



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

Project Name	Low-Carbon District Heating Project in Hohhot in Inner Mongolia Autonomous Region		
Project Number	47052-002		
Country / Economy	China, People's Republic of		
Project Status	Active		
Project Type / Modality of Assistance	Loan		
Source of Funding / Amount	Loan 3218-PRC: Low-Carbon District Heating Project in Hohhot in Inner Mongolia Autonomous Region		
	Ordinary capital resources		US\$ 150.00 million
	Loan: Low-Carbon District Heating Project in Hohhot in Inner Mongolia Autonomous Region		
	Shanghai Pudong Development Bank		US\$ 142.40 million
Strategic Agendas	Environmentally sustainable growth Inclusive economic growth		
Drivers of Change	Knowledge solutions Partnerships		
Sector / Subsector	Energy / Energy utility services		
Gender	No gender elements		
Description	<p>The proposed project will introduce a first-of-its-kind low-carbon, low-emissions, and highly energy-efficient district heating system in the eastern part of Hohhot, the capital of the Inner Mongolia Autonomous Region. The project will demonstrate the efficiency and viability of large-scale natural gas and wind-based district heating in the Inner Mongolia Autonomous Region. Combining these two energy sources will improve the poor air quality in urban areas of the Inner Mongolia Autonomous Region during the winter and help reduce carbon dioxide emissions.</p>		
Project Rationale and Linkage to Country/Regional Strategy	<p>The Inner Mongolia Autonomous Region is located in a severe cold climate zone of the People's Republic of China, where winter temperatures can drop to as low as 40 degree Celsius 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 the Inner Mongolia Autonomous Region, 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. Hohhot has the highest concentration of urban residents in the Inner Mongolia Autonomous Region. About 10% of the Inner Mongolia Autonomous Region'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 of floor area; existing isolated, decrepit, and inefficient heating systems for an additional 42.0 million square meters of floor area need to be replaced. The hazy skies above Hohhot already have a high concentration of inhalable particulate matter during winter. Through a decree issued in 2013, the Hohhot municipal government 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, and negligible sulfur oxides. Since the decree was issued, the Hohhot municipal government has provided CNY230 million in subsidies for natural gas use and switching from coal to gas boilers. The Hohhot municipal government 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.</p> <p>The Inner Mongolia Autonomous Region is a resource-rich province. In addition to being the People's Republic of China's top coal-producing province, the Inner Mongolia Autonomous Region has large reserves of natural gas and excellent solar and wind energy resources. In 2013, the Inner Mongolia Autonomous Region reached 18 gigawatts of installed wind power capacity, equivalent to 25% of the total installed wind power capacity in the People's Republic of China. The Government of Inner Mongolia Autonomous Region plans to increase installed wind capacity up to 50 gigawatts by 2020. The Inner Mongolia Autonomous Region 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 the Inner Mongolia Autonomous Region.</p> <p>The National Energy Administration in the People's Republic of China 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 Government of Inner Mongolia Autonomous Region and Hohhot municipal government are keen to pilot the use of curtailed wind power for district heating, taking into consideration that the current curtailed wind power in the Inner Mongolia Autonomous Region could meet the heating demand up to about 100 million square meters of floor area and contribute to better air quality in the winter by eliminating hazardous emissions from coal-based heating systems. Yet, the Inner Mongolia Autonomous Region 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 the Inner Mongolia Autonomous Region and elsewhere in the People's Republic of China's northern provinces.</p> <p>The Asian Development Bank has supported two other projects in the Inner Mongolia Autonomous Region to provide energy-efficient district heating. 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 to enable sharing of renewable energy subsidies. 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. The project also supports the goal of Asian Development Bank's Energy Policy, which prioritizes energy efficiency and access to energy for all, including district heating. It is aligned with Asian Development Bank's country partnership strategy, 2011-2015 for the People's Republic of China, which identifies environmental sustainability as one of the three pillars of Asian Development Bank assistance.</p>		
Impact	Improved energy efficiency and cleaner environment in IMAR		

Project Outcome	
Description of Outcome	Improved air quality and reduced greenhouse gas emissions in Hohhot
Progress Toward Outcome	The project has achieved 93% of contract awards and 92% disbursements at an elapsed time of 88%. Good or excellent air quality rating recorded per heating season are as follows: 2013/14: 93 days; 2014/2015: 117 days; 2015/2016: 117 days; 2016/2017: 130 days; and 2017/2018: 143 days; 2018/2019: 121 days; 2019/2020: 148 days; and 2020/2021: 147 days. After the project becomes fully operations, it is expected to reduce SO <sub>2</sub> by 254 tons, TSP by 34.98 tons, NO <sub>x</sub> by 1,078 tons, based on an annual coal consumption of 360,000 tons.
Implementation Progress	
Description of Project Outputs	District heating coverage expanded Low-carbon and highly efficient heat-generation system installed A new business model for wind-based district heating piloted
Status of Implementation Progress (Outputs, Activities, and Issues)	The project has completed 36.83 km of heating pipeline and 10.9 million square meters of heating area. The overall construction progress include: (i) The pipeline connect Jinqiao Zone and Qiaokao Zone has been joined up, the bridge structure of crossing XiaoHei River has been completed. The road work in the Jinqiao peak shaving heat source plant area is complete. 17 heat stations have been completed, 10.8km pipeline construction has been completed; (ii) Haoqingyinqi site reselection have been completed, to be approved by Municipal government and some relative land use procedures are being proceeded, Land acquisition agreements has been signed and the compensation has been paid to the affected households in August 2021. 32 heat stations have been completed, and 18.8km heat pipeline has been laid; (iii) 25 heat stations has been built and 12.33km heat pipeline has been laid for Xinjiaying heat source plant.
Geographical Location	
Safeguard Categories	
Environment	A
Involuntary Resettlement	C
Indigenous Peoples	C
Summary of Environmental and Social Aspects	
Environmental Aspects	The project is classified as category A for environment. A project environmental impact assessment was drafted and disclosed on Asian Development Bank website on 12 May 2014. A revised draft of the environmental impact assessment was disclosed on 10 July 2014 and a reformatted version of the revised draft was disclosed on 15 October 2014. The environmental impact assessment complies with Asian Development Bank's policies and requirements including Asian Development Bank's Safeguard Policy Statement (2009). The project will avoid 848,500 tons of standard coal, and will emit 60% less carbon dioxide, 82% less nitrogen oxides, negligible particulate matters, and 98% less sulfur dioxide compared with the existing heating supply. The project 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 environmental impact assessment concludes that the construction and operation impacts can be mitigated through the implementation of an environmental management plan, which defines mitigation measures, monitoring requirements, and institutional responsibilities to ensure proper environmental management throughout the project construction and operation.
Involuntary Resettlement	The project is classified category C for involuntary resettlement. The project does not entail 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 entail demolition of any structure.
Indigenous Peoples	The project is classified category C for indigenous peoples. The project beneficiaries include ethnic minorities. Thus, the project does not have any adverse impact on ethnic minority people.
Stakeholder Communication, Participation, and Consultation	
During Project Design	Project information was communicated through public consultation, information disclosure mechanism in Asian Development Bank's and government's website, meetings, interviews, focus group discussions, and community consultation meetings, in accordance with Asian Development Bank's requirements of information disclosure policy. Two meaningful consultations with stakeholders have been conducted during feasibility study and environmental impact assessment in accordance with the People's Republic of China Interim Guideline on Public Consultation in Environmental Impact Assessment (2006) and Asian Development Bank'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 environmental impact assessment was disclosed at www.adb.org and on the website of the Hohhot City Development, Investment and Operation Company.
During Project Implementation	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 latest environmental monitoring report covering the period July to Dec 2019 was uploaded on ADB's website in January 2020. The latest loan review mission was held virtually on 21 January 2021 which discussed the (i) overall project progress; (ii) procurement packages including the unawarded packages; (iii) closing of accounts of terminated packages 7 and 9; (iv) progress in completing requirements on access to Clients Portal for Disbursement; (v) contract awards and disbursements projections and targets for 2021 and onwards; (vi) request for loan closing date and reallocation of loan proceeds; (vi) safeguards; and (vi) reporting requirements. The meeting was attended by representatives from the provincial finance department and Chengfa heating company.
Business Opportunities	
Consulting Services	All three individual consultants (district heating specialist, environment specialist, and social specialist) are already onboard and are providing support to the implementing agency.
Procurement	Taking into consideration the maturity of district heating market in the People's Republic of China and experiences from past district heating projects, Asian Development Bank-financed goods contracts that cost \$10 million or more will be procured through international competitive bidding and less than \$10 million will be procured through national competitive bidding, using Asian Development Bank's standard bidding documents. Yet, the project will install low nitrogen oxides natural gas and electrode boilers, which are new to the People's Republic of China's district heating market. Therefore, international competitive bidding will still be 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. Majority of the procurement packages have been awarded in 2017. The remaining two packages--14 and 17, with estimated values of \$5.1 m and \$4.9 m, respectively, will be advertised in 2020. The cumulative contract award is \$138 million, and cumulative disbursement is \$91 million.
Responsible ADB Officer	
Liu, Xinjian	
Responsible ADB Department	
East Asia Department	
Responsible ADB Division	
PRC Resident Mission	
Executing Agencies	
Government of Inner Mongolia Autonomous Region	
Timetable	

Concept Clearance	15 Jul 2013
Fact Finding	19 May 2014 to 30 May 2014
MRM	11 Jul 2014
Approval	09 Dec 2014
Last Review Mission	-
Last PDS Update	26 Sep 2022

## Loan 3218-PRC

Milestones					
Approval	Signing Date	Effectivity Date	Closing		
			Original	Revised	Actual
09 Dec 2014	19 Mar 2015	17 Jun 2015	31 Oct 2020	31 Oct 2023	-

Financing Plan		Loan Utilization			
	Total (Amount in US\$ million)	Date	ADB	Others	Net Percentage
Project Cost	230.30	Cumulative Contract Awards			
ADB	150.00	26 Sep 2022	136.72	0.00	91%
Counterpart	80.30	Cumulative Disbursements			
Cofinancing	0.00	26 Sep 2022	102.94	0.00	69%

Status of Covenants						
Category	Sector	Safeguards	Social	Financial	Economic	Others
Rating	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory

Project Page	<a href="https://www.adb.org/projects/47052-002/main">https://www.adb.org/projects/47052-002/main</a>
Request for Information	<a href="http://www.adb.org/forms/request-information-form?subject=47052-002">http://www.adb.org/forms/request-information-form?subject=47052-002</a>
Date Generated	05 June 2023

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