ADB

Technical Assistance Report

Project Number: 51031-001
Knowledge and Support Technical Assistance (KSTA)
October 2017

People's Republic of China: Study of Clean Energy Supply for the Rural Areas in the Greater Beijing–Tianjin–Hebei Region

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 4 September 2017)

Currency unit	–	yuan (CNY)
CNY1.00	=	$6.5595
$1.00	=	CNY0.1525

ABBREVIATIONS

ADB	–	Asian Development Bank
BTH	–	Beijing–Tianjin–Hebei
PRC	–	People's Republic of China
TA	–	technical assistance

NOTE
In this report, "$" refers to US dollars.

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KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data

Project Number: 51031-001

Project Name	Study of Clean Energy Supply for the Rural Areas in the Greater Beijing-Tianjin-Hebei Region	**Department /Division**	EARD/EAEN
Nature of Activity	Capacity Development	**Executing Agency**	Ministry of Agriculture
Modality	Regular		
Country	China, People's Republic of		

2. Sector

	Sector	Subsector(s)	ADB Financing ($ million)
✓	Energy	Energy efficiency and conservation	0.08
		Renewable energy generation - biomass and waste	0.08
		Renewable energy generation - geothermal	0.08
		Renewable energy generation - solar	0.08
		Renewable energy generation - wind	0.08
		Total	**0.40**

3. Strategic Agenda

	Subcomponents
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive
Environmentally sustainable growth (ESG)	Eco-efficiency
	Global and regional transboundary environmental concerns
	Urban environmental improvement

Climate Change Information

Mitigation ($ million)	0.40
CO_2 reduction (tons per annum)	100,000
Climate Change impact on the Project	Low

4. Drivers of Change

	Components
Governance and capacity development (GCD)	Institutional development
Knowledge solutions (KNS)	Application and use of new knowledge solutions in key operational areas
	Knowledge sharing activities
	Pilot-testing innovation and learning
Private sector development (PSD)	Promotion of private sector investment

Gender Equity and Mainstreaming

No gender elements (NGE) ✓

5. Poverty and SDG Targeting

Geographic Targeting	Yes
Household Targeting	No
SDG Targeting	Yes
SDG Goals	SDG3, SDG7, SDG13

Location Impact

Rural	High

6. Risk Categorization

Low

7. Safeguard Categorization

Safeguard Policy Statement does not apply

8. Financing

Modality and Sources	Amount ($ million)
ADB	**0.40**
Knowledge and Support technical assistance: Technical Assistance Special Fund	0.40
Cofinancing	**0.00**
None	0.00
Counterpart	**0.00**
None	0.00
Total	**0.40**

I. INTRODUCTION

1. The proposed knowledge and support technical assistance (TA) will increase rural clean energy supply in the greater Beijing–Tianjin–Hebei (BTH) region by assessing the current energy consumption and structure, and their impacts on air quality.[1]

2. The proposed TA is included in the country operations business plan for the People's Republic of China (PRC), 2017–2019.[2] The proposed TA is fully aligned with the country partnership strategy, 2016–2020 for the PRC that features the management of climate change and the environment to support the government's priorities in realizing an "ecological civilization."[3] The proposed TA will also support the strategic priorities of the Midterm Review of Strategy 2020 of the Asian Development Bank (ADB) to mitigate climate change and promote environmental sustainability.[4]

II. ISSUES

3. In recent years, haze has become a severe problem in the PRC, especially in the greater BTH region. In 2015, only 186 days met PRC's air quality standards in Beijing, while there were 46 heavily polluted days. The frequent occurrence of haze in this region has drawn extensive attention domestically and internationally. Haze poses a threat to public health as well as socioeconomic development. One study estimated that the severe haze in January 2013 may have resulted in approximately 700 premature deaths, 6,000 hospitalizations for cardiovascular disease, 5,500 hospitalizations for respiratory disease, and $250 million in economic losses.[5]

4. Particulate matter that is less than 2.5 micrometers in diameter formed from the burning of raw coal is a main cause of large-scale haze in the greater BTH region. As living standards have improved in the rural areas, households have transitioned from direct burning of traditional, low quality fuels (e.g., straw, fuelwood, and other biomass) to raw coal in household stoves and heating facilities. Currently, coal accounts for more than 55% of domestic energy consumption in the greater BTH region and its surrounding rural areas. This shift has resulted in adverse impacts on the environment and high levels of pollution emissions. Raw coal combustion, especially low-quality coal combustion, produces a large amount of particulate matter and carbon monoxide.[6] When emissions produced from coal-based power generation are compared to those produced by burning raw coal, results show that pollutant emissions from raw coal combustion are higher by about 5 to 10 times. This is largely because the pollutants are directly emitted into the atmosphere without any treatment,[7] which poses serious risks to the environment and public

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[1] The greater BTH region refers to Beijing and Tianjin municipalities; Hebei, Henan, Shandong, Shanxi, and Liaoning provinces; and Inner Mongolia Autonomous Region.

[2] ADB. 2017. *Country Operations Business Plan: People's Republic of China, 2017–2019*. Manila.

[3] An "ecological civilization" refers to achieving harmony between growth, people, and nature. It includes activities to mitigate ecological damage, relieve pressures on natural resources, and improve the balance between the environment and the economy. ADB. 2016. *Country Partnership Strategy: PRC, 2016–2020—Transforming Partnership*. Manila. The TA first appeared in the business opportunities section of ADB's website on 25 August 2017.

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

[5] M. Gao et al. 2015. Health impacts and economic losses assessment of the 2013 severe haze event in Beijing area. *Science of the Total Environment*. 511. pp. 553–561.

[6] Z. Jingchao, K. Kotani, and T. Saijo. 2017. Low-quality or high-quality coal: Household energy choice in rural Beijing. *Kochi University of Technology Social Design Engineering Series.* 6. pp. 1–22.

[7] L. Zenglin, 2017. Status and management measures on raw coal burning in China. *Coal Processing and Comprehensive Utilization*. Volume 1. pp. 4–7.

health.[8] Therefore, reducing pollution emissions from rural and semi-urban energy consumption can greatly contribute to addressing the haze problem in the greater BTH region.

5. The Government of the PRC is committed to increasing the use of clean heating technologies. In May 2017, a joint notice was issued by the Ministry of Finance; Ministry of Housing, Urban, and Rural Development; Ministry of Environmental Protection; and National Energy Administration to initiate clean heating pilots in the northern region.[9] As part of this plan, the central government will provide financial support to pilot cities to replace raw coal-based heating facilities with clean heating. The national government is also encouraging provincial and municipal governments to adopt policy measures that promote institutional innovation and attract private sector investments to scale up the replacement of coal-based heating facilities in additional cities.

III. THE TECHNICAL ASSISTANCE

6. The TA will focus on the Beijing, Tianjin, Hebei, Shandong, and Henan municipalities and provinces that have substantial biomass, solar, wind, and geothermal resource potential. In line with the central government's plans, the TA will help local governments in the greater BTH region develop policy measures to optimize rural energy supply and improve air quality through knowledge-building activities. The activities include the following:

(i) **Conducting a survey to identify the status and structure of rural energy consumption.** Solving rural energy and environmental pollution problems requires a well-designed energy structure that enables efficient use of energy. To obtain data on rural energy consumption, a questionnaire and field survey in the greater BTH region will be conducted by the expert team. The survey results will be used to analyze current rural energy consumption patterns and structure, propose key measures for energy efficiency and pollution reduction, determine a reasonable energy demand and supply system, and establish a rural energy consumption baseline.

(ii) **Assessing impacts of rural energy consumption on air quality.** Energy consumption is one of the main causes of the deteriorating air quality in the greater BTH region. A study consisting of case studies, a literature review, and expert consultations will be conducted by the expert team to assess the amount of pollution emissions from rural and semi-urban energy consumption and the resulting impacts on air quality of these emissions.

(iii) **Proposing clean energy supply structures in pilot cities.** The TA will analyze different technologies to supply energy in cities in the greater BTH region. Considering the natural endowments of each municipality and province, the TA will focus on improving energy efficiency and promoting biomass, geothermal, solar, and other clean energy technologies. The TA will (i) identify pilot cities based on the location's energy consumption structure, local resource endowment, economic development levels, and inhabitants' lifestyles; and (ii) deploy the most appropriate alternative clean energy technologies. The selected clean energy sources must be reliable and reduce air pollution.[10] Successful pilots should encourage neighboring areas to switch from coal-based sources to clean energy.

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[8] About 700–800 million tons of raw coal are used annually in the PRC.

[9] Northern region refers to the northern part of PRC where heating is compulsory, it includes Beijing, Tianjin, Henan, Hebei, Shandong, Shanxi, and Inner Mongolia.

[10] For example, the combination of solar photovoltaic and air-source heat pumps would make full use of the available energy resources, save energy and reduce emissions, and provide continuous heating supply.

(iv) **Assessing the market potential for clean energy and developing a clean energy strategy.** The TA will (i) conduct a field survey to assess the market potential for clean energy development and undertake a cost–benefit analysis of different clean energy sources, (ii) propose a clean energy development strategy and policy recommendations to the government, and (iii) include a workshop on clean energy supply in the greater BTH region.

A. Impact and Outcome

7. The TA is aligned with the following impact: air pollution reduced and public health improved in the greater BTH region. The TA will have the following outcome: rural energy structure and air quality improved in the greater BTH region.

B. Outputs, Methods, and Activities

8. **Output 1: Survey of the status and structure of rural energy consumption in the greater Beijing–Tianjin–Hebei region conducted.** By 2019, the major factors affecting rural energy consumption behaviors will be identified by the expert team and a report on the status and structure of rural energy consumption in the greater BTH region prepared by the expert team.

9. **Output 2: Report on the status and structure of rural energy consumption in the greater BTH region prepared.** By 2019, a report summarizing the impacts of rural energy consumption on air quality will be prepared by the expert team.

10. **Output 3: Rural clean energy supply plan proposed.** A rural energy supply plan will be developed to identify the most appropriate technologies to supply energy in various pilot cities of the greater BTH region. By 2019, at least three clean energy pilots will be conducted by the expert team.

11. **Output 4: Recommendations on the clean energy development strategy made to the government.** By 2019, the market potential for clean energy development in the pilot cities will be assessed and a cost–benefit analysis conducted to inform policy recommendations for a clean energy development strategy by the expert team. A workshop on clean energy supply in the greater BTH region will also be organized by the expert team for related stakeholders, including government officials, financial institutions, and the private sector.

C. Cost and Financing

12. The TA is estimated to cost $450,000, of which $400,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-other sources). The key expenditure items are listed in Appendix 2.

13. The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, information and documents relevant for the preparation of the TA, and other in-kind contributions.

D. Implementation Arrangements

14. ADB will administer the TA. ADB's Energy Division, East Asia Department will select, administer, supervise the consultants' outputs for the TA, and evaluate consultants.

Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	November 2017–November 2019		
Executing agency	Ministry of Agriculture		
Implementing agency	Rural Energy and Environment Agency, Ministry of Agriculture		
Consultants	To be selected and engaged by ADB		
	Individual selection method	1 person-month	$20,000
	Quality- and cost-based selection method	18 person-months	$110,000
	1 firm through QCBS (90:10)		$150,000
Procurement	To be procured by ADB following ADB Procurement Policy (2017, as amended from time to time) and the associated Project Administration Instructions[a]		
Disbursement	The TA resources will be disbursed following ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time)		

ADB = Asian Development Bank, QCBS = quality- and cost-based selection, TA = technical assistance.

[a] Project Administration Instructions 2.02, 2.03, 2.06, 2.07, and 5.09 will be used as a reference until these are updated and replaced by staff instructions. *Project Administration Instructions*. PAI 2.02. Manila; ADB. 2014. General Procedure for Selecting and Engaging Consultants. *Project Administration Instructions*. PAI 2.03. Manila; ADB. 2012. Consultant Contract Management. *Project Administration Instructions*. PAI 2.06. Manila; ADB. 2014. Consultant Performance Evaluation. *Project Administration Instructions*. PAI 2.07. Manila; ADB. 2013. Administering Grant-Financed Technical Assistance Projects. Project Administration Instructions. PAI 5.09. Manila.

Source: ADB estimates.

15. **Consulting services.** Consultants will be engaged in accordance with ADB's Procurement Policy (2017, as amended from time to time) and the associated Project Administration Instructions.[11] Consultants will be engaged to prepare the TA, using the individual selection method and output-based partial lump-sum contracts. The consultants will provide 19 person-months of consulting services, which will involve one international consultant (1 person-month) and 11 national consultants (18 person-months).[12] The international consultant will be a renewable energy specialist. The national consultants will include (i) a clean energy specialist, (ii) an energy policy and regulatory expert, (iii) a rural clean energy specialist, (iv) an energy efficiency expert, (v) an economist, (vi) a distributed energy network specialist, (vii) an environment specialist, (viii) a geothermal energy specialist, (ix) a biomass energy specialist, (x) a clean stoves specialist, and (xi) a solar energy specialist. In addition, a consulting firm will be engaged using the quality- and cost-based selection method and an output-based, partial lump-sum contract for the complementary survey of status and structure of rural energy consumption. The expert team will prepare reports and policy recommendations, including (i) report on the status and structure of rural energy consumption in the greater BTH region, (ii) report of the impacts of rural energy consumption on air quality, (iii) rural energy supply plan in the selected pilot cities, and (iv) policy recommendations on the clean energy development strategy for the pilot cities.

[11] Project Administration Instructions 2.02, 2.03, 2.06, 2.07 and 5.09 will be used as a reference until these are updated and replaced by staff instructions. *Project Administration Instructions*. PAI 2.02. Manila; ADB. 2014. General Procedure for Selecting and Engaging Consultants. *Project Administration Instructions*. PAI 2.03. Manila; ADB. 2012. Consultant Contract Management. *Project Administration Instructions*. PAI 2.06. Manila; ADB. 2014. Consultant Performance Evaluation. *Project Administration Instructions*. PAI 2.07. Manila; ADB. 2013. Administering Grant-Financed Technical Assistance Projects. Project Administration Instructions. PAI 5.09. Manila.

[12] Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 3).

IV. THE PRESIDENT'S DECISION

16. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $400,000 on a grant basis to the Government of the People's Republic of China for the Study of Clean Energy Supply for the Rural Areas in the Greater Beijing–Tianjin–Hebei Region, and hereby reports this action to the Board.

Takehiko Nakao
President

October 2017

DESIGN AND MONITORING FRAMEWORK

Impact the TA is Aligned with Air pollution reduced and public health improved in the greater BTH region (Comprehensive Action Plan for Air Pollution Prevention and Control; and the Thirteenth Five-Year Plan)[a]			
Results Chain	**Performance Indicators with Targets and Baselines**	**Data Sources and Reporting**	**Risks**
Outcome Rural energy structure and air quality improved in the greater BTH region	By 2020 a. At least two of the study's recommendations on clean energy implemented (2016 baseline: NA) b. Number of days in the year air quality standards in Beijing are met increased to 240 (2015 baseline: 186 days)	a–b. Government's reports	Local governments' current priority on rural development is not sustained Higher cost of clean energy system deters investments
Outputs 1. Survey of the status and structure of rural energy consumption in the greater BTH region conducted	By 2019 1a. Major factors affecting rural energy consumption behaviors identified (2016 baseline: NA)	1a. TA completion report	Limited capacity of local counterparts
2. Report on the status and structure of rural energy consumption in the greater BTH region prepared	2a. Impacts of rural energy consumption on air quality assessed (2016 baseline: NA)	2a. TA completion report	
3. Rural clean energy supply plan proposed	3a. At least three cities selected as pilots (2016 baseline: NA) 3b. Local resource endowments, economic development levels, and lifestyles in the pilot cities analyzed (2016 baseline: NA)	3a–b. TA completion report	
4. Recommendations on the clean energy development strategy made to the government	4a. Market potential for clean energy development in the pilot cities assessed (2016 baseline: 0) 4b. Cost-effectiveness analysis conducted (2016 baseline: NA) 4c. Clean energy development strategy and policy recommendations	4a–b. TA completion report 4c. Workshop training materials	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
	proposed (2016 baseline: NA)		
Key Activities with Milestones **1. Survey of the status and structure of rural energy consumption in the greater BTH region conducted** 1.1 Collect data on rural energy consumption through questionnaire and field survey in the greater BTH region (June 2018) 1.2 Identify the major factors affecting rural energy consumption behaviors (June 2018) 1.3 Analyze the status, structure, and influencing factors of rural energy consumption status (June 2018) 1.4 Prepare report on the status and structure of rural energy consumption in the greater BTH region (June 2018) **2. Report on the status and structure of rural energy consumption in the greater BTH region prepared** 2.1 Study pollutant emissions from rural energy consumption by conducting case studies, conducting a literature review, and seeking expert consultation (December 2018) 2.2 Assess the impacts of rural energy consumption on air quality (December 2018) 2.3 Prepare a report on the impacts on air quality of pollutant emissions from rural energy consumption (December 2018) **3. Rural clean energy supply plan proposed** 3.1 Study local resource endowments, economic development levels, and lifestyles (June 2019) 3.2 Propose rural clean energy supply plan (June 2019) **4. Recommendations on the clean energy development strategy made to the government** 4.1 Collect data on the market potential for clean energy development through a field survey (June 2019) 4.2 Propose clean energy development strategy and make policy recommendations (June 2019) 4.3 Organize workshop on clean energy supply in the greater BTH region (June 2019)			
Inputs ADB: $400,000 Note: The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, information and documents relevant for the preparation of the TA, and other in-kind contributions.			
Assumptions for Partner Financing Not applicable			

ADB = Asian Development Bank, BTH = Beijing–Tianjin–Hebei, NA = not applicable, PRC = People's Republic of China, TA = technical assistance.

[a] Government of the PRC, State Council. 2013. *Action Plan for Air Pollution Prevention and Control.* Beijing; Government of the PRC. 2016. *Thirteenth Five-Year Plan, 2016–2020.* Beijing.

Source: ADB.

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COST ESTIMATES AND FINANCING PLAN

($'000)

Item	Amount
Asian Development Bank[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	20.0
ii. National consultants	110.0
b. Out-of-pocket expenditures	
i. International and local travel	20.0
ii. Reports and communications	10.0
2. Workshop, training, and study tour[b]	60.0
3. Survey[c]	150.0
4. Contingencies	30.0
Total	**400.0**

Note: The technical assistance (TA) is estimated to cost $450,000, of which contributions from the Asian Development Bank are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office accommodation, office supplies, information and documents relevant for the preparation of the TA, and other in-kind contributions. The value of government contribution is estimated to account for 11% of the total TA cost.

[a] Financed by the Asian Development Bank's Technical Assistance Special Fund (TASF-other sources).

[b] Includes the cost of supporting the travel expenses of three to five staff from relevant national government agencies to participate in an overseas study tour on the similar development of rural new energy in ADB member countries in Europe such as the Nordic countries. The interim, midterm and final workshops will be held in Beijing. Also, includes interpretation and translation costs.

[c] A consulting firm or institute will be recruited to undertake the survey.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/LinkedDocs/?id=51031-001-TAReport

1. Terms of Reference for Consultants