of 0.4% and a maturity premium of 0.1%. Commitment charges for an Asian Development Bank loan are 0.15% per year to be charged on the undisbursed loan amount.

Sources: Project feasibility study report and Asian Development Bank estimates.

11. The government has requested a loan of \$150 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including a grace period of 5 years, straight-line repayment method, an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per year the interest and other charges during construction to be capitalized in the loan, and such other terms and conditions set forth in the draft loan and project agreements. Based on the above loan terms and this repayment option, the average loan maturity is 15.25 years and the maturity premium payable to ADB is 0.10% per annum.

12. The financing plan is in Table 2. The ADB loan will finance \$150 million (46.55%) of the total project costs. China General Nuclear Power Corporation (CGN) will finance \$96.68 million (30%) as equity contribution, and \$75.58 million (23.45%) will be cofinanced by the Export-Import Bank of China (China Exim Bank) as a domestic loan, which is considered as collaborative direct value-added cofinancing, based on the memorandum of understanding signed with China Exim Bank.¹⁴ The ADB loan will be used for the procurement of equipment and materials; tax and duties; related transportation, insurance, and installation costs; and

¹⁴ China Exim Bank is a state policy bank of the PRC under the direct leadership of the State Council. It was established in 1994 and is solely owned by the government. In 2012, it received investment-grade credit ratings from Moody's Investors Service (Aa3), Standard & Poor's (AA-), and Fitch (A+).

interest and commitment charges on the loan during construction. The equity contribution and domestic loan will finance civil works, engineering services, land acquisition, environment and social monitoring, other material and equipment costs not funded by ADB, and contingencies.

Table 2: Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank	150.00	46.55
China General Nuclear Power Corporation	96.68	30.00
Export-Import Bank of China	75.58	23.45
Total	322.26	100.00

Sources: Asian Development Bank; China General Nuclear Power Corporation.

13. The PRC will be the borrower and will relend loan proceeds to China Exim Bank through the Ministry of Finance with the same terms and conditions as the loan between it and ADB. China Exim Bank will onlend the loan proceeds to the CGN with the same loan terms plus an administration fee for onlending services. CGN will then lend the loan proceeds to CGN-DSE with the same terms and conditions as with China Exim Bank. CGN-DSE shall bear the exchange rate and interest rate fluctuation risks.

14. The project costs by expenditure category, financier, components/outputs, year and allocation and withdrawal of loan proceeds are described in sections A through F. The project contract and disbursement S-curve is shown in Section E while the fund flow arrangement is shown in Section F.

A. Detailed Cost Estimates by Expenditure Category

Item	CNY million			US \$ million			% of Total
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost	
A. Investment Costs ^a							
1 Civil Works		0.00	73.15		11.80	11.80	3.66%
2 Solar Field	576.41		247.03	92.97		39.84	41.21%
3 HTF System	16.89		67.56	2.72		10.90	4.23%
4 Thermal Energy Storage system	47.96		191.83	7.74		30.94	12.00%
5 Power Generation System	44.80		104.53	7.23		16.86	7.47%
6 Auxirialies	67.08		44.72	10.82		7.21	5.60%
7 Other Costs	102.40		68.27	16.52		11.01	8.54%
8 Engineering Service	28.57		19.05	4.61		3.07	2.38%
Subtotal (A)	884.11		816.14	142.60		131.64	85.10%
B. Contingencies ^b							
1 Physical	44.21		40.81	7.13		6.58	4.25%
2 Price	57.02		85.64	9.20		13.81	7.14%
Subtotal (B)	101.23		126.45	16.33		20.40	11.40%
C. Financing Charges During Implementation ^c							
1 Interest During Implementation	23.74		44.57	3.83		7.19	3.42%
2 Commitment Charges	1.78		0.00	0.29		0.00	0.09%
Subtotal (C)	25.53		44.57	4.12		7.19	3.51%
Total Project Cost (A+B+C)	1010.87		987.16	163.04		159.22	100.00%

^a In October 2013 prices. The base cost includes tax and duties estimated \$31.33 million, of which \$14.94 million will be for Asian Development Bank (ADB) financed components.

^b Physical contingencies computed at 5.0% of base cost. Price contingencies are based on estimated domestic and international inflation rates during construction.

^c Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year forward London interbank offered rate plus a spread of 0.4% and a maturity premium of 0.1%. Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Project feasibility study report and Asian Development Bank estimates.

B. Allocation and Withdrawal of Loan Proceeds

Category			ADB Financing
No.	Item	Amount Allocated (\$)	Percentage and Basis for Withdrawal from the Loan Account
1	Equipment and materials*	145,880,000	100% of total expenditure claimed
2	Interest and Commitment Charges	4,120,000	100% of amount due
Total		150,000,000	

ADB = Asian Development Bank.

*including installation thereof and related transportation and insurance costs. No withdrawals shall be made from the Loan Account for the equipment and materials until the Borrower shall have certified that the Onlending Agreements shall have been duly executed and delivered, and all conditions precedent to their effectiveness shall have been fulfilled.

C. Detailed Cost Estimates by Financier

(\$ million)

Item	ADB	%	EXIM	%	CGN	%	Total
A. Investment Costs							
1 Civil Works	0.00	0.00%	1.89	16.01%	9.91	83.99%	11.80
2 Solar Field	68.50	51.58%	64.31	48.42%	0.00	0.00%	132.81
2a. ADB Financing	68.50	100.00%	-	-	-	-	-
2b. EXIM Financing	-	-	64.31	100.00%	-	-	-
3 HTF System	13.62	100.00%	0.00	0.00%	0.00	0.00%	13.62
4 Thermal Energy Storage system	32.70	84.55%	0.00	0.00%	5.98	15.45%	38.68
4a. ADB Financing	32.70	100.00%	-	-	-	-	-
4b. CGN Financing	-	-	-	-	5.98	100.00%	-
5 Power Generation System	18.50	76.81%	0.00	0.00%	5.59	23.19%	24.09
5a. ADB financing	18.50	100.00%	-	-	-	-	-
5b. CGN Financing	-	-	-	-	5.59	100.00%	-
6 Auxirialies	12.56	69.65%	3.29	18.24%	2.18	12.09%	18.03
6a. ADB Financing	12.56	100.00%	-	-	-	-	-
6b. EXIM Financing	-	-	3.29	100.00%	-	-	-
6c. CGN Financing	-	-	-	-	2.18	100.00%	-
7 Other Costs	0.00	0.00%	0.00	0.00%	27.53	100.00%	27.53
8 Engineering Service	0.00	0.00%	0.00	0.00%	7.68	100.00%	7.68
Subtotal (A)	145.88	53.20%	69.49	25.34%	58.86	21.46%	274.24
B. Contingencies	0.00	0.00%	0.00	0.00%	36.72	100.00%	36.72
C. Financing Charges During Implementation	4.12	36.42%	6.09	53.85%	1.10	9.73%	11.31
Total Project Cost (A+B+C)	150.00	46.55%	75.58	23.45%	96.68	30.00%	322.26

^a In October 2013 prices. The base cost includes tax and duties estimated \$31.33 million, of which \$14.94 million will be for Asian Development Bank (ADB) financed

^b Physical contingencies computed at 5.0% of base cost. Price contingencies are based on estimated domestic and international inflation rates during construction.

^c Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year forward London interbank offered rate plus a spread of 0.4% and a maturity premium of 0.1%. Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: Project feasibility study report and Asian Development Bank estimates.

D. Detailed Cost Estimates by Year

(\$ million)

Item	Total	2013	2014	2015	2016	2017
A. Investment Costs						
1 Civil Works	11.80	0.00	3.54	3.54	2.36	2.36
2 Solar Field	132.81	0.00	39.84	53.13	13.28	26.56
3 HTF System	13.62	0.00	4.09	5.45	1.36	2.72
4 Thermal Energy Storage system	38.68	0.00	11.60	15.47	3.87	7.74
5 Power Generation System	24.09	0.00	7.23	9.63	2.41	4.82
6 Auxirialies	18.03	0.00	5.41	7.21	1.80	3.61
7 Other Costs	27.53	0.00	8.26	8.26	8.26	2.75
8 Engineering Service	7.68	0.77	3.07	2.30	1.54	0.00
Subtotal ^a	274.24	0.77	83.04	104.99	34.88	50.56
B. Contingencies ^b	36.72	0.06	8.57	13.52	5.40	9.17
C. Financing Charges During Implementation ^c	11.31	0.00	1.46	3.42	4.78	1.64
Total Project Cost (A+B+C)	322.26	0.83	93.07	121.93	45.06	61.37
% of Total Project Cost	100.00%	0.26%	28.88%	37.84%	13.98%	19.04%

^a In October 2013 prices. The base cost includes tax and duties estimated \$31.33 million, of which \$14.94 million will be for Asian Development Bank (ADB) financed components.

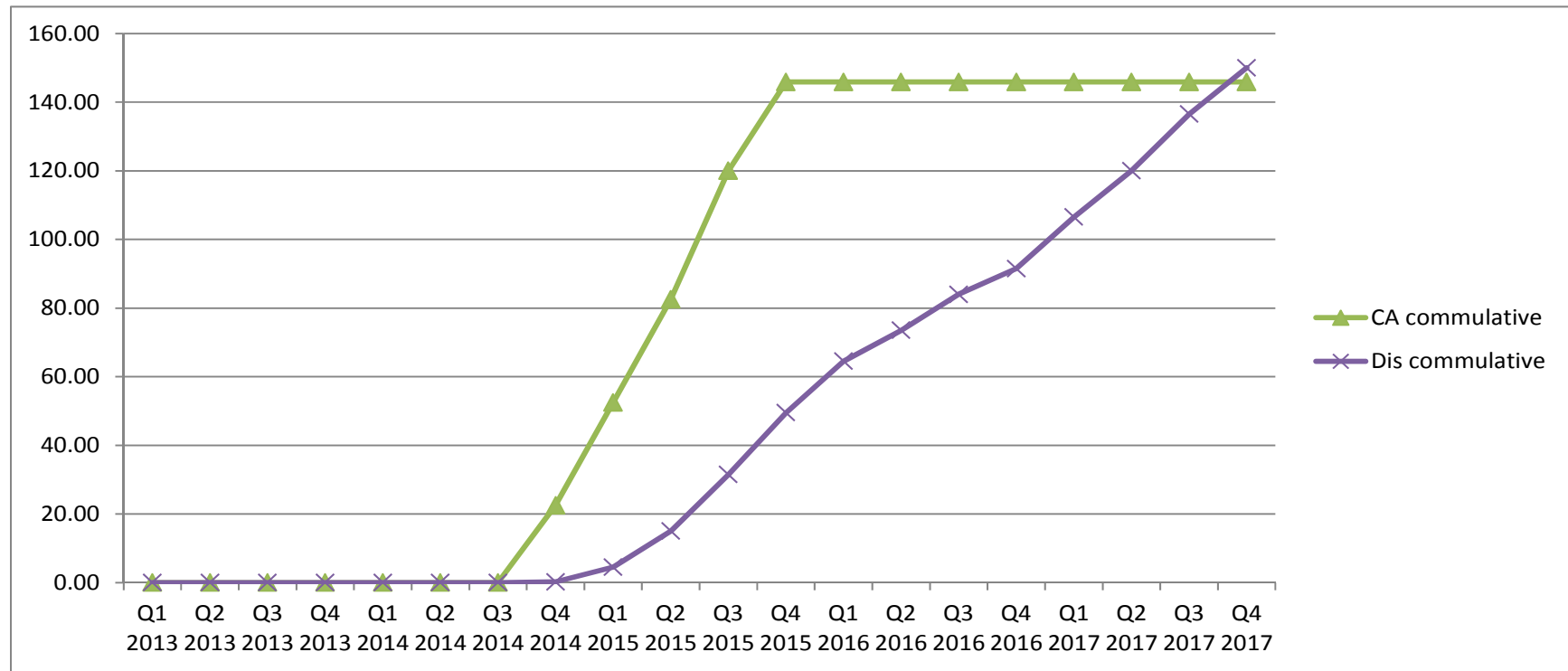
^b Physical contingencies computed at 5.0% of base cost. Price contingencies are based on estimated domestic and international inflation rates during construction.

^c Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year forward London interbank offered rate plus a spread of 0.4% and a maturity premium of 0.1%. Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

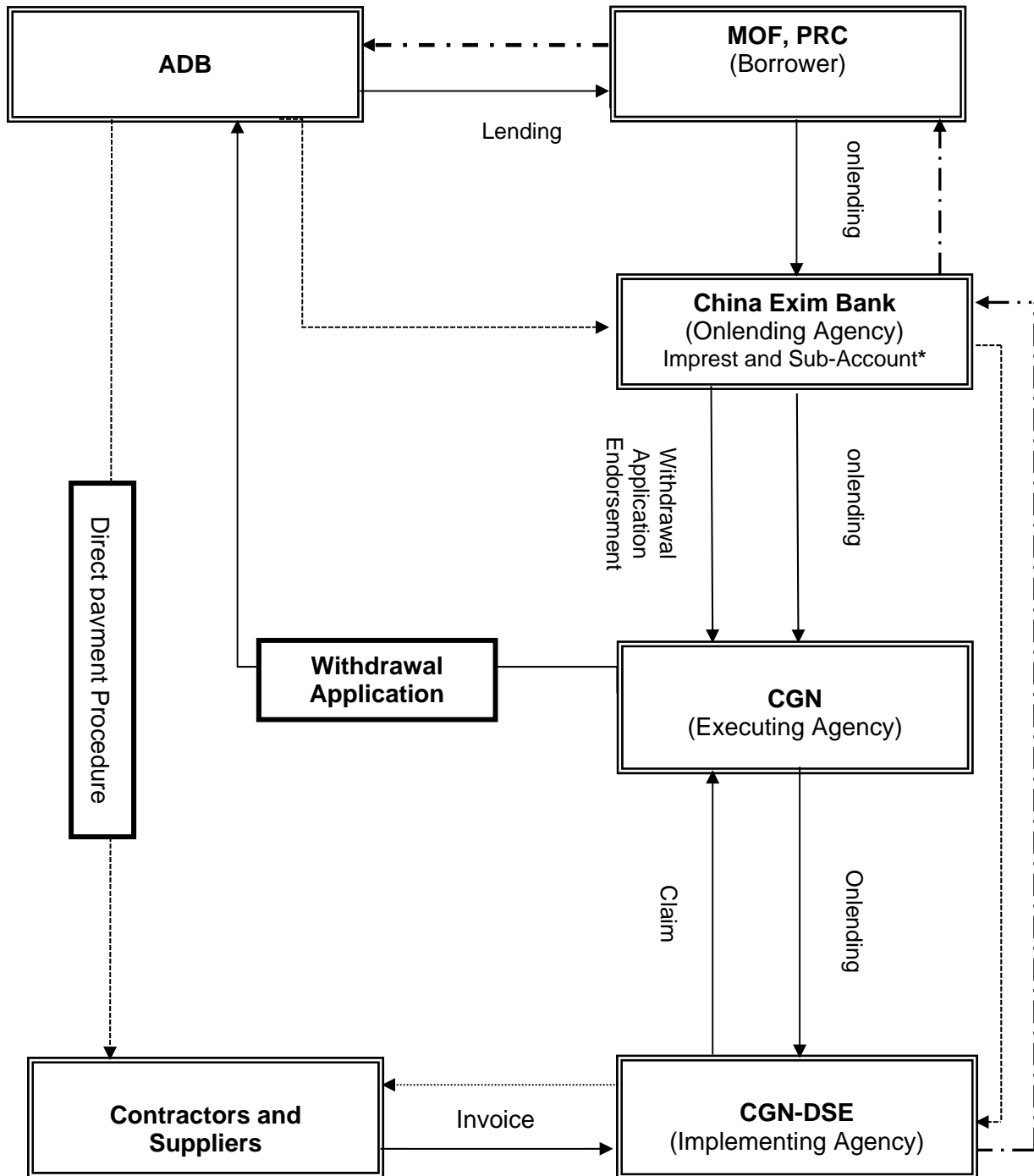
Source: Asian Development Bank estimates.

E. Contract and Disbursement S-curve

	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017
Contract Award	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.50	30.00	30.00	37.50	25.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Disbursement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	4.30	10.50	16.50	18.00	15.00	9.00	10.50	7.50	15.00	13.50	16.50	13.50
CA commulative	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.50	52.50	82.50	120.00	145.88	145.88	145.88	145.88	145.88	145.88	145.88	145.88	145.88
Dis commulative	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	4.50	15.00	31.50	49.50	64.50	73.50	84.00	91.50	106.50	120.00	136.50	150.00



F. Fund Flow Diagram



ADB = Asian Development Bank, CGN = China General Nuclear Power Corporation, CGN-DSE = CGN Delingha Solar Energy Co. Ltd. China Exim Bank = Export -Import Bank of China, MOF = Ministry of Finance, PRC = People's Republic of China.

----- Disbursement: - · - · - Repayment

* Imprest account and sub account to be opened in China Exim Bank are established under the name of CGN and CGN-DSE respectively. Imprest account and sub account are maintained jointly by China Exim Bank and CGN, and by China Exim Bank and CGN-DSE respectively.

IV. FINANCIAL MANAGEMENT

A. Financial Management Assessment

15. The financial management assessment (FMA) was conducted in accordance with ADB's Guidelines for the *Financial Management and Analysis of Projects*¹⁵ and *Financial Due Diligence: a Methodology Note*.¹⁶ The FMA considered the capacity of CGN and CGN-DSE, including funds-flow arrangements, staffing, accounting and financing reporting system, internal and external auditing arrangements, and financial information systems.

16. The financial management and accounting procedures used by CGN and CGN-DSE are aligned with the regulations and policies issued by the Ministry of Finance, and considered effective and adequate for the Project. CGN has developed and maintained the group company-wide financial management monitoring and supervising structure in budgeting, asset management, funding management, internal and external auditing, and reporting, with internal financial management rules and a centrally managed online financial management system. CGN-DSE also follows this internal financial management rules and is incorporated into the online financial management system. The assessment indicates that accrual based accounting and the PRC business accounting standard are followed, separation of functions for authorization, transaction, recording, and asset management is well established, and a rigorous financial management system is implemented.

B. Disbursement

17. The Loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2012, as amended from time to time),¹⁷ and detailed arrangements agreed upon between the Government and ADB.

18. Pursuant to ADB's Safeguard Policy Statement (2009),¹⁸ ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth in Appendix 5 of the Safeguard Policy Statement.

19. Direct payment procedure will generally be used for large equipment and material supply contracts. Reimbursement procedures will be used as appropriate when the CGN initially funds ADB eligible expenditures from its own resources.

20. Each year, the necessary amounts of counterpart funding will be allocated by the CGN and disbursed upon request from CGN-DSE. For ADB's loan proceeds, withdrawal applications to ADB will be prepared by CGN and jointly signed by China Exim Bank. At the end of each year, realistic projections of contract awards/commitments and disbursements for the following calendar year will be made for an assessment and projection of ADB funds. CGN-DSE will be responsible for preparing disbursement projections each year.

21. An imprest account in US dollars in the name of CGN and a sub-account in CNY in the name of CGN-DSE will be established promptly after loan effectiveness at China Exim Bank,

¹⁵ ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

¹⁶ ADB. 2009. *Financial Due Diligence: A Methodology Note*. Manila.

¹⁷ Available at: http://www.adb.org/Documents/Handbooks/Loan_Disbursement/loan-disbursement-final.pdf

¹⁸ Available at: <http://www.adb.org/Documents/Policies/Safeguards/Safeguard-Policy-Statement-June2009.pdf>

and maintained and administered by CGN (together with China Exim Bank¹⁹) and CGN-DSE respectively. The maximum ceiling of the imprest account will not exceed 10% of the loan amount.²⁰ The imprest account and the sub-account are to be used exclusively for ADB's share of eligible expenditures. CGN and CGN-DSE who established the imprest account and the sub-account respectively in their name are accountable and responsible for proper use of advances to the imprest account and the sub-account. The CGN may request for initial and additional advances to the imprest account based on 6 months estimated expenditures to be financed through the imprest account. The imprest account will be established, managed, and liquidated in accordance with ADB's *Loan Disbursement Handbook* and detailed arrangements agreed by the Government and ADB. ADB's *Loan Disbursement Handbook* describes which supporting documents should be submitted to ADB and which should be retained by the government for liquidation and replenishment of the imprest account and the sub-account.

22. Before the submission of the first withdrawal application, the borrower should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per withdrawal application is \$100,000 equivalent under reimbursement and imprest fund procedures, unless otherwise approved by ADB. The CGN is to consolidate claims to meet this limit for reimbursement and imprest account claims. Withdrawal applications and supporting documents will demonstrate, among other things that the goods, and services were produced in or from ADB members, and are eligible for ADB financing.

23. No withdrawals will be made from the Loan Account for the equipment and materials until the Borrower shall have certified that the Subsidiary Loan Agreement and Onlending Agreements have been duly executed and delivered, and all conditions precedent to their effectiveness shall have been fulfilled.

C. Accounting

24. CGN and CGN-DSE will maintain separate project accounts and records by funding source for all expenditures incurred on the project. Consolidated project financial statements will be prepared annually in accordance with applicable guidance and regulations, where these are generally consistent with internationally recognized accounting principles and practices.²¹

D. Auditing and Public Disclosure

25. CGN will cause the annual consolidated project financial statements to be audited in accordance with the Guidelines for the audit of ADB and World Bank-financed projects²² and the Government Auditing Standards of the PRC (where these are consistent with international standard of auditing), by an auditor acceptable to ADB. CGN will submit to ADB, in the English language, within six months at the end of the financial year:

¹⁹ China Exim Bank, being the principal on-lending agency, will also be one of the signatories of the withdrawal application to maintain an oversight on the transactions under the loan.

²⁰ Bank charges incurred in the operation of the imprest account may be financed from the ADB loan.

²¹ Applicable laws, regulations and guidelines include

- The Accounting Law of the PRC (2000).
- Regulation on new accounting system for business enterprises (2006).
- Accounting Methods for Projects Financed by the World Bank (2000).

²² China National Audit Office. 2012. *Guidelines for the Audit of Asian Development Bank and World Bank-financed Projects*. Beijing.

- (i) the annual consolidated project financial statements;
- (ii) an audit report which includes auditor's opinions which cover (a) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting framework; (b) whether loan and grant proceeds were used only for the purposes of the project or not; (c) the level of compliance for each financial covenant contained in the legal agreements for the project; and (d) compliance with the imprest fund procedure.
- (iii) the audit management letter
- (iv) the audit findings and recommendations; and
- (v) the audited annual financial statements and auditors' reports of CGN and CGN-DSE.

26. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

27. CGN has been made aware of ADB's policy on delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.²³ ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

28. Public disclosure of the project financial statements, including the auditor's opinion on the project financial statements, will be guided by ADB's Public Communications Policy (2011).²⁴ After review, ADB will disclose the financial statements for the project and the opinion of the auditors on the financial statements within 30 days from the date of the receipt by posting them on ADB's website. The Audit Management Letter will not be disclosed.

V. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

29. Due to readiness of the project, CGN has requested advance contracting and retroactive financing. This will include the procurement of goods. All advance contracting and retroactive financing will be undertaken in conformity with ADB's Procurement Guidelines (2013, as amended from time to time).²⁵ The amount to be retroactively financed will not exceed \$30 million (equivalent to 20% of the ADB loan) and finance costs may be incurred before loan

²³ ADB Policy on delayed submission of audited project financial statements:

- When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (i) the audit documents are overdue; and (ii) if they are not received within the next six months, requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed.
- When audited project financial statements have not been received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (i) inform the executing agency of ADB's actions; and (ii) advise that the loan may be suspended if the audit documents are not received within the next six months.
- When audited project financial statements have not been received within 12 months after the due date, ADB may suspend the loan.

²⁴ Available from <http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications>

²⁵ Available at: <http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf>

effectiveness but not more than 12 months before the signing of the loan agreement. The issuance of invitations to bid, under advance contracting and retroactive financing, will be subject to ADB approval. The borrower, CGN, and CGN-DSE have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project.

B. Procurement Plan

Project Information	
Country	People's Republic of China
Name of Borrower	People's Republic of China
Project Name	Qinghai Delingha Concentrating Solar Thermal Power
Loan Reference	46058
Date of Effectiveness	(TBD)
Amount	\$150 million
Executing Agencies	China General Nuclear Power Corporation
Approval Date of Original Procurement Plan	(TBD)
Approval of Most Recent Procurement Plan	(TBD)
Period Covered by this Plan	Q1 2014 – Q1 2015

30. All procurement of goods and works shall be carried out in accordance with ADB's Procurement Guidelines. Except as ADB may otherwise agree, the following process thresholds shall apply to procurement of goods and works. ADB-financed civil works contracts, costing \$10 million or more, and goods contracts costing \$1 million or more, will be procured through international competitive bidding procedures using ADB's standard bidding documents. Goods contract packages costing more than \$100,000 and less than \$1 million will be procured using national competitive bidding, as well as civil works contracts costing more than \$100,000 and less than \$10 million. Civil works and goods contract packages costing less than \$100,000 will be procured using shopping procedures. The relevant sections of ADB's Anticorruption Policy (1998, as amended to date) will be included in all documents and contracts.

Table 3: Procurement of Goods and Services

Method	Threshold	Prior or Post
ICB for Works	Equal to or more than \$10 million	Prior
ICB for Goods	Equal to or more than \$1 million	Prior
NCB for Works	Equal to or more than \$200,000 and less than \$10 million	Post ^a
NCB for Goods	Equal to or more than \$100,000 and less than \$1 million	Post ^a
Shopping Works	Less than \$200,000	Prior
Shopping Goods	Less than \$100,000	Prior

ICB = international competitive bidding, NCB = national competitive bidding.

^a The first NCB works and goods packages are required to have prior review by the Asian Development Bank.

31. The following table lists goods and works contracts to be funded by ADB, for which procurement activities are either ongoing or expected to commence within the next 18 months

Table 4: Goods and Works Contracts Estimates to Cost More Than \$1 Million

No.	Description	Value (\$ million)	Procurement Method	Anticipated Advertising Date	Prior Approval?	% of ADB loan
1	Solar field Equipment	68.50	ICB	Q1 2014	Yes	100%
2	Thermal Energy Storage	32.70	ICB	Q1 2014	Yes	100%
3	Heat Transfer Fluid and auxiliary equipment	26.18	ICB	Q2 2014	Yes	100%
4	Power Block equipment	18.50	ICB	Q1 2014	Yes	100%
Total of ADB loan		145.88				

ADB = Asian Development Bank, ICB = international competitive bidding.
Sources: CGN-SEDC and Asian Development Bank estimates.

32. The following table lists goods and works contracts to be fully funded by the executing agency and domestic loan, for which procurement activities are either ongoing or expected to commence within the next 18 months. For those, domestic procedure in the PRC will apply.

Table 5: Goods and Works Contracts Estimates to Cost More Than \$1 Million

No.	Description	Value (\$ million)	Procurement Method	Anticipated Advertising Date	Domestic Preference
1	Civil works	11.78	NCB	Q1 2014	-
2	Power Generation system	24.09	ICB	Q1 2014	Yes
3	Auxiliary equipment of solar field	31.31	ICB	Q1 2015	Yes
4	Auxiliary equipment for storage	8.75	ICB	Q1 2015	Yes
5	Distributed control system	1.65	ICB	Q2 2015	-
Total		77.58			

Sources: CGN-SEDC estimates.

C. National Competitive Bidding Guideline

33. The Borrower's *Law of Tendering and Bidding of the People's Republic of China* promulgated by Order No. 21 of the President of the People's Republic of China on August 30, 1999, are subject to the following clarifications required for compliance with the Guidelines:

- (i) All invitations to prequalify or to bid shall be advertised in the national press, or official gazette, or a free and open access website in the Borrower's country. Such advertisement shall be made in sufficient time for prospective bidders to obtain prequalification or bidding documents and prepare and submit their responses. In any event, a minimum preparation period of thirty (30) days shall be given. The preparation period shall count (a) from the date of advertisement, or (b) when the documents are available for issue, whichever date is later. The advertisement and the prequalification and bidding documents shall specify the deadline for such submission.
- (ii) Qualification requirements of bidders and the method of evaluating the qualification of each bidder shall be specified in detail in the bidding documents, and in the prequalification documents if the bidding is preceded by a prequalification process.

- (iii) If bidding is preceded by a prequalification process, all bidders that meet the qualification criteria set out in the prequalification document shall be allowed to bid and there shall be no limit on the number of pre-qualified bidders.
- (iv) All bidders shall be required to provide a performance security in an amount sufficient to protect the Borrower/Project Executing Agency in case of breach of contract by the contractor, and the bidding documents shall specify the required form and amount of such performance security.
- (v) Bidders shall be allowed to submit bids by mail or by hand.
- (vi) All bids shall be opened in public; all bidders shall be afforded an opportunity to be present (either in person or through their representatives) at the time of bid opening, but bidders shall not be required to be present at the bid opening.
- (vii) All bid evaluation criteria shall be disclosed in the bidding documents and quantified in monetary terms or expressed in the form of pass/fail requirements.
- (viii) No bid may be rejected solely on the basis that the bid price falls outside any standard contract estimate, or margin or bracket of average bids established by the Borrower/Project Executing Agency.
- (ix) Each contract shall be awarded to the lowest evaluated responsive bidder, that is, the bidder who meets the appropriate standards of capability and resources and whose bid has been determined (a) to be substantially responsive to the bidding documents and (b) to offer the lowest evaluated cost. The winning bidder shall not be required, as a condition of award, to undertake responsibilities for work not stipulated in the bidding documents or otherwise to modify the bid as originally submitted.
- (x) Each contract financed with the proceeds of the Loan shall provide that the suppliers and contractors shall permit ADB, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by ADB.
- (xi) Government owned enterprises in the Borrower's country may be permitted to bid if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law and (c) are not a dependent agency of the Borrower/Project Executing Agency.
- (xii) Re-bidding shall not be allowed solely because the number of bids is less than three (3).

VI. SAFEGUARDS

A. Land acquisition and ethnic minority.

34. Involuntary land acquisition under the project will affect the people of the Mongolian ethnic group, and land acquisition and ethnic minority development plan (LAEMDP) has been

prepared.²⁶ The project will permanently acquire 246 hectares of jointly contracted grass land with 50 year land usage rights since 1985, which belongs to 153 people from the 31 Mongolian ethnicity households. The land to be acquired is semi-arid unused land, which is 0.7% of the total grazing land area for grazing owned by the affected household and it causes no loss of income and fixed assets. All affected households are entitled a cash compensation for loss of land, and in-kind assistances which will provide employment opportunity during the construction and operation of the project, portable solar photovoltaic power generation sets and high insulation yurts (nomad tents), and livelihood skill development training. The implementing agency shall ensure that (i) LAEMDP is implemented in accordance with its terms and that compensation and in-kind assistance for affected people are carried out promptly and efficiently in accordance with the government's applicable laws and ADB's Safeguard Policy Statement (2009)²⁷; and (ii) implementation of LAEMDP is monitored, evaluated and reported to ADB semi-annually and publicly disclosed on ADB website and to affected persons. The implementing agency shall ensure continued consultation and information disclosure on LAEMDP activities during project implementation. Also, the implementing agency shall establish a culturally-appropriate grievance redress mechanism to receive and resolve complaints from affected persons on LAEMDP implementation.

35. If there is any change in scope, which may affect people by land acquisition, structure demolition, and involuntary resettlement, CGN-DSE is requested to inform ADB of the situation in advance through CGN-SEDC. CGN-DSE should prepare and submit an updated LAEMDP to ADB, through CGN-SEDC, for review and approval, in accordance with ADB's Safeguard Policy Statement (2009).²⁸

B. Environment

36. The project outcome will avoid 122,554 tons of coal usage for power generation per year, with associated emission reduction of 154,446 tons of carbon dioxide. The project is also designed to further lower the environmental footprint and address one of the core issues of water scarcity by adopting an air cooling system which will reduce the water consumption by 75% as compared with a conventional CSP plant with wet cooling system.²⁹ The potential adverse environmental impacts of the project include (i) soil erosion, noise, fugitive dust, solid waste and safety risks during construction; (ii) noise, solid waste and waste water, and leakage of synthetic oil HTF during operation. The initial environmental examination (IEE)³⁰ 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 socio economic benefits that significantly outweigh the potential negative impacts

37. CGN-DSE will be responsible for ensuring that the project to be designed, constructed, decommissioned, and operated should be in accordance with the national and local government environmental, health and safety laws, regulations, procedures, and guidelines, ADB's Safeguard Policy Statement; and the IEE including environmental monitoring plan (EMP). CGN-DSE holds the final responsibility for the implementation and compliance with the EMP, and the

²⁶ Land Acquisition and Ethnic Minority Development Plan (accessible from the list of linked documents in Appendix 2)

²⁷ ADB. 2009. *Safeguard Policy Statement*. Manila.

²⁸ ADB. 2009. *Safeguard Policy Statement*. Manila.

²⁹ 0.38 million cubic meters per year of water consumption is assumed for CSP with dry cooling, compared to 1.45 million cubic meters per year with wet cooling. Even though environment due diligence confirmed that water availability at the project location is sufficient enough to cover water consumption with wet cooling system, the project takes more careful approach to reduce water consumption by adopting dry cooling system.

³⁰ Initial Environmental Examination (accessible from the list of linked documents in Appendix 2).

submission of environmental safeguards monitoring reports (EMP monitoring reports). The nominated environment officer will undertake effective environmental management activities specified in the EMP. The effectiveness of mitigation measures will be evaluated through ADB review missions and EMP monitoring. The contractors will be responsible for internal environmental monitoring during construction. The environmental officer in CGN-DSE and the municipal environmental protection bureaus will be responsible for supervising the contractors. CGN-DSE is responsible for ensuring that the environmental mitigation measures in the EMP will be properly implemented. The environmental management unit, under the implementing agencies, will be responsible for the internal monitoring during operation.

38. CGN-DSE is responsible for preparing and submitting environmental safeguards monitoring reports (EMP monitoring reports) through CGN-SEDC to ADB semiannually during construction and annually during operation. The environment management plan with mitigation measures, monitoring plan, and institutional arrangements, will be updated during engineering design and incorporated in the bidding documents and civil works contracts. CGN shall make available, and cause CGN-DSE to make available, the necessary budgetary and human resources to fully implement the EMP. If any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the project that were not considered in the IEE and/or EMP, CGN-DSE through CGN-SEDC should promptly inform ADB in writing of the occurrence of such risks or impacts, with detailed description of the event and the proposed action plan for incorporation in the updated EMP.

39. Environmental or social grievances may occur during construction and operation. CGN-DSE agreed to establish a project public complaints unit (PPCU) in CGN-DSE under the supervision of its local environmental protection bureau. The PPCU will receive environmental grievances and act according to the designed environmental Grievance Redress Mechanism of the project. Procedures and timeframes for the grievance redress process are described in the IEE. CGN-DSE will provide training to the members of the PPCUs and the contact persons of the Grievance Redress Mechanism entry points to ensure that responsibilities and procedures are clear.

VII. GENDER AND SOCIAL DIMENSIONS

40. Since the project is designed to demonstrate the feasibility of a utility scale CSP and its electricity will be connected to the grid, the project design can not include gender features to directly enhance benefits to women and address gender equality or women's empowerment issues as the objective of Primary beneficiaries are the electricity users at the national level while the secondary beneficiaries are the people in the project city (Delingha city). The project area has rich salt and alkaline earth resources, and these related chemical industries are the backbone of Delingha's economy, which contribute more than 50% of the gross domestic product of the project city. One of the needs of local people including the poor is access to better employment opportunities in Delingha city. The local government requires diversifying its economy base and creating more employment opportunities for the local population. The local government recognizes that abundant rich solar resources available in the city can create new solar-based industry. This project is one of the first investments in the solar project in Delingha city, which contributes in diversifying the local economy base as well as creating 334 unskilled jobs annually during construction and 30 permanent jobs for operation and maintenance.

VIII. PERFORMANCE MONITORING, EVALUATION, REPORTING AND COMMUNICATION

A. Project Design and Monitoring Framework

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>Impact Expanded share of CSP in renewable energy mix in the PRC</p>	<p>Share of CSP increases to 3 GW by 2020 (baseline: 0 GW in 2013)</p> <p>CSP capacity avoids more than 5 million tons of CO₂ emissions per year by 2020</p>	<p>The statistical year book of the PRC</p>	<p>Assumptions The government remains committed to expand renewable energy.</p> <p>The government and private sector provide required investment in a timely manner.</p> <p>Risks The costs and reliability of CSP plants do not meet investors and policy makers' requirements.</p>
<p>Outcome Demonstrated feasibility and reliability of the utility-scale CSP plant with thermal storage system in Qinghai Province</p>	<p>50 MW Qinghai Delingha plant operates reliably delivering designed output (baseline: 0 MW in 2013)</p> <p>197 gigawatt-hours of clean electricity generated annually, thereby avoiding 154,446 tons of CO₂ per year by 2017 (baseline: 0 gigawatt-hours in 2013)</p>	<p>Electric power year book of the PRC</p>	<p>Assumptions The project operates reliably at design output.</p> <p>Offtake tariffs are adequate for the project, ensuring financial viability.</p> <p>Risks Poor performance of key equipment or contractors causing the plant to operate at less than design capacity.</p> <p>Less electricity generation as planned due to the uncertainty of direct solar irradiation.</p>
<p>Outputs 1. The construction of a first-of-its-kind utility-scale CSP plant in Qinghai Province constructed</p> <p>2. Capacity development and training in CSP construction,</p>	<p>50 MW parabolic trough CSP plant with 7 hours thermal storage capacity is commissioned and commercially operational by 2016 (baseline: 0 MW in 2013)</p> <p>Capacity development training provided in design, construction supervision, and</p>	<p>Electric power year book of the PRC</p> <p>Corporate annual report of China General Nuclear Power Corporation</p> <p>Design, construction, and operation and maintenance manuals</p>	<p>Assumption Grid connection agreement concluded in a timely manner.</p> <p>Procurement and construction works implemented as planned.</p> <p>Sufficient counterpart funds available.</p> <p>Adequate technical guidance in design and supervision, and operation and maintenance manuals are developed.</p>

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
and operation and management	operation and management for 50 counterpart engineers and operators by 2016	Project completion report	Trained counterpart staff are retained for design, supervision, and operation and maintenance stages.
Activities with Milestones <ol style="list-style-type: none"> 1. Construction of 50 MW parabolic trough CSP plant <ol style="list-style-type: none"> 1.1 Engineering design (Q4 2013–Q4 2014) 1.2 Bidding and contract awards (Q1 2014–Q2 2015) 1.3 Construction supervision (Q2 2014–Q4 2016) 1.4 Civil works (Q2 2014–Q2 2016) 1.5 Solar field system (Q3 2014–Q2 2016) 1.6 Heat transfer fluid system (Q3 2014–Q2 2016) 1.7 Thermal energy storage system (Q3 2014–Q2 2016) 1.8 Power generation system (Q2 2014–Q2 2016) 1.9 Test run (Q3–Q4 2016) 1.10 Commercial operation (Q4 2016) 1.11 Defect liability (Q1–Q4 2017) 2. Capacity development of counterpart engineers and operators <ol style="list-style-type: none"> 2.1 Design, construction, and operation and maintenance manuals (Q2–Q4 2015) 2.2 Training for engineers and operators of the implementing agency (Q1–Q4 2016) 2.3 Implementation of the environment and social safeguard actions (2014–2017) 		Inputs <p>ADB: \$150.0 million</p> <p>Export–Import Bank of China: \$75.58 million</p> <p>China General Nuclear Power Corporation: \$96.68 million</p> <p>Total: \$322.26 million</p>	

ADB = Asian Development Bank, CO₂ = carbon dioxide, CSP = concentrated solar thermal power, GW = gigawatt, MW = megawatt, PRC = People's Republic of China.

Source: Asian Development Bank estimates.

B. Monitoring

41. **Project performance monitoring** A project performance management system has been prepared, including a set of measurable indicators based on the project design, impact, and risks. The indicators include (i) annual electricity yield, (ii) CO₂ emission to be avoided, (iii) install capacity and thermal storage hours, and (iv) capacity development trainings for engineers and operators engaged during construction and test run. Performance in meeting the proposed indicators will be reported in the quarterly progress reports, the two environmental reports every year during construction and the annual environmental report during operation, and the semi-annual report on LAEMDP, as suitable. CGN-DSE will establish a safeguard management unit to coordinate the environmental and land acquisition (if any) management issues during construction and operation. The monitoring and evaluation system will include specific and measurable targets and identify key risks and institutional arrangements for effective monitoring. One month before the midterm review, CGN-DSE will submit to ADB a comprehensive report on each of these issues.

42. **Compliance with Major Loan Covenants**

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
Implementation Arrangement			
1. CGN, CGN-SEDC, CGN-DSE, and EXIM will ensure that the Project is implemented in accordance with the detailed arrangements set forth in the project administration manual (PAM). Any subsequent change to the PAM will become effective only after approval of such change by CGN, EXIM, and ADB. In the event of any discrepancy between the PAM and the Project Agreement, the provisions of the Project Agreement will prevail.	PA, Schedule, para. 1		
Environmental			
2. CGN, SGN-SEDC and CGN-DSE shall ensure, and cause other involved agencies to ensure, that the preparation, design, construction, implementation, operation and decommissioning of the Project, and that all Project facilities comply with (a) all applicable laws and regulations of the PRC relating to environment; (b) the Environmental Safeguards; and (c) all measures and requirements set forth in the IEE, the EMP, and any corrective or preventative actions (i) set forth in a Safeguards Monitoring Report, or (ii) as subsequently agreed between ADB and CGN.	PA, Schedule, para. 2		
Land Acquisition			
3. CGN, CGN-SEDC and CGN-DSE shall ensure that all land and all rights-of-way required for the Project are made available to the civil works contractor in a manner and within timeframes compliant with the Land Acquisition and Ethnic Minority Development Plan (LAEMDP) and all land acquisition and resettlement activities are implemented in compliance with (a) all applicable laws and regulations of the PRC relating to land acquisition and involuntary resettlement; (b) the Involuntary Resettlement Safeguards; and (c) all measures and requirements set forth in the LAEMDP, and any corrective or preventative actions (i) set forth in the Safeguards Monitoring Report, or (ii) as subsequently agreed between ADB and CGN.	PA, Schedule, para. 3		
4. Without limiting the application of the Involuntary Resettlement Safeguards or the LAEMDP, CGN, CGN-SEDC and CGN-DSE shall ensure , that no physical or economic displacement takes place in connection with their respective part of the Project until:	PA, Schedule, para. 4		

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
<p>(a) compensation and other entitlements have been provided to the displaced persons under Involuntary Resettlement Safeguards as described in and in accordance with the LAEMDP; and</p> <p>(b) a comprehensive income and livelihood restoration program has been established in accordance with the LAEMDP.</p>			
Ethnic Minorities			
<p>5. CGN, CGN-SEDC and CGN-DSE shall ensure that the preparation, design, construction, implementation and operation of the Project and all Project facilities comply with (a) all applicable laws and regulations of the PRC relating to indigenous peoples; (b) the Indigenous Peoples Safeguards; and (c) all measures and requirements set forth in the LAEMDP, and any corrective or preventative actions (i) set forth in the Safeguards Monitoring Report, or (ii) subsequently agreed between ADB and CGN.</p>	PA, Schedule, para. 5		
Applicability of ADB's Safeguard Policy			
<p>6. CGN, CGN-SEDC and CGN-DSE shall ensure that the provisions of the IEE, EMP and LAEMDP as well as any requirements under the Safeguard Policy Statement also apply to the portion of the Project to be financed by CGN and the EXIM.</p>	PA, Schedule, para. 6		
Human and Financial Resources to Implement Safeguards Requirements			
<p>7. CGN, CGN-SEDC and CGN-DSE shall make available, and cause CGN-DSE to make available, necessary budgetary and human resources to fully implement the EMP and the LAEMDP.</p>	PA, Schedule, para. 7		
Safeguards-Related Provisions in Bidding Documents and Civil Works Contracts			
<p>8. CGN-DSE shall ensure, that all bidding documents and civil works contracts contain provisions that require contractors to:</p> <p>(a) comply with the measures relevant to the contractor set forth in the IEE, the EMP and LAEMDP (to the extent they concern impacts on respective affected people under Environmental Safeguards, Involuntary Resettlement Safeguards and Indigenous Peoples Safeguards during construction), and any corrective or preventative actions (i) set forth in the Safeguards Monitoring Report, or (ii) as</p>	PA, Schedule, para. 8		

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
<p>subsequently agreed between ADB and CGN;</p> <p>(b) make available a budget for all such environmental and social measures;</p> <p>(c) provide CGN-DSE with a written notice of any unanticipated environmental, resettlement or social risks or impacts that arise during construction, implementation or operation of the project that were not considered in the IEE, the EMP and the LAEMDP; and</p> <p>(d) reinstate pathways and other local infrastructure to at least their pre-Project condition as soon as possible and no later than the completion of construction.</p>			
Safeguards Monitoring and Reporting			
<p>9. CGN, CGN-SEDC and CGN-DSE shall do, or cause the CGN-DSE to do, the following:</p> <p>(a) submit a Safeguards Monitoring Reports to ADB:</p> <p>(i) in respect of implementation of and compliance with the Environmental Safeguards and the EMP, annually during construction and the implementation of the Project and the EMP until the issuance of ADB's Project completion report unless a longer period is agreed in the EMP; and</p> <p>(ii) in respect of the implementation of and compliance with the Involuntary Resettlement Safeguards and Indigenous Peoples, Safeguards and LAEMDP, semi-annually during the implementation of the Project, the LAEMDP until the issuance of ADB's Project completion report unless a longer period is agreed in the LAEMDP</p> <p>(iii) and disclose relevant information from such reports to respective affected people under Environmental Safeguards, Involuntary Resettlement Safeguards and Indigenous Peoples Safeguards promptly upon submission;</p>	PA, Schedule, para. 9		

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
<p>(b) if any unanticipated environmental and/or social risks and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP and the LAEMDP, promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan; and</p> <p>(c) report any actual or potential breach of compliance with the measures and requirements set forth in the EMP or the LAEMDP promptly after becoming aware of the breach</p>			
Safeguards - Prohibited List of Investments			
<p>10. CGN, CGN-SEDC, CGN-DSE and EXIM shall ensure that no proceeds of the Loan are used to finance any activity included in the list of prohibited investment activities provided in Appendix 5 of the Safeguards Policy Statement.</p>	PA, Schedule, para. 10		
Civil Works Contracts			
<p>11. CGN-DSE shall ensure that civil works contracts include provisions to require the contractors (a) not to discriminate against people seeking work on the basis of age, provided they are capable of doing such work; (b) to provide equal pay for equal work, regardless of gender or ethnicity; (c) to comply with core labor standards and the applicable labor laws and regulations, including stipulations related to employment, such as health, safety, welfare, the workers' rights and anti-trafficking laws; (d) not to force the labor to work against their will; and (f) not to employ child labor.</p> <p>12. CGN-DSE shall ensure that the civil works contractors (a) implement HIV/AIDS and STIs awareness and prevention training for all employees; (b) provide necessary measures to ensure the safety and health of their employees; and (c) together with the local centers of disease control, disseminate information on the risks, hazards, impacts and prevention know-how on HIV/AIDS and STIs among the staff, workers on the construction sites and the local community by means of information disclosure, education and consultation.</p>	PA, Schedule, para. 11		
Counterpart Funding			
12. CGN and CGN-SEDC shall cause CGN-DSE to,	PA, Schedule,		

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
and CGN-DSE shall, provide counterpart funding in a timely manner, including any additional counterpart funding required for any shortfall of funds or cost overruns. CGN will also cause CGN-DSE to ensure that O&M of all Project facilities is fully funded without any delay.	para. 13		
Financial Management			
<p>13. CGN and CGN-SEDC shall cause CGN-DSE to, and CGN-DSE shall, develop and maintain sound financial management systems in accordance with ADB's Financial Management and Analysis of Projects, including the establishment of separate Project accounts and the maintenance of minimum balances to ensure smooth cash flow and the timely settlement of project construction liabilities and future debt servicing. In particular, CGN-DSE shall maintain (a) a debt service coverage ratio of at least 1.2 times, and (b) a long-term debt-to-equity ratio of at least 80:20.</p> <p>14. If, in the opinion of ADB, it appears that CGN-DSE cannot meet the requirements set forth in paragraph 14 above or cannot or cannot meet any debt service obligations, CGN shall take appropriate measures for CGN-DSE to strengthen its financial management systems, including, but not limited to, provision of necessary financing to CGN-DSE.</p>	PA, Schedule, para. 14		
Operation and Maintenance			
15. CGN and CGN-SEDC shall cause CGN-DSE to, and CGN-DSE shall, enter into the performance based O&M contract with an O&M contractor for the first two years of commercial operation of the CSP plant in accordance with the Section XI. B of the PAM. In particular, such O&M contract will include O&M training for operators from CGN-DSE.	PA, Schedule, para. 16		
Design and Construction Quality and Management			
16. CGN and CGN-SEDC shall cause CGN-DSE to, and CGN-DSE shall ensure that the owner's engineer is engaged in accordance with Section XI. A of the PAM and will (a) assist CGN-DSE in engineering design, tender document preparation, bid evaluation, construction supervision, and test run, and (b) provide CGN-DSE with design and construction supervision training. Such owner's engineer shall have experiences in engineering design and construction supervision for similar parabolic trough CSP. Prior to engaging the owner's engineer, CGN will cause CGN-DSE to submit the name and qualifications of the proposed	PA, Schedule, para. 17		

Project Specific Covenants	Reference	Due Date	Status/Action to be Taken
owner's engineer to ADB for its concurrence.			
Governance and Anticorruption			
17. CGN, CGN-SEDC, CGN-DSE and EXIM (a) acknowledges ADB's right to investigate, directly or through its agents, any alleged corrupt, fraudulent, collusive or coercive practices relating to the Project; and (b) agrees to cooperate, and shall cause all other government offices, organizations and entities involved in implementing the Project to cooperate, fully with any such investigation and to extend all necessary assistance, including providing access to all relevant books and records, as may be necessary for the satisfactory completion of any such investigation. In particular, CGN, CGN-SEDC, CGN-DSE and EXIM, shall ensure, or cause to be ensured, that (a) periodic inspections of the Project contractors' activities related to fund withdrawals and settlements are carried out; (b) relevant provisions of ADB's Anticorruption Policy (1998, as amended to date) are included in all bidding documents for the Project; and (c) contracts, financed under the Project, include provisions specifying the right of ADB to audit and examine the records and accounts of CGN, CGN-SEDC, CGN-DSE, EXIM, contractors, suppliers, consultants, and other service providers as they relate to the Project.	PA, Schedule, para. 18		
Change in Ownership			
18. In the event of (a) any change in ownership of the Project facilities, or (b) any sale, transfer or assignment of shares or interest or other change of control in CGN, CGN-SEDC or CGN-DSE is anticipated, CGN, CGN-SEDC and CGN-DSE, as the case may be, shall consult with ADB and EXIM at least 6 months prior to the implementation of such change. CGN, CGN-SEDC and CGN-DSE, as the case may be, shall ensure that such change be carried out in a lawful and transparent matter. CGN, CGN-SEDC and CGN-DSE, as the case may be, shall further ensure that their new controlling management complies with (a) all Project related agreements executed between ADB and the Borrower, CGN, CGN-SEDC, CGN-DSE, or EXIM; and (b) the policies of ADB relevant to the Project.	PA, Schedule, para. 19		
Condition for disbursement			
19. Withdrawal from the Loan account is conditional upon the execution of all the subsidiary loan agreements and onlending agreements satisfactory to ADB.			

C. Evaluation

43. ADB will undertake annual project reviews between 2013 and 2017. Additionally, ADB, CGN, and CGN-DSE will undertake a midterm review of the project in 2015, covering all institutional, administrative, organizational, technical, environmental, social, poverty reduction, resettlement, economic, financial, procurement, and other relevant aspects that may have an impact on the performance of the project and its continuing viability. The review will (i) examine the progress in sector reform; (ii) evaluate environment, social, and poverty impact; (iii) ensure compliance with assurances in the loan agreement; and (iv) evaluate effectiveness of the procurement implementation activities of the executing agency and tendering company using procurement review for effective implementation evaluation. The review shall also undertake a comprehensive review of potential loan savings, identify areas for reallocation of loan proceeds, and change disbursement percentages, as appropriate. Within 6 months of physical completion of the project, CGN-DSE will submit a project completion report to ADB.³¹

D. Reporting

44. The CGN-DSE will provide ADB with (i) quarterly progress reports in a format consistent with ADB's project performance reporting system; (ii) consolidated annual reports including (a) the use of the loan proceeds, (b) progress achieved by output as measured through the indicator's performance targets, (c) key implementation issues and solutions, (d) updated procurement plan, and (e) updated implementation plan for next 12 months; and (iii) a project completion report within 6 months of completion of the project. To ensure projects continue to be both viable and sustainable, project accounts and annual financial statement for the executing agency and for the implementing agency, together with the associated auditor's report, should be adequately reviewed and submitted to ADB within 6 months after the end of fiscal year. In addition, CGN-DSE will also submit environmental monitoring reports every (i) 6 months during construction and annually during operation, and (ii) land acquisition and ethnic minority monitoring reports every six months during implementation of land acquisition in which the first report will be due shortly after land transfer, and every six months during construction to evaluate the impacts of the project on the livelihoods and lifestyles of the affected village and ensure there are no remaining issues. Table 6 summarizes the key reporting requirements during project implementation.

Table 6: Summary of Key Reporting Requirements During Implementation

Name of Report/Document	Timing of Reporting
Quarterly progress reports on project implementation, with the fourth quarter reports serving as the annual reports for the years concerned	Every 3 months until loan completion
Safeguards (EMP) monitoring reports -environmental monitoring report -LAEMDP monitoring report	Until the loan completion -every 6 months during project construction and annually during operation; -every 6 months
Audited financial statements and audited project accounts, Auditor's report (including auditor's opinion) on statement of expenditures	Before 30 June of each year from 2013 throughout the implementation period
Project completion report	Within 6 months after project and loan completion

Source: Asian Development Bank guidelines.

³¹ Project completion report format is available at: <http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar>

E. Stakeholder Communication Strategy

45. The Stakeholder Communications Strategy is described in Table 7. ADB and CGN-DSE will disclose all relevant project information. At the minimum, this includes all information regarding the bidding process, bidders, contract awards, use of funds disbursed under the Project, environment and social safeguard monitoring, and physical progress.

Table 7: Stakeholder Communication Strategy

Information	Means of Communication	Responsibility	Audience	Frequency
Report and Recommendation of the President (RRP) with links to relevant documents	ADB Website	ADB	ADB, Government of PRC, Chinese Civil Society and individuals	Once
Project information during design and construction phase	stakeholder consultations and public notice board	CGN-DSE	Project beneficiaries	Regular intervals during design and construction phase
EMP monitoring report	ADB Website	ADB	Affected people and other interested stakeholders	Semi-annual
Information on LAEMDP activities	Stakeholder consultation and public notice board	CGN-DSE	Affected people and other interested stakeholders	All the time
LAEMDP monitoring report	ADB Website	ADB	Affected people and other interested stakeholders	Semi-annual
Project Performance Reports and Project Information Documents	ADB Website	ADB	ADB, Government of PRC, Chinese Civil Society and individuals	Quarterly
Quarterly progress reports	ADB Website	ADB	ADB, Government of PRC, Chinese Civil Society and individuals	Quarterly
Project Completion Report	ADB Website	ADB	ADB, Government of PRC, Chinese Civil Society and individuals	Once

Source: Asian Development Bank and CGN-DSE.

ADB=Asian Development Bank, CGN-DSE=CGN Delingha Solar Energy Co. Ltd. executing agency, EMP=Environmental Management Plan, LAEMDP=Land Acquisition and Ethnic Minority Development Plan.

IX. ANTICORRUPTION POLICY

46. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the Project.³² All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all Project contractors, suppliers, consultants and other service providers. Individuals and entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the Project.³³

³² Available at: <http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf>.

³³ ADB's Integrity Office web site is available at: <http://www.adb.org/integrity/unit.asp>.

47. To support these efforts, relevant provisions are included in the loan agreement and the bidding documents for the project. For the project, the executing agency will undertake anticorruption actions, including (i) causing CGN-SEDC to review and endorse the procurement process of goods and services and the engagement of owner's engineers; and (ii) having full time officials from CGN-SEDC review bidding, construction, and operations, as well as conduct periodic inspection of the contractors' activities related to fund withdrawals and settlements.

X. ACCOUNTABILITY MECHANISM

48. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.³⁴

XI. ENHANCED RISK MITIGATION MEASURES

A. Engagement of Owner's Engineer

49. The owners engineer (OE) is an independent third party representing CGN-DSE, the implementing agency at the stage of engineering design, construction, and test run. The OE carries out its own duties to control quality of engineering design and construction to ensure the designed performance of the project. The OE shall obtain inputs and guidance from CGN-DSE throughout the entire design and construction process to check adherence to the technical specification, applicable codes and standards, as well as to verify the proper balance between safety, maintainability, and reliability. In addition, the OE shall also supervise the contractor's work in progress and evaluate performance.

50. The selected OE should have more than 10 years of international experience in engineering design, construction supervision, and test run for CSP power plants having similar complexity and system configuration of the project. The OE will undertake but not limited to the following activities:

- (i) **Engineering Design.** Conduct holistic engineering design review including solar field, heat transfer fluid (HTF) system, thermal energy storage (TES) system, and power block. Engineering design review includes the process flow diagrams, process and instrumentation diagram, electrical lines to validate process design and technical specifications. Conduct construction drawing review including geotechnical assessment, electrical interfaces, piping interfaces, materials, control interfacing, and foundation. Guide and instruct the domestic design institute for corrective actions or design and drawings revision where necessary.
- (ii) **Control and construction documents review.** Review control and construction documents for solar field, HTF system, TES system, and power block which will be prepared by contractors to verify compliance with design specification, applicable

³⁴ For further information see: <http://www.adb.org/Accountability-Mechanism/default.asp>.

code and standard, and contracts. Guide and instruct the contract for corrective actions for control and construction documents where necessary.

- (iii) **Procurement support.** Assist CGN-DSE and the engaged tendering company in defining bidder' qualification, reviewing technical parts of tender documents in view of compliance with engineering design, evaluating bidding documents, and contract negotiation. Bill of quantity check, request for variation, and invoice check shall be primarily assessed and endorsed by the OE prior to CGN-DSE approval.
- (iv) **Construction supervision.** Conduct construction supervision which includes (a) construction and schedule monitoring in accordance with control and construction documents, and contracts, (b) cost oversight including variation order processing, (c) coordinate and control activities among various contractors, and (d) joint inspection with contractors to assess correctness and completeness of facilities constructed and acceptability for initial pre-commissioning test.
- (v) **Test run and final acceptance.** Develop initial pre-commissioning, test run, and final acceptance procedure and support CGN-DSE to conduct pre-commissioning test, test run, and final acceptance to verify compliance with functional guarantee of equipment and the designed performance of the plant.
- (vi) **Capacity development trainings.** Develop engineering design, construction supervision, test run and final acceptance manuals and provide CGN-DSE with on-the-job trainings throughout implementation of the project.

B. Performance based O&M contract Guideline

51. The first and second years of commercial operation will be a critical stage in its operation. The performance based O&M contract during the first and the second years of commercial operation, engaging international experts for key positions, will (i) mitigate the plant operation risk during the initial project start-up, and (ii) provide capacity development training for the plant operators from CGN-DSE, to achieve designed project performance and develop cost-effective O&M system.

52. The O&M contractor is responsible for all operation, repair, and maintenance services for the project, under fixed fee O&M contract. The O&M contract should be effective 6 months before the project commercial operation date, to ensure seamless transition from the test run.

53. The selected O&M contractor should have more than 2 years of relevant experience in providing comprehensive O&M services for CSP power plants having similar complexity and system configuration of the project. Key O&M officer, specifically a chief engineering officer acting as the plant manager, must have proven long term experience in operation and maintenance for such CSP plants. The O&M contractor will undertake but not limited to the following activities:

- (i) **Operation procedure.** Develop the plant operation procedure in warm-up and start-up mode, day time mode, and shut-down and night mode. These include charge-discharge procedure of TES, freezing protection procedure including natural gas boiler operation, HTF temperature and flow rate monitoring, and saturated steam flow, pressure and temperature monitoring.

- (ii) **Maintenance procedure.** Develop the plant maintenance procedure which includes scheduled maintenance, preventive maintenance, and annual overhauls. To maintain the plant performance, the following activities should be included in maintenance procedure: (a) solar field mirror washing and reflectivity measurement (including replacement), (b) heat collector element (HCE) inspection and replacement, (c) piping system (including HTF pumps and valves) inspection and repair, (d) detection of HTF leakage and repair, (e) maintenance of instruments and wiring in the solar field, (e) and weather station maintenance and metrological data monitoring.
- (iii) **Building O&M unit and capacity development training.** Develop an O&M unit organization structure, staffing plan, and shifting schedule in accordance with O&M procedure. Chief engineering officer of the O&M contractor acting as the plant manager will lead the O&M unit based upon the performance of the O&M contract. Provide trainings for O&M officers from CGN-DSE to ensure a smooth transition of O&M after the second year of commercial operation.
- (iv) **Maintenance information management system.** Develop a maintenance information management system which integrates various maintenance information and activities covering corrective and preventive work orders, equipment and material purchase orders, spare parts stock requests, manpower planning and scheduling, inventory accounting, warehouse management, and overall project accounting.

XII. RECORD OF PAM CHANGES

54. All revisions/updates during the course of implementation should be retained in this section to provide a chronological history of changes to implemented arrangements recorded in the PAM.

Dates	PAM Changes
17 May, 2013	The first PAM draft was explained and jointly reviewed with CGN, CGN-SEDC, CGN-DSE, and China Exim Bank.
22 October, 2013	The revised draft was discussed and agreed with CGN, CGN-SEDC, CGN-DSE, and China Exim Bank.