Project Administration Manual

Project Number: 47052-002
November 2014

People's Republic of China: Low-Carbon District Heating Project in Hohhot in Inner Mongolia Autonomous Region

CONTENTS

ABBREVIATIONS

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 the 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.

The Government of Inner Mongolia Autonomous Region (GIMAR), the executing agency, and Hohhot Chengfa Heating Company (HCHC), the implementing agency, are wholly responsible for the implementation of ADB financed projects, 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 the implementation including compliance by the GIMAR and the HCHC of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At the loan negotiations, the borrower and ADB have agreed to the PAM and it ensures consistency with the PRC (47052): Low-Carbon District Heating Project in Hohhot City in Inner Mongolia Autonomous Region[1] agreement. 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, 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.

[1] The name of the operational financing document may vary on a project to project basis; this reference shall be deemed to encompass such variations, e.g., a Framework Financing Agreement, as applicable.

ABBREVIATIONS

ADB	=	Asian Development Bank
DRC	=	Development and Reform Commission
EHSU	=	environment, health and safety unit
EHSS	=	Environment, Health and Safety Specialist
EIA	=	environmental impact assessment
EMP	=	environmental management plan
EMS	=	environmental monitoring stations
EPB	=	Environmental Protection Bureau
FB	=	Finance Bureau
GIMAR	=	Government of Inner Mongolia Autonomous Region
GHG	=	greenhouse gas
GRM	=	grievance redress mechanism
HCDIO	=	Hohhot City Development, Investment and Operation Company
HCHC	=	Hohhot Chengfa Heating Company
HES	=	heat-exchange station
HMG	=	Hohhot Municipal Government
HSP	=	heating source plant
ICB	=	international competitive bidding
IMAR	=	Inner Mongolia Autonomous Region
LIEC	=	Loan Implementation Environment Consultant
MOF	=	Ministry of Finance
NDRC	=	National Development and Reform Commission
PCR	=	project completion report
PRC	=	People's Republic of China
PMO	=	project management office
SCADA	=	supervisory control and data acquisition
SOE	=	statement of expenditure

I. PROJECT DESCRIPTION

A. Background and Rationale

1. The Inner Mongolia Autonomous Region (IMAR) is located in a severe cold climate zone of the People's Republic of China (PRC), where winter temperatures can drop to as low as –40 °C and subzero temperatures typically last for 6 months of the year. Thus, adequate heating is a basic human need and essential for socioeconomic activities. Coal has been the predominant fuel for heating in IMAR, contributing to indoor and outdoor air pollution and undermining human health. A district heating system with a centralized plant and a network of distribution pipes to provide space heating and hot water is one of the most energy-efficient and least-polluting heating modes in urban areas. Such a system allows heat sources to be located away from densely populated areas and has the flexibility to use a wide range of energy sources. As rapid urbanization increases the demand for heating, heavy use of coal-based district heating will worsen air quality, especially in large urban areas such as Hohhot. Switching to a low-emission fossil fuel, such as natural gas, and emission-free renewable energy is urgently needed.

2. Hohhot has the highest concentration of urban residents in IMAR. About 10% of IMAR's total population resides in the city. As urbanization and population growth increase heating demand, Hohhot faces critical gaps in its heating infrastructure. As of 2013, district heating covered only 86.8 million square meters (m^2) of floor area; existing isolated, decrepit, and inefficient heating systems for an additional 42.0 million m^2 of floor area need to be replaced. The hazy skies above Hohhot already have a high concentration of inhalable particulate matter during winter.[1] Through a decree issued in 2013, the Hohhot municipal government (HMG) promoted the use of natural gas to meet the growing energy demand and address associated environmental and health concerns. The decree includes (i) a natural gas subsidy for residential heating, and (ii) financial support to heating operators that replace small coal-fired neighborhood boilers with natural gas boilers in central business districts. Compared with coal, natural gas emits half as much carbon dioxide, a fraction of particulate matter and nitrogen oxides (NO_X), and negligible sulfur oxides. Since the decree was issued, HMG has provided CNY230 million in subsidies for natural gas use and switching from coal to gas boilers. The HMG policy to promote natural gas in district heating is aligned with the central government's 2013 Air Pollution Prevention Act, which requires all prefecture-level cities like Hohhot to reduce inhalable particulate matter by 10% in 2017 compared with 2012 levels.

3. IMAR is a resource-rich province. In addition to being the PRC's top coal-producing province,[2] IMAR has large reserves of natural gas[3] and excellent solar and wind energy resources. In 2013, IMAR reached 18 gigawatts of installed wind power capacity, equivalent to 25% of the total installed wind power capacity in the PRC. The Government of IMAR (GIMAR) plans to increase installed wind capacity up to 50 gigawatts by 2020. IMAR prioritizes combined heat and power plants to meet the electricity and heat demand, rather than electricity-only wind power plants. As a result, many wind farms are forced to disconnect from the grid, particularly at night during the winter when power demand is low but wind power generation is high. In 2013, about 11.3 terawatt-hours of wind power generation was curtailed in IMAR.

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[1] Inhalable particulate matter refers to particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$). In January 2014, Hohhot recorded 81–95 micrograms per cubic meter (m^3) of daily $PM_{2.5}$, more than three times higher than the 25 micrograms per m^3 recommended by the World Health Organization.

[2] IMAR is the top coal-producing province, followed by Shanxi and Shaanxi. IMAR produced 1,062 million tons in 2012, accounting for 30% of the PRC's total coal production (3,549 million tons).

[3] IMAR has about 834.4 billion m^3 of natural gas, equivalent to 19% of the total natural gas reserves in the PRC. According to the Statistics Bureau of the PRC, the proven natural gas reserves in the PRC total 4.4 trillion m^3.

4. The National Energy Administration in the PRC issued a policy notice in 2013 strongly encouraging the use of curtailed wind power for district heating, which requires high energy use at night during the winter. Both the GIMAR and HMG are keen to pilot the use of curtailed wind power for district heating, taking into consideration that the current curtailed wind power in IMAR could meet the heating demand up to about 100 million m^2 of floor area and contribute to better air quality in the winter by eliminating hazardous emissions from coal-based heating systems. Yet, IMAR currently does not have a business model for using the curtailed wind energy for district heating and needs to gain more insights into the technical and economic challenges before wider deployment. The proposed project will demonstrate a large-scale low-emission and low-carbon district heating system using wind power and natural gas. Because of its easy access to sufficient natural gas and excess wind power, Hohhot is an appropriate choice to demonstrate such heating system. If successful, it can be replicated in IMAR and elsewhere in the PRC's northern provinces.

5. The Asian Development Bank (ADB) has supported two other projects in IMAR to provide energy-efficient district heating.[4] The Hohhot project is a logical next step to improve energy efficiency and reduce emissions from such projects through advanced natural gas boiler technology. The project will also pilot a new business model [This information has been removed as it falls within exceptions to disclosure specified in paragraph 97, (v) of ADB's Public Communications Policy (2011)]. The project is closely aligned with the Midterm Review of Strategy 2020, which identifies environmentally sustainable growth as a priority for helping developing member countries move onto a low-carbon growth path by improving energy efficiency and expanding renewable energy.[5] The project also supports the goal of ADB's Energy Policy, which prioritizes energy efficiency and access to energy for all, including district heating.[6] It is aligned with ADB's country partnership strategy, 2011–2015 for the PRC, which identifies environmental sustainability as one of the three pillars of ADB assistance.[7]

B. Impact, Outcome, and Outputs

6. The impact will be improved energy efficiency and a cleaner environment in IMAR. The outcome will be improved air quality and reduced greenhouse gas emissions in Hohhot. The outputs will be (i) district heating coverage expanded, (ii) low-carbon and highly efficient heat-generation system installed, and (iii) a new business model for wind-based district heating piloted.

7. The project will install (i) low-emission natural gas boilers, (ii) wind-powered electric boilers with zero emissions, (iii) energy-efficient heat exchange stations, (iv) insulated heating pipelines, and (v) a distribution control and data management system to optimize system operation. The project covers three heating zones (Jinqiao, Xinjiaying, and Haoqingying) in Saihan and Xincheng districts in the eastern part of Hohhot. About 61,000 households in these areas are currently connected to 50 small and inefficient coal-fired boilers (equivalent to 158 megawatts thermal), and more than 210,500 households are using coal-fired heating stoves without any emission control. After completion, the project will avoid 848,500 tons of standard

[4] ADB. 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Inner Mongolia Autonomous Region Environment Improvement Project*. Manila; and ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Inner Mongolia Autonomous Region Environment Improvement Project (Phase 2)*. Manila.

[5] ADB. 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific*. Manila.

[6] ADB. 2009. *Energy Policy*. Manila.

[7] ADB. 2012. *Country Partnership Strategy: People's Republic of China, 2011–2015*. Manila.

coal, and will emit 60% less carbon dioxide, 82% less NO_X, negligible particulate matters, and 98% less sulfur dioxide compared with the existing heating supply. The project will achieve energy efficiency of 0.5 gigajoule/m^2, which is 17% more efficient than the average IMAR district heating system.[8] Table 1 summarizes the project's key features in the three heating zones.

Table 1: Key Features and Heating Zones of the Project

Item	Heating Zone Unit	Jinqiao Natural Gas	Xinjiaying Natural Gas	Haoqingying Natural Gas	Haoqingying Wind Power[a]	Total
Heating areas	million m^2	9.5	8.8	10.4	1.0	29.7
Heat source capacity	MWt	490	490	580	50	1,610
Heating pipe network	km	17.1	26.0	30.7		73.8
Heat exchange stations	set	45	48	87[b]		180

m^2 = square meter, MWt = megawatt thermal, km = kilometer.

[a] Wind-powered electric boilers are piloted only in the Haoqingying heating zone because the availability of a suitable power transmission line for electric boilers makes incremental costs lower.

[b] Eleven out of 87 are building-level heat exchange stations, which are more energy efficient.

Sources: Domestic feasibility study reports commissioned by from Hohhot City Development, Investment, and Operation Company (2012).

8. The project will also pilot a new business model for district heating that benefits three key stakeholders—wind farms, the district heating company, and the grid company.[9] [This information has been removed as it falls within exceptions to disclosure specified in paragraph 97, (v) of ADB's Public Communications Policy (2011)], the new business model will enable (i) wind farms to sell surplus wind energy for district heating, (ii) the heating company to buy wind energy at an affordable cost, and (iii) the grid company to cover wheeling charges for transmitting the additional wind power. This business model will benefit IMAR environmentally, socially, and economically by improving air quality, reducing health risks, and using surplus wind power that would otherwise have been wasted. The successful demonstration of this business model in Hohhot will provide lessons and guidance to other major cities in IMAR and other northern provinces that might want to replicate this approach because of similar conditions. The successful demonstration is also expected to lead to a new policy promoting wind power utilization for heating in northern PRC, thereby reducing curtailment of abundant wind power.

[8] The energy intensity of district heating in IMAR is 0.60 gigajoule/m^2 (GJ/m^2), which is higher than the PRC average of 0.57 GJ/m^2 because of the longer heating days and colder outdoor temperature.

[9] New Business Model under the Project (accessible from the list of linked documents in Appendix 2). The business model enables the heating company to purchase wind energy at an affordable cost of [This information has been removed as it falls within exceptions to disclosure specified in paragraph 97, (v) of ADB's Public Communications Policy (2011)].

II. IMPLEMENTATION PLANS

A. Project Readiness Activities

Indicative Activities	2014						2015					Who is responsible
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Establishing project management office												GIMAR, HCDIO, HCHC
MRM												ADB
FSR approval[a]												GIMAR
Engaging a tendering agency[b]												GIMAR (IMAR FB), HCDIO, HCHC
Advance contracting actions												HCDIO, HCHC, ADB
Retroactive financing actions												HCDIO, HCHC, GIMAR, ADB
Submission of FCUP												HCDIO, HCHC, IMAR DRC
Submission of Financial evaluation opinion												IMAR FB
Approval of FCUP												NDRC
Submission of Loan Negotiation Application												GIMAR, MOF, NDRC
State Council approval for loan negotiation												State Council
Loan Negotiation												MOF, NDRC, ADB
ADB Board consideration												ADB
Loan signing												MOF, ADB
Government legal opinion provided												MOF, GIMAR
Loan effectiveness												MOF, ADB

ADB = Asian Development Bank, FCUP = foreign capital utilization report, FSR = feasibility study report, GIMAR = Government of Inner Mongolia Autonomous Region, HCDIO = Hohhot City Development, Investment and Operation Company, HCHC = Hohhot Chengfa Heating Company, IMAR DRC = Inner Mongolia Autonomous Region Development and Reform Commission, IMAR FB = Inner Mongolia Autonomous Region Finance Bureau, MOF = Ministry of Finance, MRM = Management Review Meeting, NDRC = National Development and Reform Commission.

[a] One week after ADB's Management Review Meeting, the FSR can be approved by the GIMAR (IMAR DRC).

[b] Within 2 weeks after the feasibility study report approval, a tendering agency will be engaged.

B. Overall Project Implementation Plan

Item	2014		2015				2016				2017				2018				2019				2020				2021	
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
1. Jinqiao District Heating Zone																												
a. Preliminary design and approval																												
b. Detailed design and approval																												
c. Tender document preparation																												
d. Tender invitation, assessment, and contract award																												
e. Civil work construction of HSP																												
f. Civil work construction of HESs																												
g. Installation of boilers and auxiliary equipment																												
h. Installation of pipelines																												
i. Installation of HES equipment and SCADA																												
j. Testing and commissioning																												
2. Haoqingying District Heating Zone																												
a. Preliminary design and approval																												
b. Detailed design and approval																												
c. Tender document preparation																												
d. Tender invitation, assessment, and contract award																												
e. Civil work construction of HSP																												
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g. Installation of boilers and auxiliary equipment																												
h. Installation of pipelines																												
i. Installation of HES equipment and SCADA																												

Item	2014		2015				2016				2017				2018				2019				2020				2021	
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
j. Testing and commissioning																												
3. Xinjiaying District Heating Zone																												
a. Preliminary design and approval																												
b. Detailed design and approval																												
c. Tender document preparation																												
d. Tender invitation, assessment, and contract award																												
e. Civil work construction of HSP																												
f. Civil work construction of HESs																												
g. Installation of boilers and auxiliary equipment																												
h. Installation of pipelines																												
i. Installation of HES equipment and SCADA																												
j. Testing and commissioning																												
4. Management Activities																												
a. Consultant selection procedures																												
b. Labor retrenchment and reemployment plan																												
c. Environmental management plan and environmental monitoring plan																												
d. Annual/Midterm review																												
e. Project completion report																												

HES = heat exchange station, HSP = heating source plant, SCADA = supervisory control and data acquisition.

III. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Stakeholders—Management Roles and Responsibilities

Project Stakeholders	Management Roles and Responsibilities
Executing Agency Government of Inner Mongolia Autonomous Region (GIMAR), which consists of IMAR FB and IMAR DRC	• Provide overall guidance during preparation and implementation. • Ensure counterpart contributions are in place for project implementation on time. • Establish and maintain the imprest account. • Review and approve bidding documents, bid evaluation reports, contracts, and other necessary documents. • Submit withdrawal applications to ADB. • Sign onlending agreement with HMG.
Hohhot Municipal Government, Hohhot Finance Bureau	• Sign onlending agreements with GIMAR and HCDIO
Hohhot City Development, Investment, and Operation Company (HCDIO, better known as Chengfa Company)	• Sign onlending agreement with HMG. • Sign loan agreement with Shanghai Pudong Development Bank. • Sign onlending agreement with HCHC and make the ADB loan available to HCHC on the same condition. • Coordinate with all involved parties, including wind power companies, grid company, government agencies, and ADB for the project processing and implementation. • Provide advice and supervision to HCHC to ensure timely and smooth project implementation and good governance. • Review quarterly progress reports from HCHC and submit them to ADB. • Submit bidding documents, bid evaluation reports, contracts, and other necessary documents to IMAR FB, and upon the approval of IMAR FB, submit them to ADB for approval. • Prepare withdrawal applications and submit them to ADB through GIMAR (IMAR FB). • Cooperate with auditors to ensure timely submission of their reports to ADB. • Review environmental monitoring reports and submit them to ADB. • Provide project procurement service on behalf of HCHC, including awarding and managing contracts. • Engage a design institute to complete the preliminary and detailed engineering designs. • Engage a procurement agency. • Engage project management consulting service. • Engage external environmental monitoring stations.
Implementing Agency Hohhot Chengfa Heating Company **Project Management Office** established at HCHC, jointly with HCDIO	• Responsible for project implementation and in charge of all day-to-day management work during project preparation and implementation period. • Ensure environment and social safeguards compliance. • Ensure EMP is properly implemented. • Prepare quarterly progress reports and submit them to ADB through HCDIO. • Submit bidding documents, bid evaluation reports and other necessary documents to HCDIO. • Prepare environmental monitoring reports and submit

Project Stakeholders	Management Roles and Responsibilities
	them to ADB through HCDIO. • Work closely with the design institute to prepare preliminary and detailed engineering designs. • Work closely with the procurement agency and perform procurement together with HCDIO. • Work closely with loan implementation consultants.
Asian Development Bank	• Provide overall project administration. • Provide orientation to executing and implementing agency including the project management office. • Review draft bidding documents and approve bid evaluation report. • Disburse ADB loan proceeds.

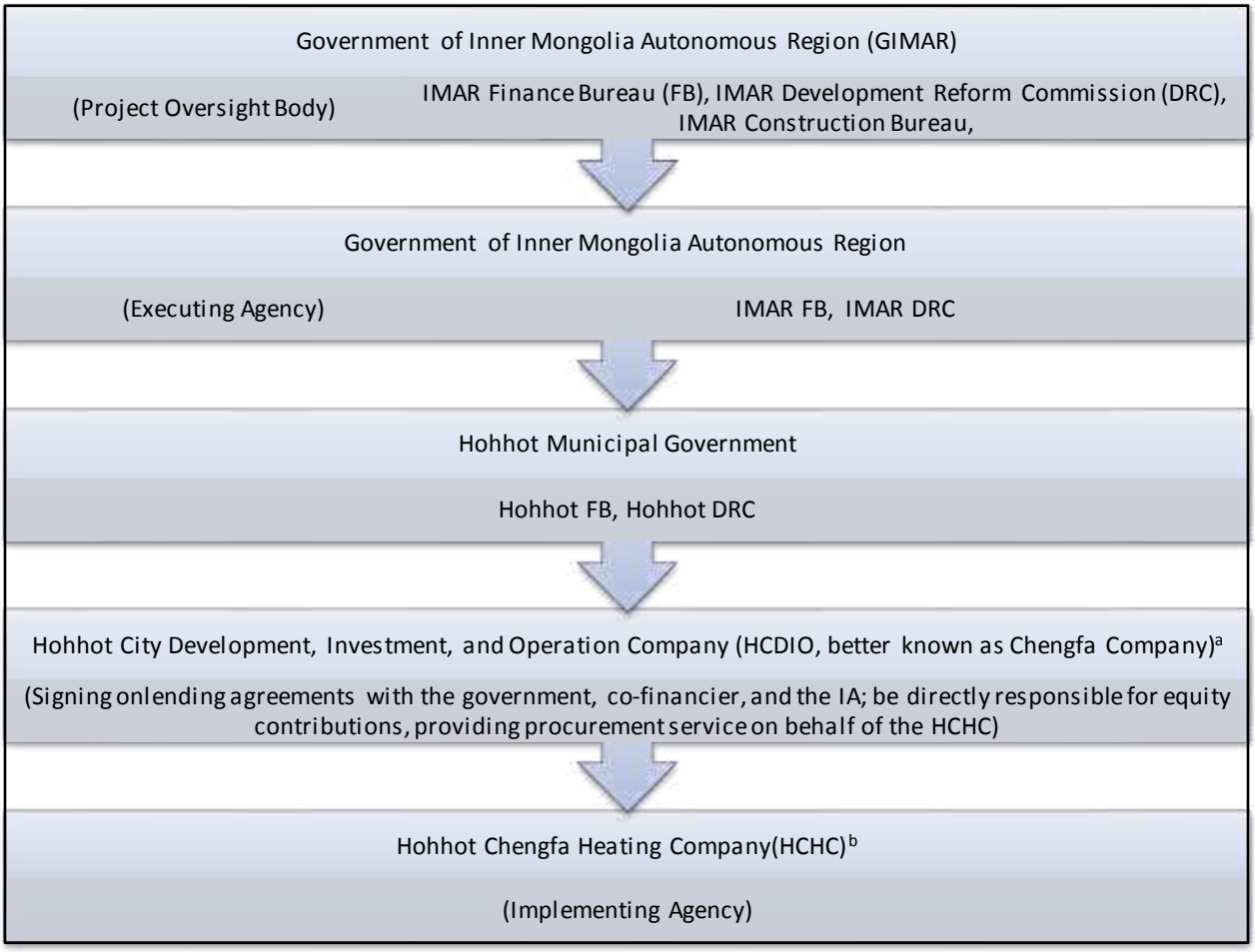
ADB = Asian Development Bank, EMP = environmental monitoring plan, GIMAR = Government of Inner Mongolia Autonomous Region, HCDIO = Hohhot City Development, Investment, and Operation Company, HCHC = Hohhot Chengfa Heating Company, HMG = Hohhot Municipal Government, IMAR DRC = Inner Mongolia Autonomous Region Development and Reform Commission, IMAR FB = Inner Mongolia Autonomous Region Finance Bureau.

B. Key Persons Involved in Implementation

Institutions	Contact Details
Executing Agency Government of Inner Mongolia Autonomous Region	Mr. Yuewu Zhang Director, Office of Foreign Capital Utilization Inner Mongolia Autonomous Region Finance Bureau Telephone No.+86 0 471 4192241 Fax No. +86 0 471 419 0060 Email address: bao7777@126.com Office Address: No.19 Chilechuan Street, Hohhot, Inner Mongolia Autonomous Region, The People's Republic of China, 010098 Ms. Si Ha Director, Office of Foreign Investment Utilization and Economic Cooperation Development and Reform Commission of Inner Mongolia Autonomous Region Telephone No.+86 0 471 6659038 Fax No. +86 0 471 6659039 Email address: nmgfgwhasi@163.com Office Address: No.3 Chilechuan Street, Hohhot, Inner Mongolia Autonomous Region, The People's Republic of China, 010098
Hohhot City Development, Investment, and Operation Company (better known as Chengfa Company)	Mr. Ruiping Zhang General Manager Hohhot City Development, Investment, and Operation Company Telephone No. :+86 0 471 5103421 Email address: chengyi1999@126.com Office Address: Chengfa Building No. 22, Zhongshan West Road, Hohhot, Inner Mongolia Autonomous Region, The People's Republic of China, 010030
Implementing Agency Hohhot Chengfa Heating Company	Mr. Ruiping Zhang General Manager Hohhot Chengfa Heating Company Telephone No. :+86 0 471 5103421 Fax no. : +86 0 471 5103490 Email address: chengyi1999@126.com Office Address: Chengfa Building No. 22, Zhongshan West Road, Hohhot, Inner Mongolia Autonomous Region, The People's Republic of China, 010030
Co-financier Shanghai Pudong Development Bank	Mr. Wei Qi

	Manager of Business Development, Hohhot Branch Shanghai Pudong Development Bank Telephone No.+86 0 471 4505287 Fax No. +86 471 4505 270 Email address:qiw1@spdb.com.cn Office Address: No. 28, Daxue West Street, Hohhot Inner Mongolia Autonomous Region, The People's Republic of China, 010020
Asian Development Bank East Asia Department Energy Division	Mr. Ashok Bhargava Director, Energy Division East Asia Department, ADB Telephone No.: +63 2 632 6387 Fax No. +63 2 636 2302 Email address: abhargava@adb.org Office Address: Room 6648, Asian Development Bank, 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines Ms. Na Won Kim Environment Specialist, Energy Division East Asia Department, ADB Telephone No.+63 2 683 1503 Fax No. +63 2 636 2302 Email address: nawonkim@adb.org Office Address: Room 6635, Asian Development Bank, 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines

C. Project Organization Structure



a. HCDIO is 100% municipality-owned enterprise.
b HCHC is 98.17% owned by HCDIO, [This information has been removed as it falls within exceptions to disclosure specified in paragraph 97, (v) of ADB's Public Communications Policy (2011)].

IV. COSTS AND FINANCING

9. The project investment cost is estimated at $403.1 million, including physical and price contingencies and financial charges during construction (Table 2).

Table 2: Project Investment Plan

Item		Amount ($ million)[a]
A.	**Base Cost**[b]	
	1. Jinqiao heating zone	106.0
	2. Xinjiaying heating zone	111.7
	3. Haoqingying heating zone	114.1
	4. Consulting services	0.5
	Subtotal (A)	**332.3**
B.	**Contingencies**[c]	**44.8**
C.	**Financing Charges During Implementation**[d]	**26.1**
	Total (A+B+C)	**403.1**

[a] Includes taxes and duties of $28.2 million to be financed from government and Asian Development Bank (ADB) loan. The following principles were followed in determining the amount of taxes and duties to be financed by ADB: (i) the amount is within reasonable country thresholds; (ii) the amount is not an excessive share of the project investment plan; (iii) the taxes and duties apply only to ADB-financed expenditures; and (iv) the financing of the taxes and duties is relevant to the success of the project.

[b] In June 2014 price.

[c] Physical contingencies ($16.6 million) are estimated at 5.0% of base cost. Price contingencies ($28.2 million) are estimated based on projected domestic and international inflation rates.

[d] Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year US$ fixed swap rate plus a spread of 0.50% and a maturity premium of 0.10%. Commitment charges for ADB loan are 0.15% per year to be charged on the undisbursed loan account. Interest during construction for the domestic bank loan has been computed at the domestic rate of 6.55%.

Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates.

10. The Government of the PRC has requested a loan of $150.0 million from ADB's ordinary capital resources to help finance the project. The loan will have (i) a 25-year term including a grace period of 5 years, (ii) an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, (iii) a commitment charge of 0.15% per year, and (iv) such other terms and conditions set forth in the draft loan and project agreements. ADB loan will be used for equipment and materials, and consulting services. Loan proceeds will be disbursed according to ADB's *Loan Disbursement Handbook* (2012, as amended from time to time), and subject to the provisions of the Loan Agreement. The government will finance $90.8 million (22.5%) through counterpart fund, and the remaining $162.4 million (40.3%) will be financed by a domestic bank—Shanghai Pudong Development Bank (Table 3).

Table 3: Financing Plan

Source	Amount ($ million)	Share (%)
Asian Development Bank		
Ordinary capital resources (loan)	150.0	37.2
Shanghai Pudong Development Bank	162.4	40.3
Government		
Hohhot City Development, Investment, and Operation Company (HCDIO)	90.8	22.5
Total	**403.1**	100.0

Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates.

11. The government is the borrower of the loan and will make the loan available, through GIMAR, to HMG, to the Hohhot City Development, Investment, and Operation Company (HCDIO), and finally to the Hohhot Chengfa Heating Company (HCHC) on the same terms and conditions as those of ADB loan. HCHC will assume the foreign exchange and interest variation risks of ADB loan. The government, GIMAR, HCDIO, and HCHC have assured ADB that counterpart funding will be provided in a timely manner, including any additional counterpart funding required for any shortfall of funds or cost overruns.

A. Detailed Cost Estimates by Expenditure Category

	CNY (million)			USD (million)			% of Total Base Cost
	Foreign Exchange	Local Currency	Total Cost[a]	Foreign Exchange	Local Currency	Total Cost	
A. Investment Cost[b]							
1. Civil works	**0.0**	**555.4**	**555.4**	**0.0**	**91.1**	**91.1**	**27.4**
2. Equipment and materials	**911.4**	**191.2**	**1,102.6**	**149.5**	**31.4**	**180.9**	**54.4**
a. Supply of tools	0.0	5.9	5.9	0.0	1.0	1.0	0.3
b. Supply of steel construction materials	25.8	0.0	25.8	4.2	0.0	4.2	1.3
c. Supply and installation of boilers and associated equipment	267.5	0.0	267.5	43.9	0.0	43.9	13.2
d. Supply and installation of HEU, Pump, and Valves	160.2	0.0	160.2	26.3	0.0	26.3	7.9
e. Supply and installation of electric and control equipment	196.9	0.0	196.9	32.3	0.0	32.3	9.7
f. Supply and installation of heating pipe and fitting	261.0	0.0	261.0	42.8	0.0	42.8	12.9
g. Supply and installation of other auxiliary equipment	0.0	185.3	185.3	0.0	30.4	30.4	9.1
3. Other Engineering Cost[c]	**0.0**	**364.7**	**364.7**	**0.0**	**59.8**	**59.8**	**18.0**
4. Consulting Services	**3.0**	**0.0**	**3.0**	**0.5**	**0.0**	**0.5**	**0.2**
Subtotal (A)	**914.5**	**1,111.3**	**2,025.8**	**150.0**	**182.3**	**332.3**	**100.0**
B. Contingencies[d]							
a. Physical	0.0	101.3	101.3	0.0	16.6	16.6	5.0
b. Price	0.0	171.9	171.9	0.0	28.2	28.2	8.5
Subtotal (B)	**0.0**	**273.2**	**273.2**	**0.0**	**44.8**	**44.8**	**13.5**
C. Finance Charges during Construction[e]							
a. Interest During construction	0.0	154.4	154.4	0.0	25.3	25.3	7.6
b. Commitment charges	0.0	4.4	4.4	0.0	0.7	0.7	0.2
Subtotal (C)	**0.0**	**158.8**	**158.8**	**0.0**	**26.1**	**26.1**	**7.8**
Total Project Cost (A+B+C)	**914.5**	**1,543.3**	**2,457.8**	**150.0**	**253.1**	**403.1**	**121.3**

HEU = heat exchange unit.

[a] Includes taxes and duties of $28.2 million to be financed from government and Asian Development Bank (ADB) loan. The following principles were followed in determining the amount of taxes and duties to be financed by ADB: (i) the amount is within reasonable country thresholds; (ii) the amount is not an excessive share of the project investment plan; (iii) the taxes and duties apply only to ADB-financed expenditures; and (iv) the financing of the taxes and duties is relevant to the success of the project.

[b] In June 2014 price.

[c] Other engineering cost includes: geology and other engineering surveys; engineering design; third party review of detailed designs; construction drawings; as-built drawings; site preparation and temporary facilities; engineering insurance; special equipment safety supervision and inspection fee.

[d] Physical contingencies ($16.6 million) are estimated at 5.0% of base cost. Price contingencies ($28.2 million) are estimated based on projected domestic and international inflation rates.

[e] Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year US$ fixed swap rate plus a spread of 0.50% and a maturity premium of 0.10%. Commitment charges for ADB loan are 0.15% per year to be charged on the undisbursed loan account. Interest during construction for the domestic bank loan has been computed at the domestic rate of 6.55%.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

B. Allocation and Withdrawal of Loan Proceeds

Item	Total Amount Allocated for ADB Financing ($)		Percentage and basis for Withdrawal from the Loan Account[a]
	Category	Subcategory	
A. Equipment and Materials[b]	**149,500,000**		
a. Supply of steel construction materials		4,232,000	100% of total expenditure
b. Supply and installation of boilers and associated equipment		43,878,000	100% of total expenditure
c. Supply and installation of HEU, Pump, and valves		26,284,000	100% of total expenditure
d. Supply and installation of electric and control equipment		32,294,000	100% of total expenditure
e. Supply and installation of heating pipes and fitting		42,812,000	100% of total expenditure
B. Consulting Services	**500,000**		
Total (A+B)	**150,000,000**		

ADB = Asian Development Bank, HEU = heat exchange unit.
[a] Including taxes and duties.
[b] Including transportation and insurance costs.
Source: Asian Development Bank estimates.

C. Detailed Cost Estimate by Financiers ($ million)[a]

Item	ADB Loan		Shanghai Pudong Development Bank		Government-HCDIO		Total	
	Amount	%	Amount	%	Amount	%	Amount	%
A. Investment Cost[b]								
1. Civil works	**0.0**	**0.0**	**91.1**	**100.0**	**0.0**	**0.0**	**91.1**	**22.6**
2. Equipment and materials	**149.5**	**82.7**	**31.4**	**17.3**	**0.0**	**0.0**	**180.9**	**44.9**
a. Supply of tools	0.0	0.0	1.0	100.0	0.0	0.0	1.0	0.0
b. Supply of steel construction materials	4.2	100.0	0.0	0.0	0.0	0.0	4.2	1.0
c. Supply and installation of boilers and associated equipment	43.9	100.0	0.0	0.0	0.0	0.0	43.9	10.9
d. Supply and installation of HEU, Pump, and Valves	26.3	100.0	0.0	0.0	0.0	0.0	26.3	6.5
e. Supply and installation of electric and control equipment	32.3	100.0	0.0	0.0	0.0	0.0	32.3	8.0
f. Supply and installation of heating pipe and fitting	42.8	100.0	0.0	0.0	0.0	0.0	42.8	10.6
g. Supply and installation of other auxiliary equipment	0.0	0.0	30.4	100.0	0.0	0.0	30.4	7.5
3. Other Engineering Cost[c]	**0.0**	**0.0**	**39.9**	**66.7**	**19.9**	**33.3**	**59.8**	**14.8**
4. Consulting Services	**0.5**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.5**	**0.1**
Subtotal (A)	**150.0**	**45.1**	**162.4**	**48.9**	**19.9**	**6.0**	**332.3**	**82.4**
B. Contingencies[d]								
a. Physical	0.0	0.0	0.0	0.0	16.6	100.0	16.6	4.1
b. Price	0.0	0.0	0.0	0.0	28.2	100.0	28.2	7.0
Subtotal (B)	**0.0**	**0.0**	**0.0**	**0.0**	**44.8**	**100.0**	**44.8**	**11.1**
C. Finance Charges during Construction[e]								
a. Interest During construction	0.0	0.0	0.0	0.0	25.3	100.0	25.3	6.3
b. Commitment charges	0.0	0.0	0.0	0.0	0.7	100.0	0.7	0.2
Subtotal (C)	**0.0**	**0.0**	**0.0**	**0.0**	**26.1**	**100.0**	**26.1**	**6.5**
Total Project Cost (A+B+C)	**150.0**	**37.2**	**162.4**	**40.3**	**90.8**	**22.5**	**403.1**	**100.0**

ADB = Asian Development Bank, HCDIO = Hohhot City Development Investment and Operation company, HEU = heat exchange unit.

[a] Includes taxes and duties of $28.2 million to be financed from government and Asian Development Bank (ADB) loan. The following principles were followed in determining the amount of taxes and duties to be financed by ADB: (i) the amount is within reasonable country thresholds; (ii) the amount is not an excessive share of the project investment plan; (iii) the taxes and duties apply only to ADB-financed expenditures; and (iv) the financing of the taxes and duties is relevant to the success of the project.

[b] In June 2014 price.

[c] Other engineering cost includes: geology and other engineering surveys; engineering design; third party review of detailed designs; construction drawings; as-built drawings; site preparation and temporary facilities; engineering insurance; special equipment safety supervision and inspection fee.

[d] Physical contingencies ($16.6 million) are estimated at 5.0% of base cost. Price contingencies ($28.2 million) are estimated based on projected domestic and international inflation rates.

[e] Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year US$ fixed swap rate plus a spread of 0.50% and a maturity premium of 0.10%. Commitment charges for ADB loan are 0.15% per year to be charged on the undisbursed loan account. Interest during construction for the domestic bank loan has been computed at the domestic rate of 6.55%.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

D. Detailed Cost Estimate by Outputs/Components ($ million)[a]

Item	Total Cost	Jinqiao Heating Zone		Xunjiaying Heating Zone		Haoqingying Heating Zone	
		Amount	%	Amount	%	Amount	%
A. Investment Cost[b]							
1. Civil works	**91.1**	**32.7**	**35.9**	**34.2**	**37.5**	**24.2**	**26.5**
2. Equipment and Materials	**180.9**	**53.3**	**29.5**	**57.6**	**31.8**	**70.0**	**38.7**
a. Supply of tools	1.0	0.3	33.3	0.3	33.3	0.3	33.3
b. Supply of steel construction materials	4.2	0.0	0.0	2.1	50.0	2.1	50.0
c. Supply and installation of boilers and associated equipment	43.9	11.6	26.4	11.6	26.4	20.7	47.2
d. Supply and installation of HEU, Pump, and Valves	26.3	8.4	32.0	8.5	32.3	9.4	35.8
e. Supply and installation of electric and control equipment	32.3	9.2	28.5	10.4	32.2	12.7	39.3
f. Supply and installation of heating pipe and fitting	42.8	14.4	33.7	13.4	31.3	15.0	35.0
g. Supply and installation of other auxiliary equipment	30.4	9.4	30.8	11.3	37.1	9.7	32.1
3. Other Engineering Cost[c]	**59.8**	**19.9**	**33.3**	**19.9**	**33.3**	**19.9**	**33.3**
4. Consulting Services	**0.5**	**0.2**	**33.3**	**0.2**	**33.3**	**0.2**	**33.3**
Subtotal (A)	**332.3**	**106.2**	**31.9**	**111.9**	**33.3**	**114.2**	**34.4**
B. Contingencies[d]							
a. Physical	16.6	5.9	35.6	5.5	33.1	5.2	31.3
b. Price	26.4	8.4	31.9	8.9	33.7	9.1	34.4
Subtotal (B)	**43.1**	**14.4**	**33.3**	**14.4**	**33.5**	**14.3**	**33.2**
C. Finance Charges during Construction[e]							
a. Interest During construction	25.3	8.2	32.3	8.3	32.7	8.9	35.0
b. Commitment charges	0.7	0.2	29.2	0.2	30.8	0.3	40.0
Subtotal (C)	**26.1**	**8.4**	**32.2**	**8.5**	**32.6**	**9.2**	**35.1**
Total Project Cost (A+B+C)	**401.4**	**128.9**	**32.1**	**134.8**	**33.6**	**137.7**	**34.3**
	100.0%		**32.1**		**33.6**		**34.3**

HEU = heat exchange unit.

[a] Includes taxes and duties of $28.2 million to be financed from government and Asian Development Bank (ADB) loan. The following principles were followed in determining the amount of taxes and duties to be financed by ADB: (i) the amount is within reasonable country thresholds; (ii) the amount is not an excessive share of the project investment plan; (iii) the taxes and duties apply only to ADB-financed expenditures; and (iv) the financing of the taxes and duties is relevant to the success of the project.

[b] In June 2014 price.

[c] Other engineering cost includes: geology and other engineering surveys; engineering design; third party review of detailed designs; construction drawings; as-built drawings; site preparation and temporary facilities; engineering insurance; special equipment safety supervision and inspection fee.

[d] Physical contingencies ($16.6 million) are estimated at 5.0% of base cost. Price contingencies ($28.2 million) are estimated based on projected domestic and international inflation rates.

[e] Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year US$ fixed swap rate plus a spread of 0.50% and a maturity premium of 0.10%. Commitment charges for ADB loan are 0.15% per year to be charged on the undisbursed loan account. Interest during construction for the domestic bank loan has been computed at the domestic rate of 6.55%.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

E. Detailed Cost Estimate by Year ($ million)[a]

Item	Total Cost	2015	2016	2017	2018	2019	2020
A. Investment Cost[b]							
1. Civil works	**91.1**	**0.0**	**6.5**	**23.1**	**31.9**	**23.7**	**5.8**
2. Equipment and Materials	**180.9**	**1.0**	**11.4**	**55.3**	**66.4**	**41.8**	**4.9**
a. Supply of tools	1.0	0.2	0.7	0.1	0.0	0.0	0.0
b. Supply of steel construction materials	4.2	0.8	3.0	0.4	0.0	0.0	0.0
c. Supply and installation of boilers and associated equipment	43.9	0.0	1.1	18.1	9.8	13.1	1.8
d. Supply and installation of HEU, Pump, and Valves	26.3	0.0	1.7	16.0	7.7	0.8	0.0
e. Supply and installation of electric and control equipment	32.3	0.0	1.8	2.5	17.4	9.5	1.0
f. Supply and installation of heating pipe and fitting	42.8	0.0	1.2	11.6	26.3	3.7	0.0
g. Supply and installation of other auxiliary equipment	30.4	0.0	1.9	6.6	5.1	14.7	2.1
3. Other Engineering Cost[c]	**59.8**	**10.0**	**29.9**	**19.9**	**0.0**	**0.0**	**0.0**
4. Consulting services	**0.5**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**
Subtotal (A)	**332.3**	**11.1**	**47.9**	**98.5**	**98.4**	**65.6**	**10.8**
B. Contingencies[d]							
a. Physical	16.6	0.6	2.4	4.9	4.9	3.3	0.5
b. Price	28.2	0.9	4.1	8.4	8.4	5.6	0.9
Subtotal (B)	**44.8**	**1.5**	**6.5**	**13.3**	**13.3**	**8.8**	**1.5**
C. Finance Charges during Construction[e]							
a. Interest During construction	25.3	0.8	3.7	7.5	7.5	5.0	0.8
b. Commitment charges	0.7	0.0	0.1	0.2	0.2	0.1	0.0
Subtotal (C)	**26.1**	**0.9**	**3.8**	**7.7**	**7.7**	**5.1**	**0.8**
Total Project Cost (A+B+C)	**403.1**	**13.5**	**58.1**	**119.5**	**119.4**	**79.6**	**13.1**
% Total Project Cost	**100.0**	**3.3**	**14.4**	**29.7**	**29.6**	**19.7**	**3.2**

HEU = heat exchange unit.

[a] Includes taxes and duties of $28.2 million to be financed from government and Asian Development Bank (ADB) loan. The following principles were followed in determining the amount of taxes and duties to be financed by ADB: (i) the amount is within reasonable country thresholds; (ii) the amount is not an excessive share of the project investment plan; (iii) the taxes and duties apply only to ADB-financed expenditures; and (iv) the financing of the taxes and duties is relevant to the success of the project.

[b] In June 2014 price.

[c] Other engineering cost includes: geology and other engineering surveys; engineering design; third party review of detailed designs; construction drawings; as-built drawings; site preparation and temporary facilities; engineering insurance; special equipment safety supervision and inspection fee.

[d] Physical contingencies ($16.6 million) are estimated at 5.0% of base cost. Price contingencies ($28.2 million) are estimated based on projected domestic and international inflation rates.

[e] Includes interest and commitment charges. Interest during construction for ADB loan has been computed at the 5-year US$ fixed swap rate plus a spread of 0.50% and a maturity premium of 0.10%. Commitment charges for ADB loan are 0.15% per year to be charged on the undisbursed loan account. Interest during construction for the domestic bank loan has been computed at the domestic rate of 6.55%.

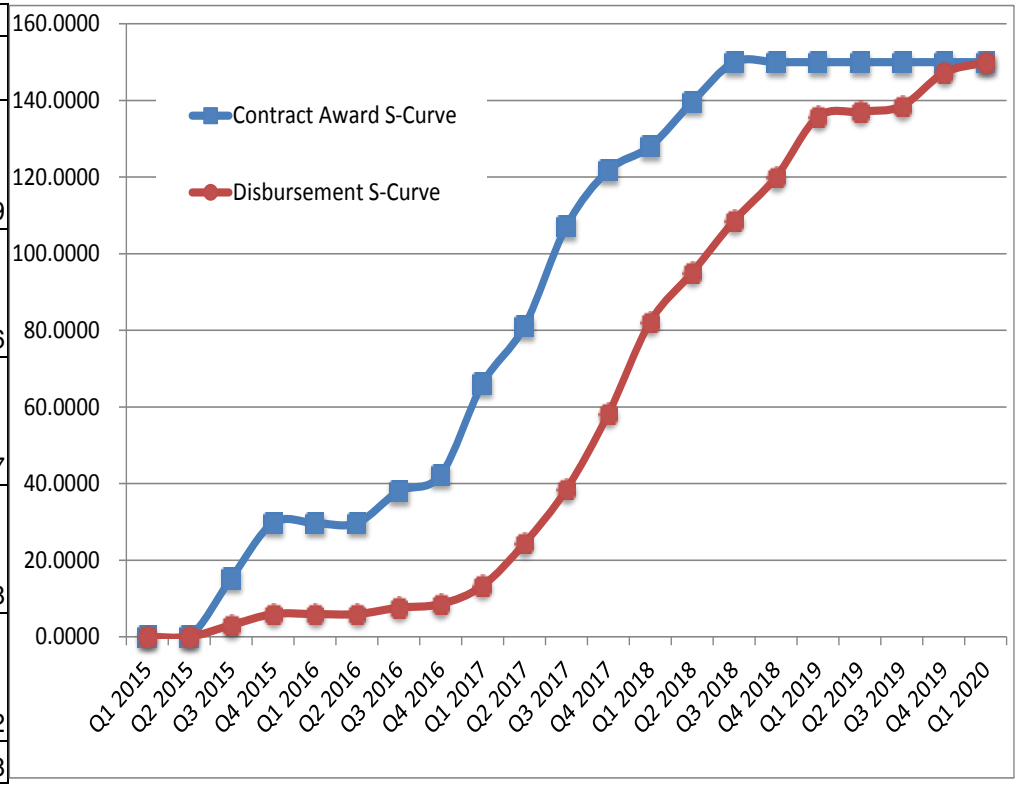
Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

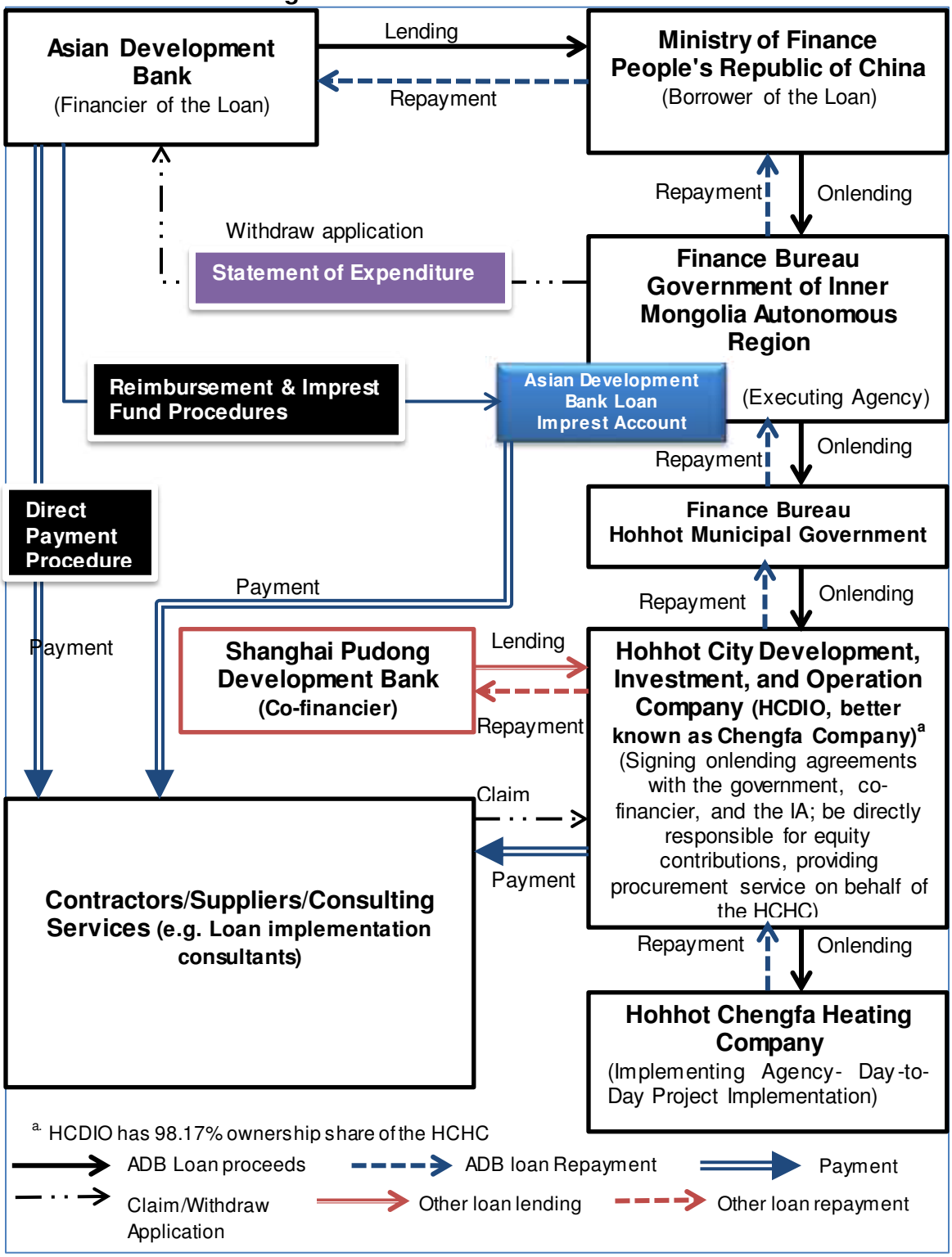
F. Contract and Disbursement S-curves

Year	Quarter	Contract Awards		Disbursement	
		Cumulative ($ million)	Annual ($ million)	Cumulative ($ million)	Annual ($ million)
2015	Q1	0.0		0.0	
	Q2	0.0		0.0	
	Q3	15.2		3.0	
	Q4	29.7	29.7	5.9	5.9
2016	Q1	29.7		5.9	
	Q2	29.7		5.9	
	Q3	38.0		7.6	
	Q4	42.2	12.5	8.5	2.6
2017	Q1	66.1		13.3	
	Q2	81.1		24.4	
	Q3	107.2		38.5	
	Q4	121.8	79.5	58.2	49.7
2018	Q1	128.0		82.2	
	Q2	139.6		95.1	
	Q3	150.0		108.6	
	Q4	150.0	28.2	120.0	61.8
2019	Q1	150.0		135.7	
	Q2	150.0		137.1	
	Q3	150.0		138.5	
	Q4	150.0	0.0	147.2	27.2
2020	Q1	150.0	0.0	150.0	2.8

Note: Numbers may not sum precisely because of rounding.



G. Fund Flow Diagram



V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

12. The financial management assessment was carried out in accordance with ADB's Guidelines for Financial Management and Analysis of Projects[11] and Financial Due Diligence: a Methodology Note[12] to assess the financial capacity of GIMAR, HCDIO and HCHC.[13] GIMAR has sufficient experience in ADB-financed loan projects, including two district heating projects and a number of other projects. GIMAR is familiar with ADB project implementation, disbursement, and procurement procedures. IMAR Finance Bureau (FB) has all necessary management systems, staff and procedures in place, sufficient experience and capacity to manage an imprest account and a positive track record in delivering ADB projects.

13. The financial management assessment was conducted for HCDIO and HCHC. The assessment results show that their financial management systems and procedures are in place to perform proper financial management and reporting. Accounting systems of HCDIO and HCHC are also adequate for the purpose of ADB loan implementation. In terms of governance risks, (i) accounting policies and procedures, (ii) staffing, (iii) reporting and monitoring, (iv) information systems, (v) internal, and (vi) external auditing were evaluated low or medium.

14. HCHC and HCDIO have extensive project implementation experiences and a successful track record in working with international finance organizations. They have successfully delivered district heating project within a planned timeframe and within the estimated cost. Under the guidance of HCDIO, HCHC has timely completed two district heating projects funded by the Japan Bank of International Cooperation and is currently implementing a district heating project funded by German development cooperation through KfW. Since both HCDIO and HCHC do not have previous ADB-financed project experience, a tendering agency with extensive previous ADB project experience was engaged in October 2014. To strengthen their financial management capacity to implement an ADB project, the staff at the project management office, which has been already established by HCDIO and HCHC, had training on ADB disbursement, procurement, reporting and other procedures during the project processing and will continue undertaking capacity building trainings during project implementation. The overall control risks before mitigation is considered to be at a *medium*.

B. Disbursement Arrangements

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

16. To facilitate project implementation through timely release of loan proceeds, the IMAR FB will establish an imprest account promptly after loan effectiveness at a commercial bank acceptable to ADB. The maximum ceiling of the imprest account will not exceed 10% of the loan amount. The imprest account is to be used exclusively for the ADB's share of eligible expenditures. The currency of the imprest account will be US dollar. The GIMAR, who established the imprest account in its name, is accountable and responsible for proper use of

[11] ADB. 2005. *Financial Management and Analysis of Projects*. Manila. http://www.adb.org/documents/financial-management-and-analysis-projects.
[12] ADB. 2009. *Financial Due Diligence: A Methodology Note.* Manila. http://www.adb.org/documents/financial-due-diligence-methodology-note.
[13] Financial management assessment was conducted under the project preparatory technical assistance in 2014.

advances to the imprest account. The initial and additional advances to the imprest account may be requested 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 an imprest account.

17. The statement of expenditure (SOE) procedure[14] may be used for reimbursement of eligible expenditures or liquidation of advances to the imprest account. The ceiling of the SOE procedure is the equivalent of $200,000 per individual payment. Supporting documents and records for the expenditures claimed under the SOE should be maintained and made readily available for review by ADB's disbursement and review missions, upon ADB's request for submission of supporting documents on a sampling basis, and for independent audit. Reimbursement and liquidation of individual payments in excess of the SOE ceiling should be supported by full documentation when submitting the withdrawal application to ADB.

18. For efficiency, the minimum value per withdrawal application is US$100,000 equivalent, unless otherwise approved by ADB. Individual payments below this amount should generally be paid from the imprest account or by the GIMAR and subsequently claimed to ADB through reimbursement. ADB reserves the right not to accept withdrawal applications below the minimum amount. IMAR FB requires furnishing withdrawal application, applicable summary sheet, corresponding bank statement, and reconciliation statement to ADB for liquidation and replenishment of imprest account.

C. Accounting

19. GIMAR will maintain, or cause to be maintained, separate books and records by funding source for all expenditures incurred on the project using accrual-based accounting following the equivalent national accounting standards. GIMAR will prepare consolidated project financial statements in accordance with the Government of the PRC's accounting laws and regulations, which are consistent with international accounting principles and practices.

D. Auditing and Public Disclosure

20. The GIMAR will cause the detailed consolidated project financial statements to be audited, in accordance with equivalent national standards adopted by GIMAR General Auditor's Office, by an independent auditor acceptable to ADB. GIMAR will submit the audited project financial statements, together with the auditors' opinion in the English language, to ADB within 6 months at the end of the fiscal year.

21. The GIMAR will also cause the entity-level financial statements to be audited in accordance with equivalent national standards adopted by the GIMAR General Auditor's Office and by an independent auditor acceptable to ADB. The audited entity-level financial statements, together with the auditors' report and management letter, will be submitted in the English language to ADB within 1 month after their approval by the competent authority.

22. The annual audit report for the project accounts will include an audit management letter and audit opinions which cover (i) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable

[14] Available at http://www.adb.org/sites/default/files/loan-disbursement-handbook.pdf.

financial reporting framework; (ii) whether loan and grant proceeds were used only for the purposes of the project or not; (iii) the level of compliance for each financial covenant contained in the legal agreements for the project; (iv) the use of the imprest fund procedure; and (v) the use of the SOE procedure certifying the eligibility of those expenditures claimed under SOE procedures, and proper use of the SOE and imprest procedures in accordance with ADB's Loan Disbursement Handbook and the project documents.

23. 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.

24. The Government, GIMAR, HCDIO, and HCHC have been made aware of ADB's policy on delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.[15] ADB reserves the right to require a change in the auditor (in a manner consistent with the constitution of the borrower), or for additional support to be provided to the auditor, if the audits required are not conducted in a manner satisfactory to ADB, or if the audits are substantially delayed. 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.

25. Public disclosure of the project financial statements, including the audit report on the project financial statements, will be guided by ADB's Public Communications Policy (2011).[16] After review, ADB will disclose the project financial statements and the opinion of the auditors on the financial statements within 30 days of the date of their receipt by posting them on ADB's website. The Audit Management Letter will not be disclosed.

[15] 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 6 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 6 months.
- When audited project financial statements have not been received within 12 months after the due date, ADB may suspend the loan.

[16] Available at http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications.

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

26. To expedite project implementation, GIMAR has requested advance contracting and retroactive financing. This will include the procurement of goods, and consulting services. All advance contracting and retroactive financing will be undertaken in conformity with ADB's Procurement Guidelines (2013, as amended from time to time)[17] and ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[18] The amount to be retroactively financed may finance costs incurred before loan 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, GIMAR, HCDIO, and the HCHC have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project.

27. **Advance contracting.** The advance contracting is needed mainly for four contract packages of goods and a consulting service contract. The issuance of invitations to bid, the draft pre-qualification and bidding documents under advance procurement action will be subject to ADB approval.

28. **Retroactive financing.** GIMAR, HCDIO, and HCHC were informed that as a general rule, retroactive financing is permitted only if (i) it is specifically agreed by ADB and the Borrower; (ii) the goods that were requested for were procured in accordance with ADB's Procurement Guidelines (2013, as amended from time to time);[19] (iii) the amount to be retroactively financed does not exceed 20% of the loan amount; and (iv) the expenditures have been incurred before effectiveness of the relevant loan but, generally, no earlier than 12 months before signing of the Loan Agreement. The advance contracting and retroactive financing will include consulting services, and goods (Table 4).

Table 4: Indicative Procurement Plan for Advance Contracting and Retroactive Financing

Pack. No.	General Description	Estimated Value	Procurement Method	Review (Prior / Post)	Bidding Procedure	Comments
1	Consulting services	0.5	IC	Prior	Individual consultant selection	Consulting service
2	Supply and installation of gas-fired boiler and associated equipment #1 (Jinqiao Heating Zone)	5.5	ICB	Post	1S1E	Goods less than $10 million, but subject to ICB and Post review

[17] Available at: http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf.
[18] Available at: http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf.
[19] Available at: http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf.

Pack. No.	General Description	Estimated Value	Procurement Method	Review (Prior / Post)	Bidding Procedure	Comments
3	Supply and installation of heat exchanging unit, pump, and valves (Jinqiao Heating Zone)	8.4	ICB	Post	1S1E	Goods less than $10 million, but subject to ICB and Post review
4	Supply and installation of electric and control equipment (Jinqiao Heating Zone)	9.2	ICB	Post	1S1E	Goods less than $10 million, but subject to ICB and Post review
5	Supply and installation of heating pipe and fitting #1 and steel material (Jinqiao Heating Zone)	6.1	NCB	Post	1S1E	Goods

IC = international consultant, ICB = international competitive bidding, 1S1E = single stage one envelope.
Source: Asian Development Bank estimates.

B. Procurement of Goods, Works and Consulting Services

29. All procurement of goods will be undertaken in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). Taking into consideration the maturity of district heating market in the PRC and experiences from past district heating projects, ADB-financed goods contracts that cost $10 million or more will be procured through international competitive bidding (ICB) and less than $10 million will be procured through national competitive bidding, using ADB's standard bidding documents. Yet, the project will install low NO_X natural gas and electrode boilers, which are new to the PRC district heating market. Therefore, ICB will be still used for goods packages relevant to new types of heating boilers, which include boilers, heat exchange units, and electric and control system packages even though they are less than $10 million. The relevant sections of ADB's Anticorruption Policy (1998, as amended to date) will be included in all documents and contracts.[20]

30. All consultants financed by ADB will be recruited according to ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[21] The terms of reference for project implementing consulting service is provided in paras. 37–42. An estimated 26.5 person-months (9.5 international, 17 national) of consulting services are required to (i) enhance the project engineering designs; (ii) conduct energy saving awareness campaign; (iii) facilitate the environmental management plan (EMP) during project implementation; and (iv) provide capacity building and institutional strengthening on EMP, grievance redress mechanism, and health and safety issues.

[20] Available at: http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf.
[21] Checklists for actions required to contract consultants by method are available in e-Handbook on Project Implementation at: http://www.adb.org/documents/handbooks/project-implementation.

C. Procurement Plan

Table 5: Basic Data

Project Name: Low-carbon District Heating Project in Hohhot in Inner Mongolia Autonomous Region	
Project Number: 47052	**Approval Number**: TBD
Country: People's Republic of China (PRC)	**Executing Agency**: Government of Inner Mongolia Autonomous Region (GIMAR)
Project Financing Amount: $403.1 million	**Implementing Agency:** Hohhot Chengfa Heating Company (HCHC)
ADB Financing: $150.0 million	
Non-ADB Financing: $253.1 million	
Date of First Procurement Plan: 31 October 2014	**Date of this Procurement Plan**: 17 November 2014

1. Methods, Thresholds, Review and 18-Month Procurement Plan

a. Procurement and Consulting Methods and Thresholds

31. Except as ADB may otherwise agree, the following process thresholds (Table 6) shall apply to procurement of goods. As indicated in para 29, ICB will be still used for some goods packages less than $10 million. In such case, the first batch of these ICB documents shall be submitted for ADB's prior review and approval. All other ICB documents that cost less than $10 million are subject to post review.

Table 6: Procurement of Goods

Method	Threshold	ADB Prior or Post Review
International Competitive Bidding for Goods	Equal to or more than $10,000,000	Prior
International Competitive Bidding for Goods	More than $100,000 and less than $10,000,000	Post[a]
National Competitive Bidding for Goods	More than $100,000 but less than $10,000,000	Post[a]

[a] The first batch of international and national competitive bidding procurement documents shall be submitted for ADB's prior review and approval. The subsequent international and national competitive bidding procurement documents can be reviewed post approval.

Source: Asian Development Bank estimates.

Table 7: Procurement of Consulting Service

Consulting Services	
Method	**Comments**
Individual consultant selection	Three loan implementation consultants will be engaged. Considering the limited number of consultants required and the independent nature of their work, individual consultant selection method is more appropriate.

Source: Asian Development Bank estimates.

b. Goods Contracts Estimated to Cost $1 Million or More

32. Table 8 lists goods contracts for which the procurement activity is either ongoing or expected to commence within the next 18 months.

Table 8: List of Goods Contracts

Pack. No.	General Description	Estimated Value	Procurement Method	Review (Prior / Post)	Bidding Procedure	Advertisement Date (quarter/year)	Comments
2	Supply and installation of gas-fired boiler and associated equipment #1 (Jinqiao Heating Zone)	5.5	ICB	Post [a]	1S1E	Q2/2015	Goods less than $10 million, but subject to ICB and Post review
3	Supply and installation of heat exchange units, pump, and valves (Jinqiao Heating Zone)	8.4	ICB	Post [a]	1S1E	Q3/2015	Goods less than $10 million, but subject to ICB and Post review
4	Supply and installation of electric and control equipment (Jinqiao Heating Zone)	9.2	ICB	Post [a]	1S1E	Q2/2015	Goods less than $10 million, but subject to ICB and Post review
5	Supply and installation of heating pipe and fitting #1 and steel materials (Jinqiao Heating Zone)	6.1	NCB	Post [a]	1S1E	Q3/2015	Goods
6	Supply and installation of Heating Pipe and fitting #2 (Jinqiao Heating Zone)	8.3	NCB	Post [a]	1S1E	Q2/2016	Goods
	Total	**37.5**					

1S1E = single stage one envelope, ICB = international competitive bidding, NCB = National Competitive Bidding.
[a] The first batch of international and national competitive bidding procurement documents shall be submitted for ADB's prior review and approval. The subsequent international and national competitive bidding procurement documents can be reviewed post approval.
Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates.

c. Consulting Services Contracts Estimated to Cost $100,000 or More

33. Table 9 lists consulting services contracts for which the recruitment activity is either ongoing or expected to commence within the next 18 months.

Table 9: List of Consulting Services Contracts

Package Number	General Description	Estimated Value ($ million)	Recruitment Method	Review (Prior / Post)	Advertisement Date (quarter/year)	Type of Proposal
1	Consulting services	0.5	Individual consultant selection	Prior	Q2/2015	Not applicable

Source: Asian Development Bank estimates.

2. Indicative List of Packages Required Under the Project

34. Table 10 provides an indicative list of goods, works and consulting services contracts over the life of the project, other than those mentioned in previous sections (i.e., those expected beyond the current period).

Table 10: Indicative List of Goods Contracts

Pack. No.	General Description	Estimated Value ($ million)	Estimated Number of Contracts	Procurement Method	Review (Prior/ Post)	Bidding Procedure
7	Supply and installation of gas-fired boiler and associated equipment #2 (Jinqiao Heating Zone)	6.1	1	ICB	Post [a]	1S1E
8	Supply of steel construction materials	4.2	1	NCB	Post [a]	1S1E
9	Supply and installation of gas-fired boiler and associated equipment (Xinjiaying Heating Zone)	11.6	1	ICB	Prior	1S1E
10	Supply and installation of heat exchange units, pump, and valves (Xinjiaying Heating Zone)	8.5	1	ICB	Post [a]	1S1E
11	Supply and installation of electric and control equipment (Xinjiaying Heating Zone)	10.4	1	ICB	Prior	1S1E
12	Supply and installation of heating pipe and fitting (Xinjiaying Heating Zone)	13.4	1	ICB	Prior	1S1E
13	Supply and installation of gas-fired boiler and associated equipment (Haoqingying Heating Zone)	14.5	1	ICB	Prior	1S1E
14	Supply and installation of heat exchange units, pump, and valves (Haoqingying Heating Zone)	9.4	1	ICB	Post [a]	1S1E
15	Supply and installation of electric and control equipment (Haoqingying Heating Zone)	12.7	1	ICB	Prior	1S1E
16	Supply and installation of heating pipe and fitting (Haoqingying Heating Zone)	15.0	1	ICB	Prior	1S1E
17	Supply and installation of electric boiler and its associated equipment (Haoqingying Heating Zone)[a]	6.2	1	ICB	Post [a]	1S1E
	Total	**112.0**				

1S1E = single stage one envelope, ICB = international competitive bidding, NCB = national competitive bidding.
[a] The first batch of international and national competitive bidding procurement documents shall be submitted for ADB's prior review and approval. The subsequent international and national competitive bidding procurement documents can be reviewed post approval.
Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates.

3. List of Awarded and On-going, and Completed Contracts

35. Table 11 lists the awarded and on-going contracts, and completed contracts.

Table 11: List of Awarded and On-going and Completed Contracts

Pack. No.	General Description	Estimated Value ($ million)	Contract Value	Procurement Method	Advertisement Date (quarter/ year)	Date of ADB Approval of Contract Award

4. Non-ADB Financing

36. Table 12 lists goods, works and consulting services contracts over the life of the project, financed by non-ADB sources.

Table 12: List of Goods and Works over the Life of the Project financed by Non-ADB Sources

General Description	Estimated Value (Cumulative) ($ million)	Estimated Number of Contracts	Procurement Method
Supply of tools	1.0	1	DP
Civil work of boiler house, heat exchange station, and heating pipe (Jinqiao Heating Zone)	32.7	1	DP
Supply and installation of other auxiliary equipment (Jinqiao Heating Zone)	9.4	1	DP
Civil work of boiler house, heat exchange station, and heating pipe (Xinjiaying Heating Zone)	34.2	1	DP
Supply and installation of other auxiliary equipment (Xinjiaying Heating Zone)	11.3	1	DP
Civil work of boiler house, heat exchange station, and heating pipe (Haoqingying Heating Zone)	24.2	1	DP
Supply and installation of Other Auxiliary Equipment (Haoqingying Heating Zone)	9.7	1	DP
Total	**122.5**		

DP = domestic procedures.
Note: Numbers may not sum precisely because of rounding.
Source: Asian Development Bank estimates.

D. Consultants' Terms of References

37. The project will have one consulting service package to support the GIMAR, HCDIO, and HCHC in the project implementation and capacity development. The consultants will be recruited in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The HCDIO and the HCHC will be responsible for engaging consultants through individual consultant selection method.

38. **District Heating Engineer/Team Leader** (international, 9.5 person-months, intermittent). The expert should have a postgraduate degree in mechanical engineering with a focus on combined heat and power plants and district heating, or in any relevant field; at least 10 years of international engineering experience in district heating and similar projects, and a good command of English. The expert will undertake the following activities:

(i) liaise with ADB, GIMAR, HCDIO, HCHC, and a design institute during the design and first phase of construction;
(ii) review the pre-design of heat exchange stations, distribution piping systems and heat source plants;
(iii) support with hydraulic analysis, pressure transient analysis, and optimization of pipe sizes;
(iv) review the detail design of and procurement documents for heat exchange stations, distribution piping systems and heat source plants;
(v) support the installation supervisory teams of HCDIO and HCHC for heat exchange stations by providing technical advice and detailed input to perform the supervisory and quality control works;
(vi) support the installation supervisory teams of HCDIO and HCHC for distribution piping installation by providing technical advice and detailed input to perform the supervisory and quality control works;
(vii) support the installation supervisory teams of HCDIO and HCHC for the boiler installations by providing technical advice and detailed input to perform the supervisory and quality control works;
(viii) support, monitor, and assess the boiler performance testing works for the first heat source plant's boiler performance tests;
(ix) participate, support, and monitor the final inspection works for each part of the district heating system, substations, piping system and boiler plants; and
(x) prepare a technical evaluation report of the project implementation reflecting the works of the expert during project implantation.
(xi) Organize seminars, workshops, and domestic and international study tours to enhance institutional capacity building on district heating.

39. **Environment Monitoring Specialist** (national, 15 person-months, intermittent). The expert should have a postgraduate degree in environment management or relevant field, and at least 7 years of work experience in environment management and monitoring. The expert should have experience in monitoring construction and operation of large scale district heating or similar projects. Experience in ADB-funded loan project would be an advantage. The expert should have a good command of English. The expert will undertake the following activities:

(i) conduct regular site visits
(ii) assist HCDIO and HCHC to update the EMP and environmental monitoring program, if needed;
(iii) assist and advise HCDIO and HCHC in the implementation of the EMP, environmental monitoring program, and grievance redress mechanism, as well as contractors on their own environmental management plans (and coordinate this work with EHSU environment officers), as requested;
(iv) verify the implementation of the environmental protection measures specified in the EMP;
(v) collect relevant information from HCDIO, HCHC, and relevant local government agencies on environment impact;
(vi) review monitoring records and environmental performance documents prepared by contractors, environmental monitoring stations, and other relevant environmental inspection authorities;
(vii) identify any environment-related implementation issues, suggest necessary corrective actions, and reflect these in a corrective action plan;
(viii) collect other relevant environment indicators to measure the positive environment impact (i.e., emissions reduction brought by the project);

(ix) collect and review the data for performance targets and indicators of outcome and outputs specified in the design and monitoring framework of the project.
(x) collect the annual carbon dioxide emissions;
(xi) prepare semiannual and annual environmental safeguards monitoring reports and a project completion report; and
(xii) organize and provide training to the GIMAR, HCDIO, HCHC, contractors and construction supervision companies on environmental management implementation and monitoring, including grievance redress mechanism.

40. **Social Specialist** (national, 2 person-months, intermittent). The expert should have a postgraduate degree in social science, or in any relevant field; should have at least 5 years of working experience; and should be fluent in English. Experience in the region and or in the PRC will be an advantage. The expert will undertake the following activities:

(i) assist HCDIO and HCHC in the implementation of gender measures and supervision of labor reemployment, if needed;
(ii) plan and prepare an energy saving awareness campaign program in close cooperation with HCDIO and HCHC;
(iii) design and prepare campaign materials for different target groups;
(iv) develop performance criteria, design and develop questionnaires that can be used for campaign evaluation;
(v) organize a campaign team and train the team members;
(vi) lead and supervise the campaign team, and ensure effective and successful execution of the campaigns; and
(vii) prepare an evaluation report on the effectiveness of the campaign, including identification of challenges and successful factors to contribute to further energy saving awareness.

41. During the consulting services, consultants shall submit the required reports to HCDIO, HCHC, and ADB, both in English and Chinese.

42. The consulting service inputs for project management and capacity development are summarized in Table 13.

Table 13: Consulting Service Inputs for Project Management and Capacity Development

Item	Amount ($'000)
1. Consultants	
a. Remuneration and per diem	
i. International consultant	218.5
ii. National consultants	76.5
b. International and local travel	33.0
c. Reports, translations, and communications	10.0
2. Training, workshops, seminars, and conferences[a]	127.0
3. Contingency	35.0
Total	**500.0**

[a] Capacity building activities, including trainings, workshops, domestic and international study tours, and conferences will be conducted to enhance institutional capacity on project environmental management plan, health safety and environment plan development and implementation, advancement of district heating technologies and equipment.
Source: Asian Development Bank estimates.

VII. SAFEGUARDS

A. Environment

43. **Environment Due Diligence.** The project is classified as category A for environment. A project environmental impact assessment (EIA) was drafted and disclosed on ADB website on 12 May 2014. The EIA complies with ADB's policies and requirements including ADB's Safeguard Policy Statement (2009).[22] It identifies potential environmental adverse impacts. During construction, these would include (i) soil erosion; (ii) noise, vibration, and dust; (iii) solid waste, (iv) community disturbance and public safety; and (v) occupational health and safety. During operation, potential adverse impacts would be (i) pollutants emission from the heat sources, (ii) noise from the heat sources and the heat exchange stations, (iii) waste water, and (iv) occupational health and safety. The EIA concludes that the construction and operation impacts can be mitigated through the implementation of the EMP, which is provided in Appendix 2 and forms part of the project administration manual. The EMP defines mitigation measures, monitoring requirements, and institutional responsibilities to ensure proper environmental management throughout the project construction and operation.

44. **EMP update, bidding documents.** In the design stage, HCDIO and HCHC will provide the EMP to the design institute for incorporating mitigation measures into the detailed designs. ADB would need to be notified on any design changes and the EIA would need to be updated accordingly if the design change could affect the findings of the environmental assessment. The EMP will be updated at the end of the detailed design, if needed, and disclosed on the ADB website. To ensure that bidders will respond to the EMP's provisions, HCDIO and HCHC will provide the following specification clauses to be incorporated in the bidding documents: (i) a list of environmental management requirements to be budgeted by the bidders in their proposals, (ii) environmental clauses for contractual terms and conditions, and (iii) the project EIA including updated EMP for compliance. The contractors will develop their own environmental management plans aligning with the project EMP and implement them accordingly.

45. **EMP implementation responsibilities.** GIMAR and HCDIO will be responsible for ensuring that the project to be designed, constructed, decommissioned, and operated is in accordance with (i) national and local government environmental, health and safety laws, regulations, procedures, and guidelines; (ii) ADB's Safeguard Policy Statement (2009); and (iii) the EIA including the EMP. GIMAR holds the final responsibility for the implementation and compliance with the EMP and monitoring plan, and the submission of environmental monitoring reports. An environment, health and safety unit (EHSU) will be established within HCHC, which is responsible for ensuring that environmental mitigation measures in the EMP will be properly implemented. The nominated environment officers 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. HCHC shall 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 EIA and/or EMP, HCHC, through the HCDIO 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.

46. The contractors and construction supervision companies will be responsible for the internal environmental monitoring and supervision during construction. The environmental

[22] ADB. 2009. *Safeguard Policy Statement.* Manila.

officers at EHSUs are responsible for supervising the contractors and construction supervision companies. The environmental monitoring unit, under the implementing agencies, will be responsible for internal monitoring during operation. Environmental impact monitoring will be conducted by local environmental monitoring stations that will be contracted by HCDIO and HCHC, as an external independent monitor. EMP implementation and supervision responsibilities are defined in the EMP. If the monitoring work reveals any breach of the performance standards set out in the EMP, corrective action will be taken. The HCHC is responsible for preparing and submitting environmental monitoring reports through HCDIO and GIMAR to ADB, semi-annually during construction and annually during operation.

47. **Capacity building.** To ensure proper environmental assurance, a loan implementation environment consultant will provide trainings to construction supervision companies, contractors, and EHSU at HCHC in accordance with the training plan (Appendix 2 Table A2-2).

48. **Grievance redress mechanism.** Environmental grievances may occur during construction and operation. The HCHC agreed to establish a project grievance redress mechanism, which follows the procedure and timeframe defined in the EMP. The loan implementation environment consultant will provide training to the staff at EHSU on access points to the grievance redress mechanism to ensure that responsibilities and procedures are clear.

B. Involuntary Resettlement

49. The project does not entail any permanent land acquisition. Installing the underground heating pipelines will temporarily occupy the publicly-owned land (road and sidewalks) for a maximum of 6 months, which will not cause involuntary resettlement of people. The project will not result in restriction in land use, in displacement of housing, and in structure demolition. The project benefits are inclusive. The project beneficiaries include ethnic minorities. Thus, the project does not have adverse impact on ethnic minority people.

50. If there is any change in scope that may result in affecting people by land acquisition, structure demolition, and involuntary resettlement, the HCHC is required to inform ADB of the situation in advance, and prepare and submit a resettlement plan to ADB for review and approval, in accordance with ADB's Safeguard Policy Statement (2009).[23]

[23] 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.

VIII. GENDER AND SOCIAL DIMENSIONS

A. Summary Poverty Reduction and Social Strategy

51. **Poverty and social impact.** The project will benefit 294,500 households or 883,500 people (30% of total population of Hohhot City), of which 271,500 households are currently connected to either coal-based small inefficient neighborhood boilers or coal-fired household stoves and 23,000 new households.[24] Among the beneficiary households, 20.8% are urban villagers (i.e., urban residents in the near future), 71.5% are urban residents, and 7.8% are migrants. By income level, 4.9% are poor (14,570 poor households) and 24.8% belong to low income group.[25] The project will also bring benefit to (i) 18 schools with about 12,000 students; (ii) 35 kindergartens with about 4,000 students, and (iii) 12 hospitals.

52. The project will bring multiple direct benefits to the poor and vulnerable groups such as (i) improving living conditions by access to cleaner and reliable heating service, (ii) reducing cases of respiratory diseases through improved indoor and outdoor air quality, (iii) reducing carbon monoxide poisoning and fire accidents by switching from coal-based household stove to centralized district heating system, (iv) reducing heating expenditure by switching from household stoves to centralized energy efficient heating system, and (v) improving better school and medical environment during the winter by providing cleaner and reliable heating services. Free heating services will be offered to 14,570 poor households or 5% of the total beneficiaries. Also, the project could provide a limited number of jobs (50 positions during the construction period) to the poor, which may help to support their income.

53. **Gender impact.** The project will bring access to cleaner, safe, and affordable heating service to about 441,750 women including 8,000 female students. Also, the project is committed that 50% of the 280 permanent employment positions created under the project will be filled in by women. In addition, the project will conduct energy conservation campaign targeting women and students in collaboration with local women's federation at least two times during the project implementation period.

B. Labor Retrenchment and Reemployment Plan

54. Once the project is operational, 50 existing inefficient and polluting small coal-fired boiler plants in the Jinqiao heating zone will be decommissioned by the HMG's Public Utilities Bureau. In such case, 132 seasonal workers will be affected. The skills training will be provided to affected workers and HCHC is committed to retain these workers as long as they come up with the required skill level. A labor retrenchment and reemployment plan is in Appendix 1.

[24] Along with the rapid urbanization, additional 23,000 households are expected to move in to the project area by 2020.

[25] Defined as those covered by Dibao (the minimum living allowance program).

IX. 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
Impact Improved energy efficiency and cleaner environment in IMAR	By 2025, energy intensity in IMAR is reduced by 23%, compared with 2010.[a] (2010 baseline: 1.95 t of standard coal equivalent per CNY10,000 of gross regional products) By 2025, emission of SO_2 is reduced by at least 4.5% and NO_x by 6.5%, compared with 2010. (2010 baseline: 1,397,000 t of SO_2 and 1,314,000 t of NO_x)[b]	Data from IMAR Environment Protection Bureau	**Assumptions** The IMAR government and enterprises make the required investments in energy efficiency and emission reduction. Local environmental protection bureaus enforce air pollution laws and standards. **Risk** Additional polluting industries in urban area worsen air quality in IMAR.
Outcome Improved air quality and reduced greenhouse gas emissions in Hohhot	By 2022, average annual concentration of $PM_{2.5}$ decreases by 12% compared with 2013. (2013 baseline: 59.1 µg/m^3) By 2022, natural gas and wind-power-based district heating project cumulatively avoids annual CO_2 emissions of 1.3 million t[c] (2013 baseline: 0 t of CO_2)[d]	Hohhot Chengfa Heating Company project performance reports Loan review missions and project performance reports Data from the project's environmental monitoring reports Data from Hohhot and/or IMAR Environment Protection Bureau	**Assumption** Successful demonstration of the pilot project leads to large uptake of natural gas and wind energy in heating. **Risk** Reduction or removal of subsidies on gas and wind reduces financial viability of using natural gas and wind energy for heating.
Outputs 1. District heating coverage expanded	By 2020, district heating covers 116.5 million square meters in Hohhot. (2013 baseline: district heating covers 86.8 million square meters)	Data from Hohhot and/or IMAR Construction Bureau Loan review missions and project performance reports	**Assumption** Housing development activities in the new heating areas are completed on time. **Risk** Full occupancy has not been achieved by 2020.
2. Low-carbon and highly efficient heat-generation system installed	By 2020, the project avoids 848,500 t of coal per year; annual emissions of 1.6 million t of CO_2; 11,000 t of SO_2; 26,000 t of PM; and 9,000 t of NO_x[c] (2013 baseline: 665,000 t of standard coal consumption; and emissions of 1.6 million t of CO_2, 9,000 t of SO_2, 65,000 t of PM, and 7,500 t of NO_x)[d]	Loan review missions and project performance reports Data from the project's environmental monitoring reports Data from Hohhot and/or IMAR Environment Protection Bureau	**Assumption** Sufficient counterpart funds are mobilized on time. **Risks** Changes in subsidy schemes on wind energy and natural gas may impact the financial sustainability of the project.

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
	By 2020, the project achieves energy efficiency of 0.5 GJ/m^2. (2013 baseline: average energy efficiency 0.6 GJ/m^2)		Project implementation may be delayed because HCDIO and HCHC have limited experience with ADB procurement.
3. A new business model for wind-based district heating piloted	By 2020, a new business model for wind-based district heating is successfully tested.	Loan review missions and project performance reports	**Assumption** Three parties—heating company, wind farms, and grid company—sign purchasing contracts with agreed financial arrangement before testing and commercial operation. **Risk** Wind energy market is changed and available wind energy for district heating is insufficient for the entire project life time.

Activities with Milestones

1. **Output 1. District heating coverage expanded**
   - 1.1. Complete civil works by September 2019.
   - 1.2. Complete construction of pipelines and heat exchange stations by March 2020.
   - 1.3. Complete trial testing by April 2020.
2. **Output 2. Low-carbon and highly efficient heat-generation system installed**
   - 2.1. Engage loan implementing consultants and a tendering agency by March 2015.
   - 2.2. Complete detailed engineering design by December 2015.
   - 2.3. Complete installation of boilers, electric, and control equipment by March 2020.
   - 2.4. Complete trial testing by April 2020.
   - 2.5. Conduct a series of capacity development activities for project management, safeguards performance, and district heating advancement by April 2020.
3. **Output 3. New business model for wind-based district heating piloted**
   - 3.1. Agree on financial arrangement among three parties—heating company, wind farms, and grid company—and sign the three party agreement by September 2015.
   - 3.2. Sign purchasing contracts among three parties by December 2019.
   - 3.3. Complete the first financial transaction by December 2021.

Inputs

Loan
ADB: $150.0 million

Shanghai Pudong Development Bank: $162.4 million

Government (Hohhot City Development, Investment, and Operation Company): $90.8 million

ADB = Asian Development Bank, CO_2 = carbon dioxide, GJ/m^2 = gigajoule per square meter, IMAR = Inner Mongolia Autonomous Region, µg/m3 = microgram per cubic meter, NO_x = nitrogen oxides, PM = particulate matter, SO_2 = sulfur dioxide, t = ton.

[a] Energy intensity is calculated as units of energy per unit of gross domestic product. Energy intensity reduction rate from 2005 to 2010 in IMAR was 22.6%.

[b] IMAR Environmental Protection Bureau. 2011. *The Twelfth Five-Year Plan for Environmental Protection in Inner Mongolia Autonomous Region.* IMAR.

[c] Emission avoidance is based on the business-as-usual scenario of coal-fired district heating system, taking into consideration the expected increase of heat demand in the project area by 2020.

[d] Energy consumption and emissions indicated in the 2013 baseline are based on the actual coal consumption of existing households in the project area and associated emissions.
Source: Asian Development Bank

B. Monitoring

55. **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 basis for performance monitoring is the design and monitoring framework, which identifies performance targets for the impact, outcomes, and outputs of the project. The performance indicators include (i) energy efficiency improvements, (ii) reductions in emissions, (iii) installation of infrastructure, and (iii) social impact indicators disaggregated by gender including (a) implementation status of labor retrenchment, (b) number of beneficiaries, (c) employment records, and (d) number of residents outreached under the energy conservation awareness raising campaign. HCHC is responsible for (i) collecting data from the sources identified in the design monitoring framework, (ii) calculating the indicators, (iii) analyzing the results, and (iv) preparing the summary of performance describing the extent to which the project is generating the intended outputs and outcomes, which will be reported in quarterly progress reports, and/or semiannual and annual environmental monitoring reports during construction and operation, and/or the annual report on social objectives, as suitable. Loan implementation consultants will help HCHC monitor project impacts and prepare periodic reports. The monitoring and evaluation system will include specific and measurable targets and identify key risks and institutional arrangements for effective monitoring. Loan implementation consultants will provide training on monitoring when necessary. One month before the midterm review, the HCHC will submit to ADB, through HCDIO, a comprehensive report on each of these issues.

56. **Compliance monitoring**. GIMAR, with assistance of HCDIO, HCHC, and the loan implementation consultants, will conduct compliance monitoring and will submit reports and information to ADB concerning the use of the loan proceeds, project implementation, and compliance of loan and project covenants. These reports will include (i) quarterly progress reports on project implementation; and (ii) a project completion report, which should be submitted not later than 3 months after the completion of the project facilities. The compliance status of loan and project covenants will be reported and assessed through quarterly progress reports. ADB review missions will verify status.

57. **Safeguards monitoring.** During construction, contractors will prepare environmental records in accordance with the monitoring plan defined in the EMP to be submitted to the EHSUs. HCDIO and HCHC will contract local environmental monitoring stations (EMSs) as an independent and external monitor to conduct environmental impact monitoring in accordance with the monitoring plan defined in the EMP. The EMSs will prepare quarterly monitoring report and submit to HCDIO and HCHC. The loan implementation environment consultant will (i) review environmental records from contractors and quarterly environmental monitoring reports from the EMSs; (ii) conduct site visits; (iii) assess project progress and compliance with the EMP; and (iv) prepare semiannual and annual environmental monitoring reports and submit them to ADB through HCHC and HCDIO. Monitoring reports submitted to ADB are to be disclosed.

C. Evaluation

58. ADB will undertake annual project reviews between 2015 and 2020 to evaluate the progress of project implementation. ADB, GIMAR, HCDIO, and HCHC will undertake a

comprehensive midterm review of the project in 2017, covering all institutional, administrative, organizational, technical, environmental, social, poverty reduction, 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 of the project; (ii) evaluate environment, social, gender, and poverty impacts; (iii) ensure compliance with assurances in the loan and project agreements; and (iv) evaluate effectiveness of the procurement implementation activities of the GIMAR and tendering company using procurement review for effective implementation evaluation. It will also include 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, the GIMAR will submit a project completion report to ADB.[26]

D. Reporting

59. HCHC, through HCDIO, and GIMAR, 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 the next 12 months; and (iii) a project completion report within 6 months of physical completion of the project. To ensure projects continue to be both viable and sustainable, project accounts and the GIMAR's annual financial statements, together with the associated auditor's report, should be adequately reviewed. In addition, HCHC will also submit to ADB, through HCDIO the (i) semi-annual environmental monitoring report during construction and annual environmental monitoring report during operation, (ii) annual financial reports, (iii) annual reports on social objectives including progress status on labor retrenchment and reemployment; and (iii) project completion report submitted not later than 6 months after project completion. Table 14 summarizes the key reporting requirements during project implementation.

Table 14: 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
Environmental monitoring reports	Until loan completion -every 6 months during project construction and annually during operation;
Social reports (gender and labor re-employment)	Until the loan completion -annually
Audited financial statements and audited project accounts	Before 30 June of each year from 2015 throughout the implementation period
Auditor's report (including auditor's opinion) on statement of expenditures	
Project completion report	Within 6 months after project and loan completion

[26] Project completion report format is available at: http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar.

E. Stakeholder Communication Strategy

60. Project information was communicated through public consultation, information disclosure mechanism in ADB's and government's website, meetings, interviews, focus group discussions, and community consultation meetings, in accordance with ADB's requirements of information disclosure policy.

61. Two meaningful consultations with stakeholders have been conducted during feasibility study and EIA in accordance with the PRC Interim Guideline on Public Consultation in EIA (2006) and ADB's Safeguard Policy Statement (2009). Representatives of 16 communities, 7 community clinics, 14 local government agencies and social institutions, 210 households, and 12 small boiler houses in the project area were consulted through meetings, focus group discussions, and household surveys. Generally, there is a high level of public support for heating service improvements, so the beneficiary communities were very supportive. The project EIA was disclosed at www.adb.org and on the website of the HCDIO.

62. During construction, the affected people will be consulted through formal questionnaire surveys and informal interviews by the environmental management unit and/or the external environmental monitor. The semiannual and annual EMP progress and monitoring reports will be disclosed at www.adb.org. The HCHC together with HCDIO will establish the grievance redress mechanism and procedures to address environment and social issues associated with the project.[27] Both ADB and HCHC will disclose all project documents including the project data sheet, design and monitoring framework, consolidated EIA, and the Report and Recommendation of the President to the Board of Directors on their websites. Disclosure of social and environmental monitoring reports will be undertaken during project implementation.

[27] The proposed grievance redress mechanism is provided in Linked Document 12–Environmental Impact Assessment.

X. ANTI-CORRUPTION POLICY

63. ADB reserves the right to investigate, directly or through its agents, any violations of the Anti-corruption Policy relating to the project.[28] All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the GIMAR and all the project contractors, suppliers, consultants and other service providers. Individuals/entities on ADB's anti-corruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.[29]

64. To support these efforts, relevant provisions are included in the loan agreement and the bidding documents for the project. ADB's Anti-corruption Policy (1998, as amended to date) has been explained to and discussed with the GIMAR, HCDIO, and HCHC. The GIMAR, HCDIO, and HCHC have indicated their commitment to promote good governance and establish a corruption-free environment under the project. The GIMAR will undertake anti-corruption actions, including (i) conducting periodical inspections on the contractors' activities related to fund withdrawals and settlement; and (ii) ensuring that all contracts financed by ADB in connection with the project include relevant provisions of ADB's Anticorruption Policy in all bidding documents for the project specifying the right of ADB to audit and examine the records and accounts of the HCDIO and the HCHC, and all the contractors, suppliers, consultants and other service providers as they relate to the project.

[28] Available at: http://www.adb.org/documents/anticorruption-and-integrity-policies-and-strategies
[29] ADB's Integrity Office website is available at: http://www.adb.org/integrity/unit.asp.

XI. ACCOUNTABILITY MECHANISM

65. 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, the 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.[30]

[30] For further information see: http://www.adb.org/site/accountability-mechasim/main.

XII. RECORD OF PAM CHANGES

66. The project administration manual is a living document and is subject to change after ADB Board approval of the project's report and recommendation of the President. It is concise yet informative, providing checklists of all activities related to project implementation along with the necessary procedures for the project management office's to effectively implement and monitor the project.

No.	Changes/Updates	Date	Remarks
1	PAM initial draft agreed	28 May 2014	Agreed during the loan fact-finding mission
2	PAM revised draft agreed	20 September 2014	Agreed during the PPTA review mission. The revision reflects the ADB procurement reform-10 Action Plan
3.	PAM revised draft agreed	31 October 2014	Agreed during the loan negotiation.

ADB = Asian Development Bank, PAM = project administration manual, PPTA = project preparatory technical assistance.

LABOR RETRENCHMENT AND REEMPLOYMENT PLAN

A. Introduction

1. Once the project is operational, 50 existing inefficient and polluting small coal-fired boiler plants in the Jinqiao heating zone will be decommissioned by the Hohhot Municipal Government's Public Utilities Bureau. The boiler houses are currently operated by 141 workers including 132 seasonal workers and 9 permanent staff (Table A1-1). The closure of boiler houses will affect 132 seasonal workers, whereas nine permanent staffs will be transferred to other positions in their respective companies or institutions. This labor retrenchment and reemployment plan is prepared to safeguard the rights of 132 affected seasonal workers.

Table A1-1: Number of Boiler Houses Closure and Affected Workers

No.	Owner	Number of Small Boilers	Non-affected and affected Formal Employees	Affected Seasonal Workers	Total
1	Longde Garden	2	0	7	7
2	Ziyun Xiaoqu	2	0	7	7
3	Xuefu Huayuan	3	0	10	10
4	Artificial Limb Factory	1	0	3	3
5	Qingcheng district	1	0	3	3
6	Dormitory of Semiconductor Factory	2	1	4	5
7	Veterinary Station	2	1	4	5
8	Insurance Company	2	0	7	7
9	Institute of Petrochemical Industry	2	1	4	5
10	Hydrological Team	1	0	3	3
11	Commodity Inspection and Testing Bureau	2	1	5	6
12	Veterinary Machinery Authenticate Station	3	1	3	4
13	Baota Zhuanyuan	2	0	5	5
14	Foreign Economic and Trade School	2	1	3	4
15	Xinya Cashmere Sweater Ltd.	2	0	4	4
16	Ruitong Vehicle Repair Company	1	0	3	3
17	Xinshiji Luse Jiayuan	2	0	4	4
18	Grassland Working Station	2	1	3	4
19	Institute of Veterinary Machinery	3	1	6	7
20	Property Management Company of Well-drilling team of Saihan District	1	0	3	3
21	Kaiao Cashmere Sweater Factory	1	0	3	3
22	Dianli Xiaoqu	1	0	3	3
23	Lantian Gongyu	1	0	4	4
24	Housing Block of Chemical Plant	2	0	4	4
25	Fenghuayuan Xiaoqu	2	0	7	7
26	College of Medical Science	1	1	6	7
27	Television Chassis Factory	1	0	4	4
28	Hohhot Cigarette Factory (new)	2	0	7	7
29	Mengniu Brewery	1	0	3	3
	Total	**50**	**9**	**132**	**141**

Source: Jinqiao heat source implementing agency.

Figure A1-1: Two Small Boiler Houses to be Closed

B. Profile of Affected Workers

2. During heating season, 132 workers are employed on a temporary basis. According to the workers, over 60% of them are farmers from suburbs of Hohhot or nearby counties. About 90% worked at the same small boiler house for the last 3 years.

3. To prepare this plan, 13 workers, including 12 temporary workers and one formal employee, were surveyed. The survey results are summarized below:

(i) The former employee from the Grassland Working Station (No. 18 in Table A1-1):
  (a) is aware of the closure of the boiler house due to the implementation of the centralized heating system and environmental protection;

(b) has worked in the boiler house for the last 10 years;
(c) has a monthly salary of over CNY3,000; and
(d) knows that he will be transferred to another position in his station (the Hohhot Grassland Working Station).

(ii) Seasonal workers:
(a) Three were employed in October 2013, seven have worked in the same boiler houses for the last 3–5 years, and the remaining two have worked for more than 10 years;
(b) Eight are aware of the closure of the boiler houses where they are employed;
(c) All have contracts with boiler house owners for one heating season (6 months);
(d) Each are paid CNY1,500–CNY2,100 every month, together with free food and lodging;
(e) After heating season, seven go home for farming and another five do other temporary jobs in Hohhot and each can earn about CNY1,500–CNY3,800 per month;
(f) Seven workers contribute 10%–30% of their families' total annual income and the remaining five contribute 30%–50%;
(g) Four out of the five workers who also work in Hohhot during non-heating season think it will be easier to find jobs once the boiler houses are closed. The remaining one, a plumber, wants to be engaged in similar work after the boiler house's closure; and
(h) Six out of seven workers who go home for farming during non-heating season said that there are many employment opportunities in the tertiary sector, but requires working of more than 12 hours a day. The remaining one, a carpenter who felt it was difficult to get a job in winter season and anticipates the project could provide some help, if any.

C. Action Plan

4. **Legal Framework.** Skills training and reemployment opportunities to the affected workers will be provided in accordance with the Labor Contract Law of the People's Republic of China, enacted on 1 January 2008.

5. **Training and reemployment of seasonal workers.** Following the procedures and schedule in Table A1.2, the HCHC, through the owners' of boiler houses, will inform the affected workers of the timing of closure of boiler houses before the end of the heating season (April). Since the affected workers are hired on seasonal contractual basis by each owner of boiler houses, HCHC is not obliged to retain them and provide employment assistances in principle. However, if they would like to work at the heat source plant under the project on temporary basis, they are eligible to participate in the skills training for potential new positions offered by HCHC, which could offer up to 50 positions to the affected workers. Those who have completed the training will be hired on temporary basis during the heating season. Those who intend to work in other sectors could also participate in employment skills training organized by the Saihan District Labor and Employment Bureau, and HCHC will actively coordinate with the bureau to extend such training to affected workers.

Table A1-2: Re-employment Procedures and Schedule for Affected Workers

	Actions	Responsible Agency	Timing
1.	Notice of boiler house closure and needs assessment	HCHC and District Labor and Employment Bureau	April 2014 (before the end of heating season) or April 2015 if boiler houses are closed in 2015
2.	Sign-up for training course	Affected workers on voluntary basis	April–May 2014 or April–May 2015
3.	Provide skills training	- Labor and Employment Bureau provides non-farm employment skills training - Heat source plant operation team	June–July 2014 or June–July 2015
4.	Sign temporary employment contract for the coming heating season	HCHC (up to 50 positions could be provided per each heat source plant)	September 2014 or September 2015
5.	Provide on-the-job training	Heat source plant operation team	October–April 2014, or October–April 2015
6.	Follow-up temporary employment contract	HCHC (up to 50 positions each per heat source plant)	September in each of the following years

HCHC = Hohhot Chengfa Heating Company.

6. **Training and cost estimates.** Due to change in heat supply method from coal-based small boilers to modern centralized gas-based district heating system with renewable integration, 26 of the affected workers wish to take training to acquire new operational skills to work in heat source plants under the project.

7. Training topics will include (i) pipe maintenance; (ii) gas and electric boiler operation; (iii) laboratory technical work; (iv) machine maintenance; (v) electric maintenance; (vi) cybernation technique; and (vii) heating relay station equipment maintenance.

8. Those who intend to work in non-heating sectors will be trained by Saihan District Labor and Employment Bureau based on their needs and the HCHC will bear the cost of training if the government does not have a budget. The total training cost is estimated at CNY132,000 (Table A1-3). Initial assessments identified that 26 workers are interested in take part in skill training.

TableA1-3: Cost Estimates for Training

Type of Training	Number of Workers	Budget per Worker (CNY)	Total (CNY)	Responsible Agency
Operation and maintenance for new district heating system or non-farm employment skills	132	1,000	132,000	Implementing agency and/or Labor and Employment Bureau

D. Participation and Consultation

9. Since 2011, as part of the preparation of the feasibility study, owners of all boiler houses were informed by the Hohhot Municipal Government of the likely construction schedule of new

heat source plant and the timing of boiler house closure. During field survey under the project preparatory technical assistance in October 2013, workers of 12 boiler houses were interviewed and consulted regarding the (i) objective and scope of the impact of the project, (ii) schedule of closure of boiler houses, (iii) working positions to be offered, (iv) training needs, training arrangements and schedule, (v) income and welfare, (vi) working environment and conditions, and (vii) contents of labor agreement. HCHC will further organize meetings with the affected workers during the project implementation.

E. Complaint and Appeal

10. Complaints regarding reemployment arrangements, training, salary and benefits, should be directed to HCHC. HCHC will record and contact the related institutions or companies as soon as possible to resolve issues. If the issues are not resolved, HCHC can request help from Saihan District Labor and Employment Bureau. If HCHC and the local authority still cannot resolve the issues, the affected workers have the right to file the case in the local court.

F. Monitoring and Evaluation

11. HCHC and HCDIO is required to report the status of the labor retrenchment and reemployment to ADB through annual social reports. Also, the review missions from ADB will confirm the status of affected workers.

ENVIRONMENTAL MANAGEMENT PLAN

A. Objectives

1. This is the Environmental Management Plan (EMP) for the proposed Low-carbon District Heating Project in Hohhot, Inner Mongolia Autonomous Region (IMAR). The project will provide 1,560 megawatts of clean-burning natural gas-fired heating capacity and 50 megawatts of demonstration wind powered electrode heating capacity, which when combined will heat approximately 30 million square meters of public and residential building space.

2. The objectives of the EMP are to ensure (i) implementation of identified mitigation and management measures to avoid, reduce, mitigate, and compensate for anticipated adverse environment impacts; (ii) implementation of monitoring and reporting; and (iii) project compliance with the PRC's relevant environmental laws, standards and regulations and ADB's Safeguard Policy Statement (2009). Organizational responsibilities and budgets are clearly identified for execution, monitoring and reporting.

B. Implementation Arrangements

3. The Government of Inner Mongolia Autonomous Region is the executing agency and the Hohhot Chengfa Heating Company (HCHC) is the implementing agency. Hohhot City Development Investment and Operation Company (HCDIO, commonly referred to as the "Chengfa Company") is engaged to provide supervision to project implementation and good governance. The HCHC and the HCDIO jointly established a Project Management Office (PMO) with a Project Manager since May 2014. The PMO will include an appropriately staffed Environment, Health and Safety Unit (EHSU), and will be supported by a Loan Implementation Environment Consultant (LIEC). The PMO EHSU will include the Project Public Complaints Unit. The Haoqingying, Xinjiaying and Jinqiao branches of the HCHC will be responsible for the direct management of the three heating zones, and each branch will also form an EHSU. A conceptualized project management chart is presented in Figure A2-1.

4. The PMO will be responsible for day-to-day project implementation management including procurement and contract management, and payment to contractors.

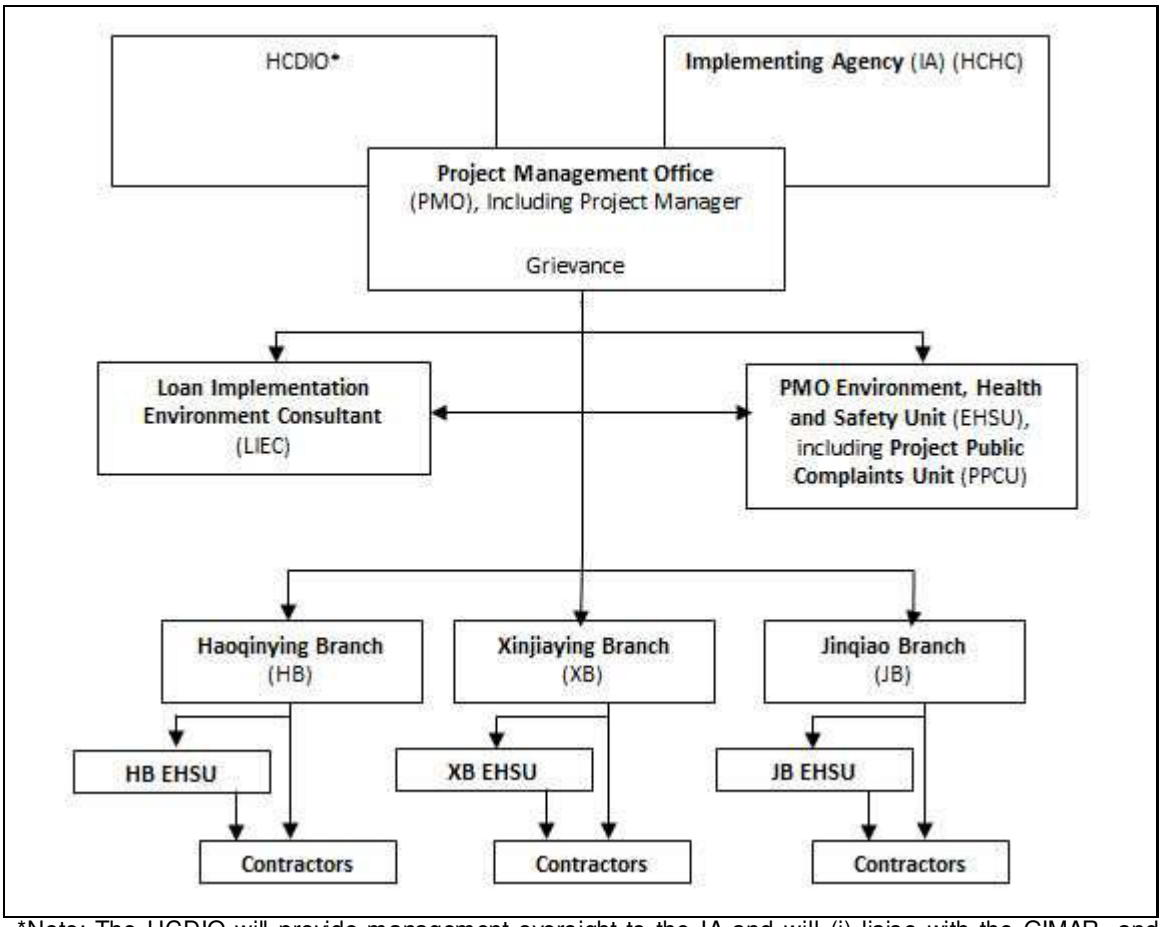
5. The EHSU within the PMO will consist of an EHSU leader and an appropriate number of staff. To ensure that the EMP requirements are incorporated into construction contracts, the PMO EHSU will prepare and provide the following specification clauses to incorporate in the bidding procedures: (i) a list of environmental management requirements to be budgeted by the bidders in their tendering documents; (ii) environmental clauses for contractual terms and conditions; and (iii) environmental monitoring requirements in domestic EIAs, the EIA and the EMP. The PMO EHSU will oversee EMP implementation, provide specific mitigation implementation guidance to the branch EHSUs and contractors, and prepare EMP monitoring reports semi-annually during construction and annually during operation. The EHSU will prepare and submit the EMP monitoring reports to the PMO who will review the reports and submit them to ADB and to the Saihan District Environmental Protection Bureau (EPB).[1]

6. The PMO through the EHSU will be responsible for contracting the Hohhot EPB Environment Monitoring Station to undertake construction and operation phase ambient

[1] The Saihan District EPB has been delegated by Hohhot EPB to be responsible for environment protection supervision and inspection during the construction phase.

monitoring.

Figure A2-1: Conceptualized Project Management Structure



*Note: The HCDIO will provide management oversight to the IA and will (i) liaise with the GIMAR, and Hohhot municipal government; (ii) sign onlending agreements with the GIMAR, through Hohhot municipal government, and will onlend to the HCHC; (iii) be directly responsible for making equity contributions; (iv) provide support and supervision in the project procurement with the IA; and (v) provide timely managerial and technical support to the IA to ensure the timely project implementation as well as good governance of the project. The HCDIO and HCHC will jointly establish a project management office (PMO).

7. The LIEC will provide project management and technical support to the PMO. The LIEC will be a part-time consultant who will support the PMO EHSU in mitigation implementation, environmental monitoring, reporting, and addressing any environment related issues that arise including grievances. The LIEC will develop construction and operation phase EHS plans.

8. The Branch EHSUs will have day-to-day responsibility for ensuring mitigation implementation in their respective heating zones. They will respond to complaints, and support the PMO EHSU in monitoring and reporting.

9. The contractors will be responsible for implementing relevant mitigation measures during construction. Following the award of the construction contract, the contractors will prepare Construction Site Environmental Management Plans, which detail the means by which the contractors will comply with the EMP. The contractors will implement the Construction Site Environmental Management Plans, and will take all reasonable measures to minimize the

impact of construction activities on the environment.

10. The PMO EHSU and the LIEC will be responsible for regular internal inspections of mitigation measures at the construction site, in accordance with the Environmental Monitoring Plan. The Hohhot EPB Environment Monitoring Station will undertake construction and operation phase ambient monitoring as per the Environmental Monitoring Plan. It is anticipated that the Saihan District EPB will also undertake random environmental compliance inspections during construction and operation. The Saihan District EPB will also conduct an environmental acceptance inspection after a three months trial operation period.

11. ADB will be responsible for reviewing overall environmental performance of the Project. ADB will review the semi-annual and annual environmental monitoring reports submitted by the PMO and will disclose the reports on its website. ADB will conduct due diligence of environment issues during the project review missions. If the PMO fails to meet safeguards requirements described in the EMP, ADB will seek corrective measures and advise the IA on items in need of follow-up actions.

12. Key project institutions and their EMP implementation responsibilities are summarized in Table A2-1.

C. Institutional Strengthening and Capacity Building

13. The institutional strengthening and capacity building focuses on the development of construction and operation phase EHS plans by the LIEC (one plan per heating zone) in accordance with relevant PRC laws and regulations, and the provision of training on the EHS plan implementation as well as implementation of the EMP and ADB and PRC safeguard requirements. In addition to typical good construction EHS practices, the EHS plans and capacity building will emphasize worker and community safety for natural gas boilers.

14. In the construction phase, significant works should not be undertaken until the construction EHS plan has been developed and training provided on its implementation. Similarly, heating zone operation should not commence until the operation phase EHS plan has been developed, and training provided on its implementation.

15. Development of the EHS plans, training topics, contents, estimated budgets and number of participants are presented in Table A2-2.

Table A2-1: Summary of Institutions and Responsibilities for EMP Implementation

Institution	Responsibilities
HCHC	Together with the HCDIO, jointly establish appropriately staffed PMO and hire LIEC and EMS; provide overall project management guidance to PMO;
HCDIO	Together with the HCHC, jointly establish appropriately staffed PMO and hire LIEC and EMS; provide supervision and guidance to the HCHC in order to ensure smooth and effective project management and good governance; Provide overall project management guidance to PMO.
Project Management Office (PMO)	Establish appropriately staffed EHSU; provide overall management and direction to EHSU.
PMO Environment, Health and Safety Unit (EHSU)	Ensure incorporation of EMP requirements into bidding documents and contracts; oversee EMP implementation; provide mitigation implementation guidance to the Branch EHSUs and contractors; undertake compliance inspections of mitigation measures at the construction sites, in accordance with the environmental monitoring plan; establish a Project Public Complaints Unit and ensure implementation of grievance redress mechanism; recruit and supervise the Hohhot Environmental Protection Bureau EMS to undertake construction and operation phase ambient monitoring; prepare EMP monitoring reports semi-annually during construction and annually during operation; coordinate the role of the LIEC.
Loan Implementation Environment Consultant (LIEC)	Provide technical assistance to the PMO EHSU in all aspects of EMP implementation; develop construction and operation phase EHS plans and provide training to the staff of the IA and contractor on EMP and EHS, utilizing additional consultants as required; assist and coordinate environmental monitoring, including undertaking compliance inspections and assisting EMS with ambient monitoring; assist the PMO EHSU in addressing any environmental issues that may arise, including grievances; and assist the PMO EHSU in preparing semi-annual and annual environmental EMP monitoring reports.
Branch EHSUs	Day-to-day responsibility for mitigation implementation; assisting the PMO EHSU and LIEC for compliance and ambient monitoring; assisting in implementation of grievance redress mechanism.
Contractors	Develop and implement Construction Site Environmental Management Plans in accordance with the EMP and other contract conditions; implement all required mitigations during construction; report all spills and accidents, and take appropriate actions.
Hohhot EPB EMS	Conduct ambient monitoring according to the environmental monitoring plan.
Saihan District EPB	Inspect the facilities during construction and operation to ensure compliance; enforce applicable the PRC's environmental laws and regulations; review EMP monitoring reports; and conducting an environmental acceptance inspection after a three months trial operation period. Ensure the boiler decommissioning activities led by Hohhot Utility Bureau will be performed in accordance with relevant PRC environmental laws and regulations and other all relevant domestic requirements. Ensure the gas company to follow a domestic EIA approval procedures and requirements and perform their gas pipe construction in accordance with all the relevant PRC environmental laws and regulations, and other domestic requirements, including their domestic EIA requirements. Ensure a planned Phase II heating source plant to meet all domestic approval requirements to minimize cumulative impact at project site.
ADB	Monitor and supervise the overall environmental performance of the project;

Institution	Responsibilities
	review the environmental monitoring reports and disclose the project monitoring reports on its website; conduct due diligence of environment issues during the project review missions.

EHSU = Environment, Health and Safety Unit, EIA = environment impact assessment, EMP = environmental management plan, EMS = environmental monitoring stations, HCDIO = Hohhot City Development, Investment and Operation Company, HCHC = Hohhot Chengfa Heating Company, LIEC = Loan Implementation Environment Consultant, PMO = Project Management Office, PRC = People's Republic of China.

Table A2-2: Institutional Strengthening and Training Program

Training Topic	Trainers	Attendees	Contents	Times	Period (days)	# Persons	Budget (USD)	Source of Funds
Construction Phase EHS Plan Development and Training	LIEC	HCHC, PMO, EHSU, Branch PMOs, Saihan District EPB, Contractors	**ADB and PRC EHS laws, regulations and policies** – ADB's safeguard policy statement – Project applicable PRC EHS laws, policies, standards and regulations International environmental, health and safety management practice in civil constructions **GRM** – GRM structure, responsibilities, and timeframe Types of grievances and eligibility assessment **Implementation of EMoP** – Impacts and mitigation measures during construction and operation – Monitoring and auditing mechanism – Reporting requirements Corrective actions for EMP **Implementation of Heating zone Construction Phase EHS Plans** – Plan descriptions – Roles and responsibilities	6 (2 per sub-project)	3	15	**EHS Plan Development** (fees and per diem): 3 plans x 10 days/plan x 350/day = $10,500 **EHS Plan Training Course Development** (fees and per diem): 10 days x $350/day = $3,500 **Course Delivery** (fees and per diem): 6 x 5 days x 350/day = $10,500 (fixed costs): $1,000 per course delivery x 6 = $6,000 **TOTAL = $30,500**	ADB
Operation Phase EHS Plan Training	LIEC	HCHC, PMO, EHSU, Branch PMOs, Saihan District EPB	**International good practices in natural gas-fired HSP operation** – Environmental, health and safety issues associated with natural gas-fired HSPs. **Implementation of Operation Phase EHS Plans** – Plan descriptions Roles and responsibilities	6 (2 per sub-project)	3	15	**Course EHS Plan Development** (fees and per diem): 3 plans x 10 days/plan x 350/day = $10,500 **EHS Plan Training Course Development** (fees and per diem):	ADB

Training Topic	Trainers	Attendees	Contents	Times	Period (days)	# Persons	Budget (USD)	Source of Funds
							10 days x $350/day = $3,500 **Course Delivery** (fees and per diem): 6 x 5 days x 350/day = $10,500 (fixed costs): $1,000 per course delivery x 6 = $6,000 **TOTAL = $30,500**	
			Total	**12**	**36**	**180**	**$70,000**	

ADB = Asian Development Bank, EHS = Environment, Health, and Safety, EHSU = Environment, Health and Safety Unit, EMP = environmental management plan, EMoP = environmental monitoring plan, EPB = Environment Protection Bureau, GRM = grievance redress mechanism, HCHC = Hohhot Chengfa Heating Company, HSP = heating source plant, LIEC = Loan Implementation Environment Consultant, PMO = Project Management Office, PRC = People's Republic of China.

D. Potential Impacts and Mitigation Measures

16. The potential impacts of the project during construction and operation have been identified and appropriate mitigation measures developed (see Chapter V of the EIA). Detailed impacts and mitigation measures are presented in Table A2-3.

E. Environment Monitoring Plan

17. An environment monitoring plan to monitor the environmental impacts of the project and assess the effectiveness of mitigation measures is presented in Table A2-4. The environment monitoring plan includes both compliance inspection undertaken by the PMO EHSU supported by a loan implementation environment (health, and safety) consultant, and ambient and discharge air, noise, wastewater and flue gas monitoring undertaken during both construction and operation phases. The monitoring methods and standard for ambient and discharge monitoring parameters are presented in Table A2-5.

18. The data and results of environmental compliance inspection and monitoring activities will be used to assess: (i) the extent and severity of actual environmental impacts against the predicted impacts and baseline data collected before the project implementation; (ii) performance or effectiveness of environmental mitigation measures or compliance with pertinent environmental rules and regulations; (iii) trends in impacts; (iv) overall effectiveness of EMP implementation; and (v) the need for additional mitigation measures and corrective actions if non-compliance is observed.

Table A2-3: Environment Impacts and Mitigation Measures

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
A. Pre-construction Phase					
Incorporate Mitigation Measures and Monitoring in Detailed Design and Bidding and Contracting	Include mitigation measures and monitoring program in detailed designs	Environmental mitigation measures identified in this EIA, the EMP including health and safety requirements, landscaping, etc, and the domestic EIAs will be incorporated in the engineering design.	EHSU supported by LIEC	PMO, ADB	Detailed Design Budget
	Include mitigation measures and monitoring program in bidding documents	Environmental mitigation measures identified in this EIA and the domestic EIAs will be incorporated in the bidding documents for the project, and will be included in contract documents for civil constructions and equipment installations. All contractors shall be required to strictly comply with the EMP.	EHSU supported by LIEC	PMO, ADB	Detailed Design Budget
	Environmental monitoring incorporated into design.	The environmental monitoring program (EMoP, see Table A-4 in Appendix I) will be incorporated into the design to ensure that environmental impacts are closely monitored and activities of the Project construction and operating are closely supervised against the PRC environmental laws, regulations and standards, ADB SPS, and the Project EMP and approved domestic EIAs.	EHSU supported by LIEC	PMO, ADB	Detailed Design Budget
Grievance Redress Mechanism (GRM)	Impacts on Project Affected Persons	In accordance with the GRM presented in Chapter VIII of the EIA, establish a Project Public Complaints Unit (PPCU) in IA's office; provide GRM training for PPCU members and GRM access points; disclose the PPCU's phone number, fax, address, and email to the public.	EHSU supported by LIEC	PMO, ADB	Detailed Design Budget
B. Construction Phase					
Erosion and Spoil	Soil erosion, spoil disposal	Good practice construction erosion controls and site maintenance:	Contractors directed by	EHSU supported by	Contractor construction

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– HSP site storm water runoff will be assessed and estimated and appropriate storm water – Fish ponds along the northwestern boundary of the Jinqiao HSP will be protected by silt fences when nearby construction activities are underway. Spoil will be reused onsite to the maximum extent feasible as fill to rehabilitate disturbed areas or for landscaping. – Temporary spoil storage sites will be identified,	Branch EHSUs	LIEC	budget
B. Construction Phase					
		designed, and operated to minimize impacts. Sites will be restored at the conclusion of storage activities. – Excess spoil that cannot be used onsite will be transported to an approved spoil disposal site. – Spoil and aggregate piles will be covered with landscape material. – During earthworks the area of soil is exposed to potential erosion at any one time will be minimized. – Construction and material handling activities during periods of rains and high winds will be limited or halted. – Pipelines will be installed and backfilled in a sequenced section-by-section approach, with sections not exceeding 300 m in length. Open excavation areas during trenching activities will be minimized, and appropriate construction compaction techniques utilized. – Any planned paving or vegetating of areas will be done as soon as practical after the materials are removed to protect and stabilize the soil. – Once construction is complete disturbed surfaces will be properly sloped and revegetated with native trees and grass (see greening plan, below).			
Wastewater	Surface and groundwater contamination from construction	Good wastewater management practices: – Adequate temporary sanitary facilities and ablutions will be provided for construction workers. Toilets will be equipped with septic tanks in accordance with	Contractors directed by Branch EHSUs	EHSU supported by LIEC	Contractor construction budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
	wastewater, and domestic water	PRC standards. Septic tanks will be pumped out on an as needed basis and the effluent will be discharged for final treatment at the Jinqiao wastewater treatment plant. – Wastewater from the canteen should be treated in an oil-water separator, and then discharged into the municipal sewer for final treatment at the Jinqiao wastewater treatment plant. – Construction wastewater will be directed to temporary detention and settling ponds prior to discharge to urban storm sewers. – Areas where construction equipment is being washed will be equipped with water collection basins and sediment traps.			
Air Pollution	Dust, vehicle emissions	– HSP sites, HES sites and pipeline sections under construction will be fully enclosed by a 3 m fence	Contractors directed by	EHSU supported by	Contractor construction

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		prior to the commencement of construction. Fence height will be increased near sensitive locations (residential areas, schools, clinics and hospitals). – Water will be sprayed on active construction sites where fugitive dust is being generated on a daily basis, and more frequently during windy days. – Construction activities will be halted during high wind events. – All construction piles with the potential to generate dust will be covered and/or regularly watered. – Transport vehicles will be limited to low speeds in construction sites. – Loads will be covered during truck transportation to avoid spillage or fugitive dust generation. Fine materials will be transported in fully contained trucks. – Construction site roads will be well maintained, and watered and swept on an as-needed basis. Construction site road entry points will be equipped with truck drive through wash ponds. – Transport routes will avoid residential neighborhoods and other sensitive areas to the maximum extent practical. – Vehicles and construction machineries will be maintained to a high standard (to be done off-site) to ensure efficient operating and fuel-burning and compliance with the PRC emission standards GB 11340-2005, GB 17691-2005, GB 18285-2005 and GB 18352-2005. – The use of coal for cooking on site, heating and hot water is prohibited. – Non-ozone depleting blowing agents will be utilized for the polyurethane foam (PUR) during the	Branch EHSUs	LIC EHSS	budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		construction of pre-insulated bonded heating pipes.			
Noise	Impacts from construction noise on	To ensure construction activities meet PRC noise standards (*Noise Standards for Construction Site*	Contractors directed by	EHSU supported by	Contractor construction

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
	sensitive resources	*Boundary*, GB 12523-2011) and protect workers: – Construction activities will be restricted to 6:00-12:00 h and 14:00-22:00 h. Construction activities will be prohibited during the nighttime (22:00 h to 07:00 h). Exceptions will only be allowed in special cases, and only after getting approval of the surrounding residents, EPB and other relevant departments. When undertaking construction planning, simultaneous high-noise activities will be avoided, and high noise activities will be scheduled during that day rather than evening hours. Similarly, construction sites will be planned to avoid multiple high noise activities or equipment from operating at the same location. – Low-noise equipment will be selected as much as possible. – Noise levels from equipment and machinery must conform to the PRC standard GB 12523-2011, will be equipped with mufflers, and will be properly maintained to minimize noise. – Machines in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum. – Noise personal protective equipment will be provided to workers. – Transportation routes and delivery schedules will be planned during detailed design to avoid densely populated and sensitive areas and high traffic times. – Vehicles transporting construction materials or wastes will slow down and not use their horn when passing through or nearby sensitive locations, such as residential communities, schools and hospitals. – Given their location within residential areas, special attention will be paid to protect sensitive sites near HESs and along the pipeline routes: – High noise construction activities will be positioned as far away from sensitive sites as possible. – Low noise equipment will be utilized to the extent possible.	Branch EHSUs	LIC EHSS	budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– Temporary or permanent noise barriers will be installed to protect sensitive sites.			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
Solid Waste	Inappropriate Waste Disposal	– Wastes will be reused or recycled to the extent possible. – Littering by workers will be prohibited. – Domestic waste containers will be provided at all works sites. Domestic waste will be collected on a regular basis all work by the local sanitation departments and transported for recycling, reuse, or disposal at a licensed landfill, in accordance with relevant PRC regulations and requirements. – Construction waste dumpsters will be provided at all work sites. Construction waste will be collected on a regular basis by a licensed waste collection company and transported for recycling, reuse, or disposal at a licensed landfill, in accordance with relevant PRC regulations and requirements. – Excavated soil will be backfilled onsite to the extent possible. Excess spoil that cannot be used on-site will be transported to an approved spoil disposal site. – There should be no final waste disposal on site. Waste incineration at or near the site is strictly prohibited. – Contractors will be held responsible for proper removal and disposal of any significant residual materials, wastes, and contaminated soils that remain on the site after construction.	Contractors , local sanitation departments (domestic waste), licensed waste collection companies (construction waste)	EHSU, LIC	Contractor construction budget
Hazardous and Polluting Materials	Inappropriate transportation, storage, use and spills	– A hazardous materials handling and disposal protocol that includes spill emergency response will be prepared and implemented by contractors. – Storage facilities for fuels, oil, chemicals and other hazardous materials will be within secured areas on impermeable surfaces provided with dikes, and at least 300 m from drainage structures and important water bodies. A standalone site within the storage facility will be designated for hazardous wastes. – Suppliers of chemicals and hazardous materials must hold proper licenses. They will follow all relevant protocols in “Operation Procedures for Transportation, Loading and Unloading of Dangerous or Harmful Goods” (JT 3145-91).	Contractors, waste management companies	EHSU, LIEC	Contractor construction budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– A licensed company will be hired to collect, transport, and dispose of hazardous materials in accordance with relevant PRC regulations and requirements. Vehicles and equipment will be properly maintained and refueled in designated service areas on impermeable surfaces provided with oil traps, at least 300 m from drainage structures and important water bodies.			
Flora and Fauna	Removal of vegetation	– A greening plan will be implemented in each HSP site , using appropriate native species. According to the domestic EIAs, the approximate area to be vegetated for each HSP is: – Haoqingying greening area: 34,486 m^2 – Xinjiaying greening area: 27,226 m^2. – Jinqiao greening area: 34,375 m^2. Any vegetated areas impacted by pipeline works or construction of HESs will be restored post-construction using appropriate native species.	DI (plan design), Contractors (plan implementation)	EHSU, LIEC	Contractor construction budget
	Waterway pipeline crossing	The Jinqiao heating zone will require one river crossing. To minimize potential impacts: – Directional drilling will be used to embed the pipeline under the waterway. The waterbody will be protected by siltation fences.			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
Socioeconomic Resources	Community Disturbance and Safety	**Traffic and Public Safety** Traffic control plans, agreed to by the local traffic control authority, will be developed and implemented for each heating zone in order to minimize community disturbance: – Local government, using information provided by the PMO, will inform residents, institutions, bossiness and other affected parties as to planned construction activities including schedule and duration of construction works, and expected traffic and other disruptions. – Transportation routes and delivery schedules will be planned during detailed design to avoid densely populated and sensitive areas and high traffic times. – Warning signs and cones will be installed along roads to protect workers and people in the neighborhood. Safety flag people will be used if appropriate. – During evening construction warning lights will also be used. – Vehicles transporting construction materials or wastes will slow down and not use their horn when passing through or nearby sensitive locations, such as residential communities, schools and hospitals. – Roadside earthworks should be completed as quickly as possible, and all spoil either backfilled or removed. – Road crossing will use the pipe-jacking installation method where possible in order to minimize disruption. – Public access to construction sites and other areas of danger will be restricted and temporary barriers installed.	DI (plan design), Contractors (plan implementation)	EHSU, LIEC	Contractor construction budget
		Access to Public Services, Private Properties and Businesses Local authorities will be consulted to minimize disruption of public services such as telephone, water, gas and power supply. Contactors will use good construction practices to avoid disruption of other services. – The contractor shall take measures to minimize	Contractors directed by Branch EHSUs	EHSU supported by LIEC	Contractor construction budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		disruption of access to private properties and businesses where possible. Temporary access to affected private properties, businesses and public service buildings will be provided including temporary crossings over pipeline trenches, and subsequently good quality permanent access will be provided.			
	Worker Occupational Health and Safety	Contractors will implement adequate precautions to protect the health and safety of their workers:	EHS Plan Developed by	EHSU	LIEC Budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	

		– Each contractor will implement the relevant heating zone construction phase EHS plan developed by the LIC EHS experts.
		– An EHS officer will be appointed by each contractor to implement and supervise the EHS management plan.
		– The EHS Plans will:
		  – Identify and minimize the causes of potential hazards to workers.
		  – Implement appropriate safety measures.
		  – Ensure the provision of adequate type and number of fire extinguishers and first aid facilities onsite.
		  – Provide training to workers on occupational health and safety and emergency response, especially with respect to using potentially dangerous equipment.
		  – Ensure that all equipment is maintained in a safe operating condition.
		  – Ensure that material stockpiles or stacks, such as, pipes are stable and well secured to avoid collapse and possible injury to workers.
		  – Provide appropriate personal protective equipment to workers to minimize risks, including ear protection, hard hats and safety boots, and post adequate signage in risk areas.
		  – Provide procedures for limiting exposure to high noise or heat working environments in compliance with PRC noise standards for construction sites (GB 12523-2011).
		  – Provide training to workers on the storage, handling and disposal of
			LIEC
			
			EHS Plan implemented by contractors directed by Branch EHSUs
				EHSU supported by LIEC	Contractor construction budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– hazardous wastes. – Ensure regular safety meetings with staff.			
Physical Cultural Resources	PCRs may be damaged if proper precaution is not taken.	– The tomb south of the Jinqiao HSP will be demarcated by fence and signs as a no-entry area. – A construction phase chance find procedure will be established and activated if any chance finds of PCRs are encountered: – construction activities will be immediately suspended if any PCRs are encountered; – destroying, damaging, defacing, or concealing PCRs will be strictly prohibited in accordance with PRC regulations; – the local Cultural Heritage Bureau will be promptly informed and consulted; and, construction activities will resume only after thorough investigation and with the permission of the local Cultural Heritage Bureau.	Contractors	EHSU supported by LIEC and District Cultural Heritage Bureau	In the event that a PCR is discovered, the direct cost for compensation to contractor will be covered by a special fund to be developed for cultural relic protection.
C. Operation Phase					
Air Pollution	Combustion Emissions	– Low nitrogen oxides natural-gas fired boilers will be utilized producing less than 100 mg/m^3 nitrogen	Contractors (construction)	EHSU	Contractor construction

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		oxides emissions (1,560 megawatt heating capacity) and ensure at least the parameters indicated in Table 55 to be met.			budget
		– Zero emission wind-powered demonstration electrode boilers utilized (50 megawatt heating capacity).	HCHC (operation)	Saihan District EPB	HCHC operation budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
Water	Municipal Water Consumption	– Confirmations obtained from Hohhot Municipal Water Supply Company on availability of sufficient supply.	Hohhot Municipal Water Supply Company	Hohhot Water Affairs Bureau	HCHC operation budget
Wastewater	Discharge of Production and Domestic Wastewater	Domestic wastewater will be treated in digestion tanks, and then in combination with the production wastewater, will be discharged to the Hohhot municipal sewerage system for treatment at the Jinqiao wastewater treatment plant. – Each HSP will be equipped with an emergency – overflow tank (1200 m^3 capacity for Haoqingying and Jinqiao, and 1500 m^3 capacity for Xinjiaying). All emission concentration of suspended solids, chemical oxygen demand, and biochemical oxygen demand and ammonia nitrogen will be in compliance with Class III standard requirements of integrated wastewater discharge standard (GB 8978-1996), which sets the emission standards for wastewater discharged to a municipal sewerage system.	HCHC	Saihan District EPB	HCHC operation budget
Solid Waste	Collection and Disposal	– Waste bins will be provided at all facilities. – Wastes will be routinely collected by the local	District Sanitation	Saihan District EPB	HCHC operation

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		sanitation department for recycling, if possible, or final disposal at an approved waste disposal site. – No permanent on-site solid waste disposal will be permitted at HSPs or HESs. – No burning of wastes will be permitted at HSPs or HESs. All structures and/or components replaced during maintenance activities will be reused or recycled to the extent possible. Non-recyclable parts will be disposed at an approved waste disposal site.	Departments		budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
Chemical and Hazardous Materials	Inappropriate Management	– A register of all activities that involve the handling of potentially hazardous substances will be developed, including protocols for the storage, handling and spill response. This will include all fuels, oils, grease, lubricants, and other chemicals. – All chemicals, toxic, hazardous, and harmful materials will be transported in spill proof tanks with filling hoses and nozzles in working order, All chemicals, toxic, hazardous, and harmful materials will be stored in secure areas with impermeable surfaces and protective dikes such that spillage or leakage will be contained from affecting soil, surface water or groundwater systems. Their usage will be strictly monitored and recorded. Some chemicals will be stored off-site, such as water quality analysis chemicals which will be stored at an independent laboratory. – Material safety data sheets will be posted for all hazardous materials. – Oil absorbents will be readily accessible in marked containers. – Good housekeeping procedures will be established to avoid the risk of spills.			
		– Spills will be dealt with immediately, and personnel will be trained and tasked with this responsibility.	HCHC, Licensed	Saihan District EPB	HCHC operation

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– Workers will be properly trained before handling hazardous wastes and have the requisite PPE. – Hazardous waste will be temporarily stored in closed containers away from direct sunlight, wind, water and rain in secure designated areas with impermeable surfaces and protective dikes such that spillage or leakage will be contained. – Hazardous wastes will be collected and disposed by licensed contractors on an as needed basis.	Contactors		budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
Noise	Impact on Sensitive Receptors	– The project design will use low-noise equipment as far as possible, and will also utilize noise elimination, shock absorption, insulated enclosures and sound dampening materials on exterior walls to ensure the noise level indicated in Tables 68-70 to be met. All plant and equipment, including vehicles will be properly maintained in order to minimize noise. – Appropriate noise PPE will be provided to the workers who are likely to be exposed to high noise level environments.	Contractors (construction) HCHC (operation)	EHSU Saihan District EPB	Contractor construction budget HCHC operation budget
Occupational Health and Safety	Risks to Workers	To minimize risks associated with leaks of natural gas: – All natural gas works will be in compliance with	Contractors (construction)	EHSU	Contractor construction

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		relevant PRC building code requirements, including the *Code for Design of City Gas Engineering* (GB 50028-2006) and *Regulation on Electric Apparatus Design for Explosion and Fire Risk Environment* (GB 50058-92).	HCHC (operation)	Saihan District EPB	budget HCHC operation budget
		– Independent gas regulation stations will be constructed at least 14 m away from other buildings and 30 m from the site boundary, to minimize the risk – of explosion damaging other Project facilities or the public.[32] – The China Gas Company of Hohhot will construct and operate the gas regulation stations. – The gas regulation stations will be specially designed to withstand and contain explosions. Gas regulation stations and the connection to the boilers will be equipped with flammable gas detection, alarm and fire suppression systems. In case of a gas leak, automatic shutdown valves will shut down the gas supply, the system will generate audible and visual alarms, and the emergency ventilation system will exhaust gas from the stations so as to protect the building and operators. Normal air change for the stations will be six times per hour, but in emergencies the ventilation system will change the air 12 times per hour. Electrical devices within the explosion risk area will be safety equipped.			
		– The gas pipelines feeding into the pressure regulation stations will be embedded underground, and will be coated with three layers of PE corrosion protection sleeves. The gas lines exiting the gas pressure regulation stations will be suspended overhead, and will be treated 4 times with anti-	Plans developed by LIEC	PMO, Saihan District EPB	LIEC Budget

[32] In the *Code for Design of City Gas* Engineering (GB 50028-2006) the recommended distance from a gas regulation station with no more than 1.6 MPa inlet pressure to other buildings is 9 m. In the Project, the minimum distance from gas regulation stations to the nearest building is 21 m in the Xinjiaying HSP, 15 m in the Jinqiao HSP, and 14 m in the Haoqinying HSP respectively, which fully conforms to the national code requirement.
Gas regulation stations are defined as Class II explosion risks. Space within 4.5 meter away from a regulation station is included in the explosion risk region, as regulated in *Regulation on Electric Apparatus Design for Explosion and Fire Risk Environment* (GB50058-92). The minimum distance from a gas regulation station to a site boundary fence is 30 meter in three HSPs, which confines the explosion risk within the plant sites; explosions will not impact areas outside the site boundaries.

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		corrosion paint. Pipelines will be grounded and equipped with anti-lightning devices where applicable. – All other at risk areas will have flammable gas detection and alarm systems able generate audible and visual alarms, and automatic fire suppression systems. – All gas related devices will be brightly colored and equipped with warning signs. To mitigate potential health and safety risks to workers, the following measures will be taken: In operation phase EHS plans for each heating zone including fire prevention and control will be developed and implemented, and workers will be trained regularly on their implementation.	Plans implemented by HCHC	Saihan District EPB	HCHC Budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– The HSP general arrangements will be designed in strict compliance with relevant PRC fire, health and safety standards. Fire compartments will be established based on the fire risk, and fire-resistant buildings/structures will include fire-proof doors and windows. Fire-alarm and suppression systems will be installed and tested regularly to ensure it functions properly. – The process control system will include an out-of-limit alarm to ensure all hazardous materials are safety under control at all time. – PPE, including goggles, gloves, safety shoes, will be provided to workers. – Naked fire sources, hot surfaces, electric sparks, electrostatic sparks and ignition sources will be strictly controlled, especially near natural gas. – Control measures will be strictly undertaken to ensure the discharge, exhaust and safety relief of flammable fuels in enclosed systems. – No unauthorized personnel should be allowed into HSPs or HESs. – Authorized personnel must have appropriate PPE at all times.			
	Emergency Response	An emergency risk and response plan for each heating zone will be established in accordance with the "National Environmental Emergency Plan" (24 January 2006) and other relevant PRC laws, regulations and standards, and will include measures in the World Bank EHS guidelines with respect to occupational and community health and safety. The plan must be established and in place before the plant is operational.	Plans developed by EHSU with support from LIEC	Saihan District EPB, local emergency authorities	LIEC budget
		Indicative plan requirements are as follows: – Procedures for responding to different types of emergency situations will be identified in the response plan. Emergency exercises will be conducted and they should include different emergency scenarios.	Plans implemented by HCHC	Saihan District EPB, local emergency authorities	HCHC budget

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		Training Requirements – Appropriate operating and maintenance employees			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		will be trained to ensure that they are knowledgeable of the requirements of emergency response plan. Training will be provided as follows: – Initial training to all employees before the HSP plant is put in operation; – When new equipment, materials, or processes are introduced. – When emergency response procedures have been updated or revised. **Annual Emergency Simulation** – Simulated emergency exercises will be conducted at least annually. **Receiving Notification of a Possible Emergency** – When a supervisor receives a report of a possible emergency situation, he/she should obtain at minimum the following information from the reporting person: – Name of person reporting emergency; – Nature of emergency-leak, fire, interruption of service if leak, odor present, etc. – Details of emergency: location, amount, how long has the odor been noticed, what actions have been taken, etc. – Leaks or other emergencies require prompt investigation. **Immediate On-site Action** The first responder will assess the nature of the report. This assessment should include the status of			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		the emergency, an estimation of how the incident might progress, and an evaluation of the manpower,			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		equipment, and materials needed to adequately cope with the situation. – If there is a strong odor or any measurable reading of gas detected inside a structure: – Clear the building of all occupants. – Eliminate potential ignition sources. – Localize or isolate the problem and shut off gas as needed. – Determine the extent of the hazardous area and establish a restricted area. – The responding supervisor shall determine the extent of the emergency and inform the dispatcher of the condition at the site. – If emergency procedures are put into effect, the responding supervisor should select a location and establish an emergency command post. – The responding supervisor will assign one person to remain at the command post to maintain communications until the emergency is over. – When necessary, the command post will be coordinated with the local emergency responders. When local emergency responders are involved, they will be in charge of the incident. – The responding supervisor will make himself known to fire and/or police department officials, or other authority having jurisdiction, and will remain with them during the emergency. – All employees reporting to the scene of the emergency will report to the command post for identification and instructions. - Key personnel will be alerted, and it will			

Category	Potential Impacts and Issues	Mitigation Measures and/or Safeguards	Responsibility		Source of Funds
			Implemented by	Supervised by	
		– be their responsibility to keep the emergency personnel under their supervision informed and available for emergency call out. – When a system failure cannot be made safely by normal procedures, emergency shutdown procedures should be implemented. – Reduce system pressure or segment a section before repair procedures are implemented. – Well trained and qualified personnel will be dispatched to monitor system pressure and repair work. **Communication with Public Officials** – When an emergency resulting in a hazard to the public safety occurs, the local fire department, police, the city medical emergency center and other relevant public officials should be notified. An emergency call list will be prepared and make it available at the plant control room.			

ADB = Asian Development Bank, DI = design institute, EHS =environment, health, and safety, EHSS = environment, health and safety specialist, EHSU = environment, health and safety unit, EIA = environment impact assessment, EMP = environment monitoring plan, EMS = environment monitoring station, EPB = environment protection bureau, ,GRM = grievance redress mechanism, HCHC = Hohhot Chengfa Heating Company, HSP = heating source plant, IA = implementing agency, LIEC = loan implementation environmental consultant, m = meter, m^2 = square meter, m^3 = cubic meter, PCR = Physical Cultural Resources, PMO = project management office, PPCU = Project Public Complaints Unit, PPE = personal protective equipment, PRC = People's Republic of China.
Source: Domestic Project EIA Reports (2014) and TA consultants.

Table A2-4: Environmental Monitoring Plan (EMoP)

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
A. Construction Phase						
Erosion and Spoil	Compliance inspection of erosion protection measures and spoil management	Construction sites, spoil disposal sites	Monthly; and once after completion of spoil disposal	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Wastewater generated from construction	Compliance inspection of wastewater mitigation measures (detention ponds, septic systems)	HSP construction sites	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Air Pollution	Ambient dust monitoring (TSP, PM_{10})	HSP construction sites; representative number (15%) of HESs and pipeline construction segments	Monthly	Hohhot EPB EMS	PMO	EPB EMS lump sum monitoring contract
	Compliance inspection of dust mitigation measures (water spraying, cover transport vehicles, etc.); and maintenance and condition of vehicles and construction equipment.	All construction sites	Weekly when there are construction activities	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Noise	Leq dB(A)	HSP construction sites; representative number (15%) of HESs and pipeline constriction segments	Monthly: a day each time and two samples; once during daytime, once during nighttime.	Hohhot EPB EMS	PMO	EPB EMS lump sum monitoring contract
Solid Waste	Compliance inspection of domestic and construction waste collection and disposal	Waste collection and disposal sites.	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Hazardous and Polluting Materials	Compliance inspections of hazardous management, protocols, and licenses of suppliers and waste removers	Storage facilities for fuels, oil, chemicals and other hazardous materials. Vehicle and equipment maintenance areas.	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Greening Plan	Compliance inspection of implementation of greening plans (HSPs), HESs and pipelines	HSP sites, HES sites, pipeline routes.	After construction is complete.	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
Health and Safety	Record and report both minor and	HSPs, HESs, pipelines	Continuous	HCHC EHS	HCHC and	Included in

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
	lost-time incidents			Specialists	HCDIO	IAs' operation budgets
Socioeconomic Impacts	Compliance inspection to determine if traffic and public safety measures are in place	Pipeline and HSP construction sites at or near roads. Transportation routes.	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
	Compliance inspection to determine if temporary access being provided to public and private properties	Pipeline routes	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
	Compliance inspection to determine if EHS Plans developed and implemented, and workers have appropriate PPE	All construction sites	Monthly	EHSU supported by LIEC	PMO	EHSU: PRC PMO Budget LIEC: ADB LIEC Budget
B. Operation Phase						
HSP Emissions	SO_2, NO_2, TSP, PM_{10} (Compliance with Table 55)	Internal monitoring: sampling at stack of HSPs	Online continuous emission monitoring systems (CEMs)	IAs	Saihan District EPB	Included in IAs' operation budgets
	SO_2, NO_2, TSP, PM_{10} (Compliance with Table 55)	Calibration monitoring: at stack outlet of the HSPs	Twice per heating season	Local EMSs	Saihan District EPB	EPB EMS lump sum monitoring contract
	CO_2	Calculated from natural gas consumption	Annually	IA	HCDIO	Included in IAs' operation budgets
Ambient Air Quality	SO_2, NO_2, TSP, PM_{10}, $PM_{2.5}$,	No.3 and No.6 indicated in Figures 41-52	Twice per heating season	Hohhot EPB Monitoring Stations	Hohhot EPB	Hohhot EPB (Non project funds)
Domestic and Production Wastewater Discharged to Municipal Sewer	Suspended solid, chemical oxygen demand, biochemical oxygen demand	HSP Discharge Locations	Quarterly (4 times per year)	Local EMSs	Saihan District EPB	EPB EMS lump sum monitoring contract
Noise from HSP	Leq dB(A)	Compliance monitoring: at 1m outside of the HSPs' boundary	Twice per heating season.	Local EMSs	Saihan District EPB	EPB EMS lump sum monitoring contract
Noise from HES	Leq dB(A)	Compliance monitoring: at 1m outside of the HESs	Twice per heating season, random selection of HESs	Local EMSs	Saihan District EPB	EPB EMS lump sum monitoring contract

Subject	Parameter	Location	Frequency	Implemented by	Supervised by	Source of Funds
Health and Safety	Compliance inspection to determine if EHS Plans developed and implemented, and workers have appropriate PPE	HSPs, HESs, pipelines	Ongoing, random	HCHC EHS Specialists	HCHC and HCDIO	Included in HCHCs' operation budgets
	Record and report both minor and lost-time incidents during construction and operation	HSPs, HESs, pipelines	Continuous	HCHC EHS Specialists	HCHC and HCDIO	Included in HCHCs' operation budgets

ADB = Asian Development Bank, dB = decibel, CEMS = continuous emissions monitoring system, EHSU = environment, health and safety unit, EMS = environment monitoring station, EPB = environment protection bureau, HCDIO = Hohhot City Development, Investment, and Operation Company, HCHC = Hohhot Chengfa Heating Company, HES = heat exchange station , HSP = heating source plant, IA = implementing agency, Leq = equivalent continuous noise level, LIEC = loan implementation environmental consultant, NO_2 = nitrogen dioxide, pH = potential hydrogen, PM = particulate matter, PMO = project management office, PRC = People's Republic of China, SO_2 = sulfur dioxide, TSP = total suspended particulates.
Source: Domestic EIA Reports (2014) and TA consultants estimate.

19. Ambient and discharge monitoring will be conducted in compliance with relevant PRC regulations, methods and technical specifications:

(i) *Regulations of Quality Management for Environmental Monitoring,* July 2006.

(ii) *Technical Guideline on Environmental Monitoring Quality Management (HJ 630-2011)* published by Ministry of Environmental Protection in September, 2011.

(iii) *Technical Specifications for Installation and Acceptance of Ambient air Quality Continuous Automated Monitoring System for SO_2, NO_2, O_3 and CO (HJ 163-2013)* published by Ministry of Environmental Protection in June, 2013.

(iv) *Manual Methods for Ambient Air Quality Monitoring (HJ/T 194-2005)* published by Ministry of Environmental Protection in November, 2005.

(v) *Technical Specifications of Quality Assurance and Quality Control for monitoring of stationary pollution source (on trial) (HJ/T 373-2007)* published by Ministry of Environmental Protection in November, 2007.

(vi) *Technical Specifications Requirements for Monitoring of Surface Water and Waste Water (HJ/T 91-2002)* published by Ministry of Environmental Protection in December, 2002.

(vii) *Technical Specifications for Environmental Noise Monitoring Routine Monitoring for Urban Environmental Noise (HJ 640-2012)* published by Ministry of Environmental Protection in December, 2012

20. The standard monitoring methods, detection limits, and the standard code for each of the monitoring parameters are shown in Table A2-5. The data and results of environmental inspection and monitoring activities will be used to assess : (i) extent and severity of actual environmental impacts against the predicted impacts and baseline before the project implementation; (ii) performance or effectiveness of environmental mitigation measures or compliance with pertinent environmental rules and regulations; (iii) trends in impacts; (iv) overall effectiveness of EMP implementation; and (v) need for additional mitigation measures and corrective actions if non-compliance is observed.

Table A2-5: Standard Monitoring Methods of Air, Noise and Wastewater

Media	Parameter	Method (Standard No.)	Standard/Averaging Period
Air	TSP (mg/m^3)	Gravimetric (GB/T15432-1995)	0.30 (24-hr)
	PM_{10} (mg/m^3)	Gravimetric with specific sampler (HJ/T 618-2011, Determination of atmospheric articles PM10 and PM 2.5 in ambient air by gravimetric method)	0.07 mg/m^3 (Annual) 0.15 mg/m^3 (24-hr)
	SO_2 (mg/m^3)	Formaldehyde absorbing-para rosaniline spectrophotometry (HJ 482-2009) Tetrachloromercurate(TCM)-pararosaniline method (HJ 483-2009)	.060 (annual) .150 (24-hr) .500 (1-hr)
	NO_2 (mg/m^3)	Ethylene diamine dihydrochloride spectrophotometric method (HJ 479- 2009)	0.04 (annual) 0.08 (24-hr) 0.20 (1-hr)
	$PM_{2.5}$ (mg/m^3)	Gravimetric method with specific sampler (HJ/T 618-2011, Determination of atmospheric articles PM10 and PM 2.5 in ambient air by gravimetric method)	0.035 (annual) 0.070 (24-hr)
Noise	Equivalent Continuous A Sound (Leq)	Acoustimeter Method Emission standard of environment noise for boundary of construction site (GB12523-2011)	70(day) 55 (night)
		Emission standard for industrial enterprises noise at boundary (GB12348-2008).	60 day 50 night
Wastewater	pH value	Glass electrode method (GB6920-86)	6-9
	COD (mg/L)	Permanganate index (GB11914-89)	500
	Petroleum (mg/L)	Infrared spectra photograph (HJ 637-2012)	30
	SS (mg/L)	Gravimetric method (GB11901-89)	400
	BOD (mg/L)	dilution and seeding method (HJ 505-2009)	300

BOD = biochemical oxygen demand, hr = hour, Leq = equivalent continuous noise level mg/L = microgram per liter, mg/m^3 = microgram per cubic meter, NO_2 = nitrogen oxide, PM = particulate matter, SS = suspended solid, SO_2 = sulfur oxide, TSP = total suspended particulates,
Source: PRC standards.
Standard Limits:

- Air pollution standard is Class II, *Ambient Air Quality Standards* (*GB3095—2012).*
- Noise at HSP boundary during construction is Class II, *Noise Standard for Construction Site Boundary* (GB12523-2011).
- Noise at boundary during operation period is Class II, *Noise Standard for Construction Site Boundary (GB12348-2008).*
- Ambient noise is Class II, *Environmental Quality Standards for Noise* (GB3096-2008).
- Wastewater is Class III, *Integrated wastewater discharge standard* (GB8978-1996).

F. Reporting Requirements

21. Based on the compliance inspection and ambient monitoring results, the EHSU, with support from the LIEC, will submit monthly monitoring reports to the PMO. The EHS with support from the LIEC, will also prepare EMP monitoring reports semi-annually during construction and annually during operation. The reports will be submitted to the PMO, who will review them and then submit them to the ADB and the Saihan District EPB

22. No later than 2 months after completion of the construction work the PMO will submit a construction completion report to the Saihan District EPB. Within 3 months after project completion, an environmental acceptance inspection will be undertaken by the Saihan District EPB. ADB can request the PMO for a copy of the construction completion and environmental acceptance reports.

23. The environmental reporting requirements during the implementation of the project are summarized in the Table A2-6.

Table A2-6: Reporting Requirements

Report	Prepared by	Submitted to	Frequency
A. Construction Phase			
Environmental monitoring records	EHSU supported by LIEC	PMO	Monthly
Environmental monitoring report	EHSU supported by LIEC, prepares and submits to PMO	PMO reviews and submits to ADB	Semi-annually
B. Operation Phase			
Environmental monitoring report, including annual CO_2 emissions[33]	EHSU prepares and submits to PMO	PMO reviews and submits to ADB	Annually

ADB = Asian Development Bank, CO_2 = carbon dioxide, EHSU = environment, health and safety unit, LIEC = loan implementation environmental consultant, PMO = project management office.

G. Performance Indicators

24. Performance indicators (Table A2-7) have been developed to assess the implementation of the EMP. These indicators will be used to evaluate the effectiveness of environmental management.

H. Estimated Budget for Mitigation and Monitoring

25. The estimated budgets for environmental mitigation and monitoring are summarized in Table A2-8. Construction phase costs are estimated at $1.17 million; operation phase mitigation and monitoring costs are estimated at $1.24 million. The budget does not include major capital costs for mitigations (e.g., low NO_X burners, flue gas stacks, etc.).

[33] The ADB Safeguard Policy Statement (2009) requires quantification and monitoring of GHG emissions for projects which emit more than 100,000 tCO2e per annum.

Table A2-7: Performance Indicators

No.	Description	Indicators
1	Staffing	(i) PMO EHSU established with appropriately qualified staff. (ii) Appropriately qualified LIEC EHSS recruited. (iii) Branch EHSUs established with appropriately qualified staff.
2	Budgeting	(i) Environment mitigation cost during construction and operation is sufficiently and timely allocated. (ii) Environment monitoring cost is sufficiently and timely allocated. (iii) Budget for capacity building is sufficiently and timely allocated.
3	Monitoring	(i) Compliance monitoring is conducted by EHSU and LIEC as per EMoP. (ii) Ambient and effluent monitoring is conducted by the local EMS as per EMoP. (iii) CEMS installed and functioning during operation phase.
4	Supervision	(i) ADB mission to review EMP implementation at least once a year during the construction phase. (ii) Saihan District EPB to supervise monitoring and reporting. (iii) Saihan District EPB to conduct an environmental acceptance inspection after a three months trial operation period.
5	Reporting	(i) Monthly environment monitoring reports prepared by the EHSU supported by the LIEC are submitted to PMO. (ii) Semi-annual (during construction period) and annual (during operation) EMP monitoring reports, prepared by the EHSU supported by the LIEC, are submitted to ADB and Saihan District EPB through the PMO. (iii) Construction completion report prepared by the PMO is submitted to EA and Saihan EPB. (iv) Environment acceptance report prepared by the Saihan EPB is submitted to the PMO and ADB after a 3 months trial operation period.
6	Capacity Building	(i) Construction phase HSE plan developed and in place before substantive construction activities begin. (ii) Training on HSE plan implementation, ADB Safeguard Policy Statement (2009), EMP implementation, and grievance redress mechanism is provided to at the beginning of project implementation. (iii) Operation phase HSE plan developed and in place before substantive Project operation activities begin. (iv) Training on HSE plan implementation and best international practices in natural-gas fired HSP operation is provided prior to Project operation.
7	Grievance Redress Mechanism	(i) Project public complaints unit is established in the PMO. (ii) Contact persons of project public complaints unit are assigned and disclosed to the public before construction. (iii) Complains are recorded and processed within the set time framework in the grievance redress mechanism of this environment impact assessment.
8	Compliance with the PRC standards	(i) Project complies with the PRC's environmental laws and regulations and meets all required standards.

ADB = Asian Development Bank, CEMS = continuous emission monitoring system , EHSS = environment, health and safety specialist , EHSU = environment, health and safety unit, EMoP = environmental monitoring plan, EMP = environmental management plan, EMS = environmental monitoring stations, EPB = environment protection bureau, HSE =health, safety, and environment ,HSP = heating source plant ,LIEC = loan implementation environmental consultant, PMO = project management office, PRC = People's Republic of China.

Table A2-8: EMP Budget

Construction Phase									
1. Monitoring	**Unit**	**Unit Cost**	**# Months**	**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	**Budget**
Ambient Air - TSP, PM_{10}	Monthly Sampling	Included in lump sum EMS budget	60	Included in lump sum Hohhot EPB EMS budget			**98,361**	**600,000**	ADB
Noise	Monthly Sampling		60						
Wastewater	Monthly Sampling		60						
2. Capacity Building	**Unit**	**Course Cost**	**# Times**	**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	
HSE Plan Development	HSE Plan - Construction	$ 3,500	1	3,500	3,500	3,500	10,500		
Construction HSE Training	HSE Course Development	3,500	1				3,500		ADB
	HSE Course Delivery	2,750	2	5,500	5,500	5,500	16,500		
Subtotal							**30,500**	**186,050**	
3. Loan Implementation Consultant (LIC)	**Unit**	**Monthly Cost**	**# Months**				**Cost USD**	**Cost RMB**	ADB
LIC HSE Specialist	Person Months	$ 2,500	30				**75,000**	**457,500**	
4. Dust Control	**Unit**	**Unit Cost**		**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	PRC
	Pipeline dust control measures	Cost per subproject		1,639	1,967	1,967	**5,573**	**33,995**	
5. Mobile Noise Protection	**Unit**	**Unit Cost**		**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	PRC
	Pipeline mobile noise control measure	Cost per subproject		820	820	1,311	**2,951**	**18,001**	
6. Landscaping and Greening	**Unit**	**Unit Cost**		**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	PRC
	Landscaping Plan	Cost Per Subproject		$ 343,333	$ 271,667	$ 345,000	**960,000**	**5,856,000**	
TOTAL Construction Phase							***Cost USD***	***Cost RMB***	
							1,172,385	***7,151,546***	
Operation Phase									
	Unit	**Cost Per Boiler**	**# Boilers**	**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	
1. Stack Emissions Monitoring	CEMS	$ 20,000.00	Jinqiao - 7	$ 140,000	$ 140,000	100,000			PRC
Subtotal			Xinjiaying - 7				**380,000**	**2,318,000**	
			Haoqinying - 5						
2. Monitoring	**Unit**	**Sample Cost**	**# Months**	**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	
Noise	Monthly Sampling	Included in lump sum EMS budget	24	Included in lump sum EMS budget			**32,787**	**200,000**	ADB
Wastewater	Quarterly Sampling		24						
3. Noise Control	**Unit**	**Unit Cost**		**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	
HSP Noise Insulation	Insulation	Cost Per Subproject		$ 163,934	$ 196,721	$ 163,934	524,589		
HSP Noise and Vibration Reduction Measures	Noise Reduction	Cost Per Subproject		$ 85,246	$ 90,164	$ 85,246	260,656		PRC
HES Noise Control and Greening	Noise Control, Greening	Cost Per Subproject		$ 2,787	$ 2,459	$ 2,459	7,705		
							792,950	**4,836,995**	
4. Capacity Building	**Unit**	**Course Cost**	**# Times**	**Jinqiao**	**Xinjiaying**	**Haoqinying**	**Cost USD**	**Cost RMB**	
HSE Plan Development	HSE Plan - Operation	$ 3,500	1	3,500	3,500	3,500	10,500		
Operation HSE Training	HSE Course Development	3,500	1				3,500		ADB
	HSE Course Delivery	2,750	2	5,500	5,500	5,500	16,500		
Subtotal							**30,500**	**186,050**	
TOTAL Operation Phase							***Cost USD***	***Cost RMB***	
							1,236,237	***7,541,045***	
GRAND TOTAL Construction + Operation							***Cost USD***	***Cost RMB***	
							2,408,622	***14,692,591***	
							Cost USD	***Cost RMB***	
Contribution from ADB LIC and Environmental Support Budget:							***267,148***	***1,629,600***	ADB
Contribution from PRC Budget:							***2,141,474***	***13,062,991***	PRC

Notes:

Construction Phase

- Construction phase monitoring based on lump sum EMS proposal, with monthly monitoring at the three HSP sites and 15% of HES and pipeline sections.
- Construction phase EHS course development based on 10 consultant days at $350/day (fees and per diem). Course Delivery based on 5 consultant days per delivery at 350/day (fees and per diem) and fixed costs of $1000 per delivery.
- LIEC is a part time consultant.
- Dust and noise control based on domestic EIAs.
- Landscaping and greening costs from domestic EIAs, based on 26% of HSP area, and a cost of 60 Yuan per m^2.

Operation Phase

- CEMS costs from domestic EIAs. Cost to be incurred during construction.
- Operation phase monitoring based on lump sum EMS proposal, with monitoring at HSP sites and random selection of HESs, and HSP wastewater discharged to municipal sewer.
- HSP and HES noise control costs from domestic EIAs. Cost to be incurred during construction.
- Operation phase EHS course development based on 10 consultant days at $350/day (fees and per diem). Course Delivery based on 5 consultant days per delivery at 350/day (fees and per diem) and fixed costs of $1000 per delivery.
- Budget does not include major capital costs for mitigations (e.g. low NO_X burners, stacks, etc).

I. Mechanisms for Feedback and Adjustment

26. The effectiveness of mitigation measures and monitoring plans will be evaluated through a feedback reporting system. If, during compliance inspections and monitoring, substantial deviation from the EMP is observed then the PMO will consult with the Saihan EPB and ADB and propose appropriate changes to the EMP monitoring and mitigation plan.

27. Any major EMP adjustments will be subject to ADB review and approval and ADB may pursue additional environmental assessment and, if necessary, further public consultation. The revised EMP with ADB confirmation is subject to reposting on the ADB's website as the ADB public communications policy requires. The revised EMP will be passed to the PMO, the heating zone Branch PMOs, and the contractor(s) for implementation.

J. EPB Environmental Acceptance

28. After a 3 month trial period the Saihan District EPB will conduct an environmental acceptance inspection for the project. If the project is in compliance with all conditions for approval of the domestic EIA (see Appendix II), the project can be put into formal operation.

K. Grievance Redress Mechanism

29. A project grievance can be defined as an actual or perceived project related problem that gives ground for complaint by an affected person. As a general policy, HCDIO will work proactively toward preventing grievances through the implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. In addition, as the project has strong public support and will not involve any involuntary land or property acquisition or resettlement, significant grievance are unlikely. Nonetheless, during construction and operation it is possible that unanticipated impacts may occur if the mitigation measures are not properly implemented, or unforeseen issues arise. In order to address complaints if or when they arise, a project grievance redress mechanism (GRM) has been developed in accordance with ADB requirements and Government practices. The GRM is a systematic process for receiving, recording, evaluating and addressing affected person's project-related grievances transparently and in a reasonable period of time.

30. **ADB's GRM Requirements.** The ADB's Safeguard Policy Statement (2009) requires the HCHC to establish a GRM to receive and facilitate resolution of affected person's concerns and complaints about the project's environmental performance during construction as well as operation phase of the project. The GRM should be scaled to the risks and adverse impacts of the project; should address affected people's concerns and complaints promptly, using an understandable and transparent process; should be readily accessible to all sections of the community at no cost and without retribution; and, should not impede access to the PRC's judicial or administrative remedies.

31. **Current Practice in the PRC.** At the national level a framework to address grievance has been established. State Council Decree No. 431 "Regulations on Letters and Visits" (January 2005) codifies a complaint mechanism at all levels of government, and safeguards the complainants from any retaliation. The Ministry of Environmental Protection "Decree No. 34 Environmental Letters and Visits System" provides specific guidelines to establish a system and address environmental complaints.

32. Currently, when affected persons are negatively affected by project activities, such as noise, dust or safety issues caused by construction activities, they may complain to the contractors and HCHC by themselves or through their community organizations, or complain directly to local EPBs. If the issue is not resolved they may take legal action, though that is typically considered as a last option.

33. In the case of issues occurring during the construction period, an affected person can complain to the contractors first if the construction activities are the source of the problem. If the contractors do not respond to the complaint or their responses cannot resolve the issue, the affected person may contact municipal EPBs or the district/county EPBs, who will record the complaints and then visit the sites to investigate and obtain the contractors' side of the story. Sometimes, the two sides might contradict, each defending its own argument. In such cases, the local EPBs will need to consult with the contractor or the supervising engineer to acquire relevant project information and collect data. This kind of fact-finding or site investigation is usually time-consuming, thus delaying the implementation of appropriate mediation measures.

34. Weaknesses of the current practice includes: (i) lack of specialized units to address grievances at the project level; and (ii) lack of specific timeframes for actions and responses to be undertaken to resolve the complaints. These weaknesses have been addressed in the project GRM.

35. **Proposed Project GRM.** The HCHC will establish a Project Public Complaints Unit (PPCU). The PPCU will be coordinated by at least two staff members. The contact persons for the different GRM entry points (residential community leaders, neighborhood organizations, local authorities, district EPB, contractors and operators) will be defined prior to construction and operation. Organizational charts of the GRM, including the contact persons of the entry points will be disclosed at each heating zone construction site. The project will provide training to the members of the PMO and the contact persons of the GRM entry points to ensure that responsibilities and procedures are clear.

36. Public grievances will most likely relate to environmental issues encountered during the construction phase. Grievances may include vehicle operation and transportation of heavy equipment and materials; fugitive dust emissions and construction noise; soil erosion and haphazard disposal of waste materials in inappropriate places; and safety measures for the protection of the general public and construction workers. Construction-related grievances can be numerous, and managing them is the contractor's responsibility under its contract with the HCHC. Operation related grievances may occur due to complaints about HSP or EHS environmental performance.

37. All complaints will be recorded in a systematic fashion by the PPCU. Effective tracking and documentation will promote timely resolution; assist in keeping concerned parties (the complainant and appropriate project personnel) informed about the status of the case and progress being made toward resolution; record responses and outcome(s) so as to promote fairness and consistency; provide a record of settlements; and assist when assessing the effectiveness of the process and action(s) to resolve complaints.

38. Once a complaint has been appropriately recorded, the PPCU will identify if the complaint is eligible. Eligible complaints include those where (i) the complaint pertains to the project, and (ii) the complaint falls within the scope of environmental issues that the GRM is authorized to address. Ineligible complaints include those where (i) the complaint is clearly not project-related; (ii) the nature of the issue is outside the mandate of the environment GRM

(such as issues related to resettlement, allegations of fraud or corruption); and (iii) other company or community procedures are more appropriate to address the issue. If the complaint is rejected, the complainant will be informed of the decision and the reasons for the rejection.

L. GRM Steps and Timeframe

39. The GRM consists of 5 escalating steps. A key goal of the GRM is to solve problems early at the lowest step. A conceptual diagram of the GRM is presented in Figure A2-2 and each step is described below:

40. **Step 1:** If a concern arises, the affected person should try to resolve the issue of concern directly with the contractor/operator and/or the HCHC project manager. If the concern is resolved successfully, no further follow-up is required. Nonetheless, the contractor/operator and/or the project manager shall record any complaint and actions taken to resolve the issues and report the results to the PPCU. If no solution is found within 15 working days or if the complainant is not satisfied with the suggested solution under Step 1, proceed to Step 2.

41. **Step 2:** The affected person will submit the grievance to the PPCU, either directly or via other entry points such as District EPBs or community leaders. The PPCU must assess the eligibility of the complaint, identify a solution, and give a clear reply within 15 working days to the complainant and to HCDIO and the contractor (if relevant) with the suggested solution. The contractor, during construction, and HCDIO, during operation, shall implement the redress solution and convey the outcome to the PPCU within 7 working days.

42. **Step 3:** If no solution is identified by the PPCU or if the complainant is not satisfied with the suggested solution under Step 2, the PPCU will organize, within 2 weeks, a multi-stakeholder meeting where all relevant stakeholders, including the complainant, HCDIO, the contractor/operator, and local District EPB will be invited. The meeting will aim to find a solution acceptable to all, and identify responsibilities and an action plan. The contractor during construction and HCDIO during operation will implement the agreed-upon redress solution and convey the outcome to the PPCU within 7 working days.

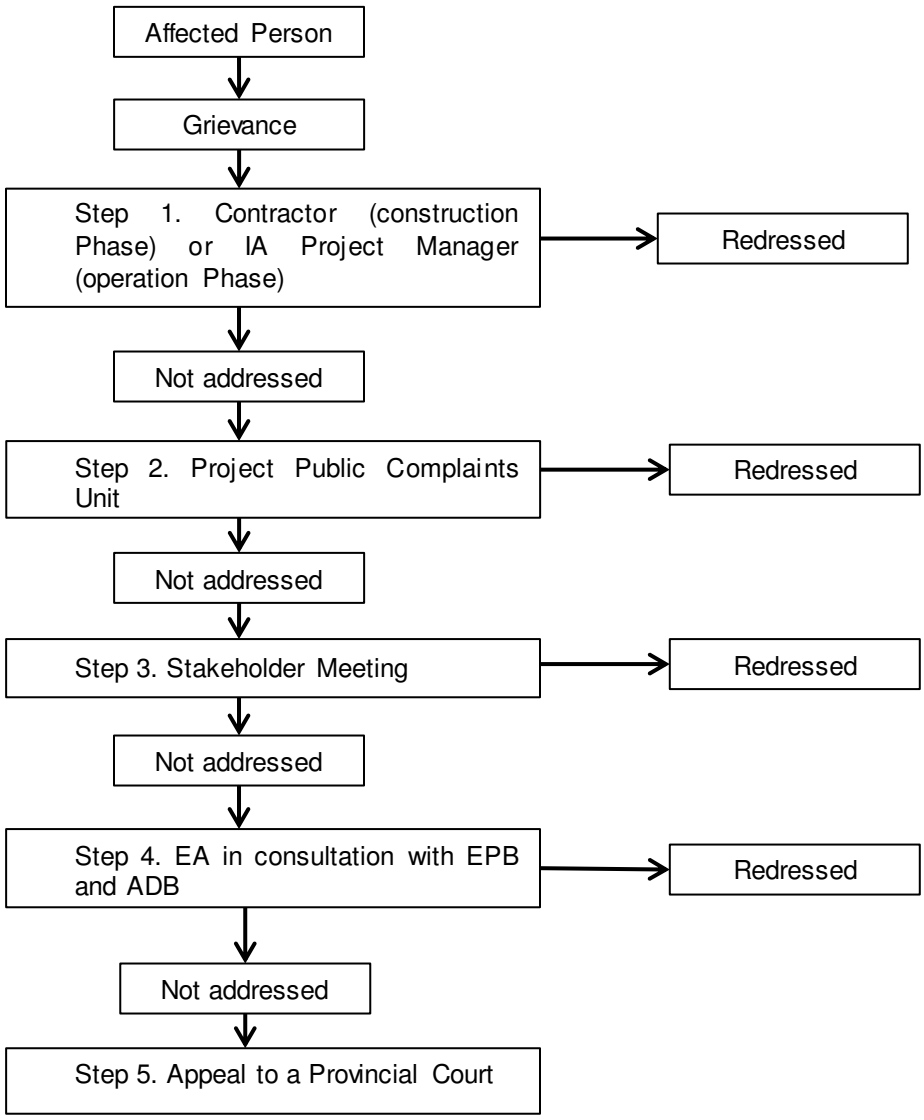
43. **Step 4:** If the multi-stakeholder hearing process under Step 3 is not successful, the PPCU, through HCDIO, will inform the GIMAR, the Hohhot EPB and the ADB accordingly. The GIMAR with the consultation from the Hohhot EPB and ADB will review the situation and attempt to develop an alternative approach to resolve the complaint within 15 working days.

44. **Step 5:** If the complainant is not satisfied with the suggested solution under Step 4 the affected person may advance the grievance to the Provincial Court. If he is not satisfied with the Provincial Court judgment, there may be an opportunity for appealing to a higher level of court.

45. The PPCU as well as the District EPBs will accept the complaints and grievances lodged by the affected persons free of charge. Any costs incurred should be covered by contractor or HCDIO or from the contingency of the contract.

46. A summary of GRM activities will be reported by HCDIO in the annual project progress reports and sent to ADB. The GRM will be operational during the entire construction phase and during the operations until the project completion.

Figure A2-2: Project GRM



ADB = Asian Development Bank, AP = affected person, EPB = environmental protection bureau, IA = implementing agency, PPCU = Project Public Complaints Unit.