



Completion Report

PUBLIC

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

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TECHNICAL ASSISTANCE COMPLETION REPORT

TA Number, Country, and Name: TA 9403-PRC: Study of Clean Energy Supply for the Rural Areas in the Greater Beijing–Tianjin–Hebei Region		Amount Approved: \$400,000.00	
		Revised Amount: Not Applicable	
Executing Agency: Ministry of Agriculture and Rural Affairs	Source of Funding: Technical Assistance Special Fund-other sources	Amount Undisbursed: \$53,691.42	Amount Used: \$346,308.58
TA Approval Date: 12 October 2017	TA Signing Date: 3 November 2017	TA Completion Date	
		Original Date: 30 November 2019	Latest Revised Date: 30 November 2021
		Financial Closing Date: 28 February 2022	Number of Extensions: 2
TA Type: Knowledge and support TA	Nature of Activity: Capacity development	TA Arrangement: Not applicable	

Description

The greater Beijing–Tianjin–Hebei (BTH) region is a major metropolitan area in the People's Republic of China (PRC) that includes eight provinces, cities, and autonomous regions.¹ Its land area and population accounts to more than 10% and 25% of the national total, respectively. It is the region with the highest air pollution in the country, directly linked to burning coal for domestic energy use, particularly in rural areas. This technical assistance (TA) project selected the greater BTH region to study the rural energy consumption structure and consumer behaviors, and propose policies on clean rural energy supply for government's consideration, aiming to help local governments in the region develop policy measures to optimize rural energy supply and improve air quality through knowledge-building activities.

Expected Impact, Outcome, and Outputs

The expected impact of the TA was air pollution reduced and public health improved in the greater BTH region, in line with the government's action plan for air pollution prevention and the Thirteenth Five-Year Plan.² The TA outcome was rural energy structure and air quality improved in the greater BTH region. The TA outputs were (i) survey of the status and structure of rural energy consumption in the greater BTH region conducted; (ii) report on the status and structure of rural energy consumption in the greater BTH region prepared; (iii) rural clean energy supply plan proposed; and (iv) recommendations on the clean energy development strategy made to the government.

Implementation Arrangements

The TA's executing agency was the Ministry of Agriculture and Rural Affairs (MARA, previously referred to as the Ministry of Agriculture at TA approval) and the implementing agency was the Rural Energy and Environment Agency under MARA.

TA extensions. The TA was envisioned to be implemented over 2 years, originally from November 2017 to November 2019. The implementation was extended twice, on 2 May 2019 for 1 year until 30 November 2020 due to the difficulty in identifying qualified experts within the estimated budget which delayed the hiring process, and on 25 August 2020 for another year until 30 November 2021 for a cumulative 24 months, due to the impact of coronavirus disease (COVID-19) during 2020 which delayed the completion of the field survey for the three case studies and holding planned workshops and training for local government officials.

Minor changes in implementation arrangements. The first minor change in implementation arrangements on 19 March 2018 (5 months after approval) was to clarify the consultant's selection method and resolve the inconsistency between the TA report, which indicated to hire individual consultants, and its appended terms of reference (TOR), which indicated the consultants would be hired through a firm. By the end of 2018, only four (out of the 11 national consultant positions planned) could be hired due to limited interest of applicants. Hence, another minor change in implementation arrangements was approved on 2 May 2019 to reduce the number of the remaining national consultant positions from seven to three to increase the available budget for each position, so that more qualified candidates would be attracted. By end of 2019, three additional national consultants (including the team leader) were selected and hired, and the analytical work could continue.

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

² Government of the PRC, State Council. 2013. *Action Plan for Air Pollution Prevention and Control*. Beijing; and Government of the PRC. 2016. *Thirteenth Five-Year Plan, 2016–2020*. Beijing.

Conduct of Activities

The TA implementation covered three parts to support the production and delivery of project results: (i) project inception to develop the TA implementation workplan, (ii) data/field survey to obtain the actual status of rural energy supply and consumption, and (iii) an analytical study to prepare solutions and policy recommendations on clean energy supply and consumption in the greater BTH rural area and to disseminate the findings of the study for capacity building.

(i) At project inception, the consulting team headed by a team leader and the project management office, supervised by the executing and implementing agencies and the Asian Development Bank (ADB), conducted frequent consultations to ensure clear understanding on the requirements and expectations in implementing the TA. On 25 July 2019, the TA inception workshop was held at ADB Resident Mission in Beijing with participation of the consulting team; representatives from the executing and implementing agencies; the rural energy departments of eight provinces, cities, and districts of Beijing, Hebei, Henan, Shanxi, Tianjin; Inner Mongolia and Liaoning; other development agencies; invited experts; and ADB officials. The Beijing Jiashu Technology Consulting Co., Ltd. (Jiashu), contracted to undertake the survey, introduced the initial survey results and the plan to complete the survey and the analysis report as basis for this TA study. The workshop received the inputs from participants to improve the work plan. The consulting team submitted the work plan as the first deliverable, which included three key parts: research on clean energy resources and development potential of the greater BTH and surrounding rural areas; research on the current situation and environmental impact of energy consumption in the greater BTH and surrounding rural areas; and collection and systematic analysis on policies related to the development and utilization of rural clean energy from national and local levels.

(ii) On the survey, the main tasks included selection of the survey indicators of rural energy consumption, analysis of the key factors affecting rural energy consumption, and collection and analysis of relevant policies for the development and utilization of rural clean energy. Jiashu undertook the survey and designed the survey questionnaires and the rural energy use indicators. Field visits were undertaken to interview rural residents, local communities, and local governments to obtain first-hand information and data of rural energy supply and consumption, and consultations were conducted to understand the residents' views on rural energy use and their acceptance of clean energy even with a higher cost. In February 2020, Jiashu submitted the survey report on the status of energy consumption of rural residents and the factors affecting rural energy consumption.

(iii) On the analytical study, the consulting team conducted the analysis on (a) the status of rural energy consumption in the region and its environmental impact, as well as assessment of the existing rural energy policies, (b) identification of the most appropriate alternative technologies and operational models of rural clean energy development and utilization, (c) review of international good practice of rural clean energy supply, (d) identification of three pilot cities/townships for clean energy demonstration by assessing the location's energy consumption structure, local resource endowment, economic development levels, and inhabitants' lifestyles, and (e) recommendations on the rural clean energy development potential to further enhance rural clean energy supply and consumption in the region. The initial analytical study report was completed in May 2020, which included three pilots: Yangxin County (Shandong Province), Xi Liangwa Township in Anping County (Hebei Province), and Shangdang District in Changzhi City (Shanxi Province) as potential clean rural energy supply demonstrations to assess their feasibilities. Thereafter, the draft study report received comments and inputs from a series of review and consultation workshops. On 21–24 July 2021, a training workshop on rural energy transformation was held in Datong City of Shanxi Province, with 303 participants. The draft report was also presented at the 2021 Asia–Pacific Forum on Green and Low Carbon Development on 21 September 2021. The executing and implementing agencies, and ADB also jointly held the final workshop on 29 November 2021 to discuss the draft report to finalize.

Technical Assistance Assessment Ratings

Criterion	Assessment	Rating
Relevance	The TA's design and formulation was fully aligned with (i) the PRC's development priorities on climate change mitigation and air pollution reduction, as per the government's Thirteenth Five-Year Plan, the action plan for air pollution prevention and control, and the PRC's Nationally Determined Contributions under Paris Agreement, (ii) the country partnership strategy for the PRC, 2016–2020, which supports rural/urban pollution control; (iii) ADB's 2009 Energy Policy and relevant Sustainable Development Goals; (iv) the ADB-financed greater BTH Clean Air flagship program, and (v) ADB Strategy 2030 operational priority 3 (tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability).	<i>Relevant</i>

Criterion	Assessment	Rating
Effectiveness	The TA's four outputs were delivered as intended: (i) survey conducted and report submitted in February 2020, (ii) report on rural energy consumption status submitted in May 2020, (iii) three clean energy supply pilots proposed, and (iv) recommendations provided to the governments of the three pilot cities. The expected outcome was also achieved, with recommendations from the study reflected in the Fourteenth Plan of MARA and supported the development of the "Top Ten Technologies for Energy Conservation and Emission Reduction in Agriculture and Rural Areas" guidance document (Appendix 1).	<i>Effective</i>
Efficiency	The TA delivered the planned four outputs within the original budget (87% used). The implementation period was extended by 24 months due to the initial difficulty in identifying consultants during 2018, which affected procurement efficiency as some terms of reference needed to be changed to adapt to the reality of the consulting market at the time. The unforeseen impact of the COVID-19 pandemic during 2020 delayed some activities and held-up planned training and workshops until travel restrictions were lifted.	<i>Efficient</i>
Overall Assessment	The TA was fully aligned with ADB and the PRC policies and strategies and was transformative in influencing the PRC's national plans. It delivered the planned four outputs within the original budget (87% used), supporting the achievement of its outcome. The implementation period was extended by two years due to the initial hiring difficulties and the impact of COVID-19 pandemic.	<i>Successful</i>
Sustainability	The government made it clear that the PRC will make all efforts in achieving carbon emission peaking before 2030 and carbon neutrality by 2060, which will mean consistent demand for clean and low carbon energy supply, including clean rural energy. The TA trained many officials of the greater BTH region in promoting clean rural energy development, addressing climate change, and reducing air pollution through consultations and workshops during the TA implementation, which is expected to have a long-term impact. Finally, the TA made contributions during the preparation of the Ministry's Fourteenth Plan and the release on 19 November 2021 of the official guidance document "Top Ten Technologies for Energy Conservation and Emission Reduction in Agriculture and Rural Areas."	<i>Likely sustainable</i>

Lessons Learned and Recommendations

Design and/or planning	Excessively tight consulting budgets or overreaching terms of reference can delay activities as consultants may not show interest to work for the estimated amounts. It is recommended to carry out a desk review of the consulting market before processing TAs to avoid such hiring problems or implementation delays.
Implementation and/or delivery	Continuous engagement and regular communication with government counterparts, consulting teams, and ADB staff can enhance delivery by adapting to unforeseen events like the COVID-19 pandemic.
Knowledge building	The TA carried out assessments and surveys, and recommended policies and actions. The TA also provided training to local government officials that proved essential. Policy implementation can only be carried out if government officials have the adequate capacity and understanding of new approaches/technologies, which training and knowledge building can provide.
Stakeholder participation	Participation of stakeholders in surveys and their inputs reflected in case studies can improve policy recommendations by reflecting the realities of the beneficiaries on the ground that may not be clear through desk research.
Replication and/or scaling up	Many developing member countries (DMCs) face similar challenges as the PRC has encountered in addressing climate change and reducing air pollution while promoting rural social and economy development. Clean rural energy development would play an important role in achieving the goals of both the rural development and global climate protection. The work undertaken by this TA in the three piloted cities could be replicated in other cities in the PRC as well as in other DMCs.

Follow-up Actions

The rural energy assessments and plans carried out for the three pilot cities can be used as models for similar studies in other municipalities in the PRC and other DMCs. The technical reports can be disseminated within the East Asia Department and shared among other project teams working on similar projects. The East Asia Sustainable Infrastructure division of ADB will prepare a knowledge product with lessons learned from this TA.

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DESIGN AND MONITORING FRAMEWORK

Impact 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 Indicator with Targets and Baselines	Achievements
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. Achieved. <ul style="list-style-type: none"> By comparing available energy supply technologies with the energy needs of various pilot cities in the region, the project produced a clean energy supply proposal for the rural areas of the greater BTH region. The TA consultant team selected three clean energy supply pilots: Yangxin County in Shandong Province, Shangdang District in Changzhi City in Shanxi Province, and Xiliangwa Township in Anping County in Hebei Province, respectively, and recommended for implementation. Such recommendations were later implemented in the three locations. The project ideas and policy recommendations proposed by this TA contributed to the drafting of the Fourteenth Five-Year Plan for energy conservation and emission reduction in agriculture and rural areas in the greater BTH region. Recommendations on the priorities for clean energy development and utilization in rural areas have been reflected in the national Fourteenth Plan of MARA. The consulting team also actively participated in providing inputs for preparation of the "Top Ten Technologies for Energy Conservation and Emission Reduction in Agriculture and Rural Areas" guidance document issued by MARA.^b b. Achieved. In 2020 and 2021, Beijing's air quality reached the standard, respectively, with 276 and 288 days of good air quality. ^c
Outputs 1. Survey of the status and structure of rural energy consumption in the greater BTH region conducted 2. Report on the status and structure of rural energy consumption in the greater BTH region prepared 3. Rural clean energy supply plan proposed	By 2019 1a. Major factors affecting rural energy consumption behaviors identified (2016 baseline: NA) 2a. Impacts of rural energy consumption on air quality assessed (2016 baseline: NA) 3a. At least three cities selected as pilots (2016 baseline: NA)	1a. Completed. Survey report including the current energy sector situation in the greater BTH region was submitted as Annex 1 of the TA consultant report. ^d 2a. Completed. Included in Chapter 3 of this TA study report (Annex 2 of the TA consultant report). 3a. Completed. Three clean energy supply pilots were selected: Yangxin County (Shandong Province), Xi Liangwa Township in Anping County (Hebei Province), and Shangdang District in Changzhi City (Shanxi Province) respectively, for study, included in Chapter 7, Annex 2 of the TA consultant report.

Results Chain	Performance Indicators with Targets and Baselines	Achievements
4. Recommendations on the clean energy development strategy made to the government	3b. Local resource endowments, economic development levels, and lifestyles in the pilot cities analyzed (2016 baseline: NA)	3b. Completed. The local resource endowments, economic development levels, and lifestyles of the selected pilots were analyzed to develop the demonstration scheme and recommendation for implementation included in Chapter 7 of Annex 2.
	4a. Market potential for clean energy development in the pilot cities assessed (2016 baseline: 0)	4a. Completed. The rural clean energy development recommendations based on the evaluations of the potential clean energy markets in the three pilot cities were provided to the governments of the three pilot cities, included in Chapter 7 of Annex 2.
	4b. Cost-effectiveness analysis conducted (2016 baseline: NA)	4b. Completed. The report included a scientific and detailed cost-benefit analysis of candidate clean energy technologies included Chapter 7 of Annex 2.
	4c. Clean energy development strategy and policy recommendations proposed (2016 baseline: NA)	4c. Completed. The TA made clean energy development strategy and policy recommendations and a clean energy supply proposal for the rural areas of the greater BTH region to the government, as included in Chapter 8 of Annex 2.

Actual 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 (actual completion: December 2018)
 - 1.2 Identify the major factors affecting rural energy consumption behaviors (actual completion: May 2019)
 - 1.3 Analyze the status, structure, and influencing factors of rural energy consumption status (actual completion: June 2019)
 - 1.4 Prepare report on the status and structure of rural energy consumption in the greater BTH region (actual completion: February 2020)
- 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 (actual completion: December 2019)
 - 2.2 Assess the impacts of rural energy consumption on air quality (actual completion: December 2020)
 - 2.3 Prepare a report on the impacts on air quality of pollutant emissions from rural energy consumption (actual completion: November 2021)
- 3. Rural clean energy supply plan proposed**
 - 3.1 Study local resource endowments, economic development levels, and lifestyles (actual completion: December 2020)
 - 3.2 Propose rural clean energy supply plan (actual completion: November 2021)
- 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 (actual completion: December 2019)
 - 4.2 Propose clean energy development strategy and make policy recommendations (actual completion: November 2021)
 - 4.3 Organize workshop on clean energy supply in the greater BTH region (actual completion: November 2019)

Actual Inputs

ADB: \$346,308.58

Note: \$50,000 (estimated in-kind government contribution 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).

ADB = Asian Development Bank, BTH = Beijing–Tianjin–Hebei, MARA = Ministry of Agriculture and Rural Affairs, NA = not applicable, 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.

^b 2021. [Ten Technical Models for Energy Conservation and Emission Reduction in Agriculture and Rural Areas Released](#) (in Chinese). 21 November.

^c 2022. [Beijing sets air quality record in 2021](#). 4 January.

^d ADB. 2022. [Study of Clean Energy Supply for the Rural Areas in the Greater Beijing–Tianjin–Hebei Region](#). Consultant's report. Manila. (TA 9403-PRC).

Source: Asian Development Bank.

TECHNICAL ASSISTANCE COST

Table A2.1: Technical Assistance Cost by Activity
(\$'000)

Item	Amount	
	Original	Actual
1. Consultants	160.0	265.9
2. Training, seminars, and/or conferences	60.0	80.4
3. Surveys	150.0	0.0
4. Contingency	30.0	0.0
Total	400.0	346.3

Source: Asian Development Bank estimates.

Table A2.2: Technical Assistance Cost by Fund
(\$'000)

Item	TASF-Other Sources
1. Original	400.00
2. Actual	346.31
3. Unused	53.69

TASF = Technical Assistance Special Fund.

Source: Asian Development Bank estimates.