



Technical Assistance Report

Project Number: 55033-001
Knowledge and Support Technical Assistance (KSTA)
September 2021

People's Republic of China: Research on Addressing Climate Change in Ningxia through the Use of Science and Technology

This document is being disclosed to the public in accordance with ADB's Access to Information Policy.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 10 September 2021)

Currency unit	–	yuan (CNY)
CNY1.00	=	\$0.154909
\$1.00	=	CNY6.455400

ABBREVIATIONS

ADB	–	Asian Development Bank
CO ₂	–	carbon dioxide
GHG	–	greenhouse gas
NHAR	–	Ningxia Hui Autonomous Region
PRC	–	People's Republic of China
STDN	–	Science and Technology Department of Ningxia
TA	–	technical assistance
YRB	–	Yellow River basin

NOTE

In this report, "\$" refers to United States dollars.

Vice-President	Ahmed M. Saeed, Operations 2
Director General	M. Teresa Kho, East Asia Department (EARD)
Director	Sujata Gupta, Sustainable Infrastructure Division (EASI), EARD
Team leader	Arun Ramamurthy, Principal Infrastructure Specialist (Digital Technology), EASI, EARD
Team members	Ma. Carmen M. Alcantara, Project Analyst, EASI, EARD Xuedu Lu, Lead Climate Change Specialist, EASI, EARD Zipporah Marquez, Operations Assistant, EASI, EARD

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

	Page
KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE	
I. INTRODUCTION	1
II. ISSUES	2
III. THE TECHNICAL ASSISTANCE	3
A. Impact and Outcome	3
B. Outputs, Methods, and Activities	3
C. Cost and Financing	4
D. Implementation Arrangements	4
IV. THE PRESIDENT'S DECISION	5
APPENDIXES	
1. Design and Monitoring Framework	6
2. Cost Estimates and Financing Plan	8
3. List of Linked Documents	9

KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data		Project Number: 55033-001
Project Name	Research on Addressing Climate Change in Ningxia through the Use of Science and Technology	Department/Division EARD/EASI
Nature of Activity Modality	Capacity Development Regular	Executing Agency Science and Technology Department of Ningxia
Country	China, People's Republic of	
2. Sector		ADB Financing (\$ million)
✓ Energy	Energy sector development and institutional reform	0.08
Agriculture, natural resources and rural development	Water-based natural resources management	0.08
Industry and trade	Large and medium industries	0.08
Information and communication technology	ICT industries and ICT-enabled services	0.08
		Total <u>0.32</u>
3. Operational Priorities		Climate Change Information
✓ Accelerating progress in gender equality		GHG Reductions (tons per annum) 0.000
✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability		Climate Change impact on the Project High
✓ Promoting rural development and food security		ADB Financing
✓ Fostering regional cooperation and integration		Adaptation (\$ million) 0.00
		Mitigation (\$ million) 0.00
		Cofinancing
		Adaptation (\$ million) 0.00
		Mitigation (\$ million) 0.00
Sustainable Development Goals		Gender Equity and Mainstreaming
SDG 1.5		Some gender elements (SGE) ✓
SDG 2.4		
SDG 5.b		
SDG 7.2		Poverty Targeting
SDG 9.4, 9.5		General Intervention on Poverty ✓
SDG 12.2		
4. Risk Categorization Low		
5. Safeguard Categorization Safeguard Policy Statement does not apply		
6. Financing		
Modality and Sources		Amount (\$ million)
ADB		0.30
Knowledge and Support technical assistance: Technical Assistance Special Fund		0.30
Cofinancing		0.00
None		0.00
Counterpart		0.00
None		0.00
Total		0.30
Currency of ADB Financing: US Dollar		

I. INTRODUCTION

1. The knowledge and support technical assistance (TA) will analyze measures to lower contribution to and minimize the impact of climate change in Ningxia, People's Republic of China (PRC) using science and technology. The TA was requested by the Government of Ningxia Hui Autonomous Region (NHAR). The NHAR is one of the regions in the PRC with highest carbon dioxide (CO₂) intensity per gross domestic product because of the predominance of the coal and chemical industries. It is also prone to the vagaries of climate change impacts because of increased drought and constrained water supply from the Yellow River, affecting agriculture activities. This TA will study appropriate scientific methods and processes to measure and strengthen climate responsiveness in the following three primary economic sectors in Ningxia: agriculture, energy, and heavy industries.¹

2. Ningxia Hui Autonomous Region, one of the five minority autonomous regions in the PRC, is located inland in the northwestern PRC and along the upper and middle reaches of the Yellow River. Ningxia covers an area of 66,400 square kilometers and includes five prefecture-level cities. In 2019, the population was 6.947 million. Ningxia is a dry region and mainly depend on water from the Yellow River for domestic, agricultural, and industrial activities. The region's public health, food security, and industrial sustainability are threatened by high air and water pollution and climate change-linked events such as floods and droughts.

3. Almost the entire population in Ningxia depends on the Yellow River for its water needs. In 2019, a total of 6.9 billion cubic meters of water was consumed in Ningxia, 88% of which was from the Yellow River. About 5.4% of the total water available in the Yellow River basin (YRB) is used for potable water for domestic needs. Agricultural water consumption in the region is 5.927 billion cubic meters, which accounts for 85% of the total water consumption and is used to irrigate an area of about 9.1231 million *mu*.² The main agricultural crops in Ningxia are corn, wheat, rice, and potatoes. The frequent occurrence of extreme weather events such as droughts and floods threaten the livelihoods of the people in the region.

4. Ningxia is an economically underdeveloped region in comparison with other provinces and autonomous regions of the PRC. Its industries are dominated by highly polluting heavy industry,³ manufacturing, and associated logistics activities. In 2018, heavy industries accounted for 79.5% of industrial energy consumption in the NHAR.

5. In the 14th Five-Year Plan, 2021–2025,⁴ it was proposed to promote economic transformation and green and low carbon development through reform and innovation. An innovation-driven strategy was therefore developed for Ningxia to meet these objectives. This strategy envisions high-quality development in the YRB through (i) developing green industries such as green and smart agriculture, new materials, clean energy, and ecological tourism; and (ii) regulating the development of enterprises with high carbon emissions. This is a major development strategy, and scientific and technological innovation plays an important role in supporting its implementation.⁵ The Science and Technology Department of Ningxia (STDN), on

¹ The TA first appeared in the business opportunities section of the Asian Development Bank (ADB) website on 24 August 2021.

² A *mu* is a Chinese unit of measurement (1 *mu* = 666.67 square meters).

³ Heavy industry refers to the industry that provides the material and technology for many sectors of the national economy. Ningxia's heavy industry mainly comprises the power, chemical, metallurgical, and nonferrous industries.

⁴ Government of the PRC. 2021. [The 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of Long-Term Goals for 2035](#). Beijing.

⁵ H. Dongmei. 2019. [Ningxia Innovation Drive Strategy to Promote Ningxia Development](#). *China Daily*. 21 November.

behalf of the NHAR government, undertakes scientific and technological innovation research work in the NHAR.

II. ISSUES

6. Ningxia's total greenhouse gas (GHG) emissions exceeded 160 million tons CO₂ equivalent in 2016 and 200 million tons of CO₂ equivalent in 2018, bringing its per capita emissions to four times of the PRC's average.⁶ More than 87% of GHG emissions can be attributed to energy sector activities in Ningxia. The breakdown of Ningxia's GHG emissions from economic activities in 2018 is as follows: 70.0% from electricity; 25.0% from industrial production; 2.5% from road transport; and 2.5% from agriculture, forestry, and services.⁷ The NHAR government and relevant departments are concerned about addressing climate change impacts and reducing emissions intensity, since these emissions negatively affect quality of life and sustainable development initiatives.

7. The quality of water in the YRB is affected by frequent flooding and droughts. The average annual rainfall in Ningxia is 289 millimeters, which is less than two-thirds the average value for the YRB, and the average annual surface water evaporation is 1,250 millimeters, one of the highest in the YRB. The distribution of water resources is uneven, with 70%–80% of runoff from the Yellow River concentrated during June–September during the flood season. Ningxia is affected by drought as well.⁸ For example, a 2019 drought resulted in crop losses across an area of about 355,000 *mu*. In the flood season of 2019, more than 20 sections of the riverbank collapsed and affected the drinking water supply for the residents in Haiyuan county, Pengyang county, and Yuanzhou district. In 2016, the Eighth Central Environmental Protection Supervision Group pointed out that the water quality of eight key Yellow River canals in Ningxia, as well as four tributaries of the Yellow River in the region, were categorized inferior.

8. During the implementation period of the Thirteenth Five-Year Plan, 2016–2020, the STDN (i) identified issues—such as weak coordination mechanisms between multiple sectors and enabling policy frameworks—that affect climate change mitigation and resilience actions, (ii) carried out the reform and innovation of science and technology systems, (iii) formulated and issued a series of policy documents, and (iv) promoted a body of knowledge on scientific and technological innovation. Thus, tackling climate change impacts requires improved streamlining of multisector policy development, sourcing and management of funds for research, and technical support for the green and smart development of key industries.

9. Uncoordinated multisector approaches in dealing with climate change matters affect the devising of effective responses. Also, inadequate awareness, capacity, and access to networks to utilize advancements in science and technology obstruct the implementation of a coordinated multisector approach. Moreover, a slow transition to green and smart development in the agriculture, energy, and heavy industries slows down potential benefits from addressing climate change mitigation and resilience in Ningxia. This requires benchmarking studies, developing sustainable monitoring mechanisms, and building institutional capacity in Ningxia. Further, the

⁶ China Statistical Press Co., Ltd. 2019. [2019 Ning Xia Statistical Yearbook](#). Beijing; and Government of the PRC, National Bureau of Statistics. 2020. [In 2019, provincial \(district, city\) regional gross domestic product energy consumption reduction rate and other indicators bulletin](#). Beijing.

⁷ Ningxia Ecological Environment Department. General Report of Greenhouse Gas Inventory in Ningxia (2018). Unpublished.

⁸ Ningxia Water Conservancy. 2019. [2019 Ningxia Water Resources Bulletin](#). Ningxia; and China Institute of Commerce and Industry. 2020. [Analysis of Ningxia's economic performance in 2019: gross domestic product increased by 6.5% year-on-year](#).

STDN needs access to specialized technical research, international best practices, and knowledge and capacity building to update its policies, procedures, and monitoring of climate change in NHAR. This TA will help the STDN explore policies and measures to formulate and support technological innovation to mitigate and adapt to climate change. The TA will also help to achieve targets for women in all capacity development activities to address gender gaps in specialized technical research.

III. THE TECHNICAL ASSISTANCE

10. The TA is aligned with four of the seven operational priorities of Strategy 2030 of the Asian Development Bank (ADB): (i) accelerating progress in gender equality, (ii) tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability; (iii) promoting rural development and food security; and (iv) fostering regional cooperation and integration.⁹ The TA is aligned with the PRC's nationally determined contributions¹⁰ under the Paris Agreement and the recent announcement to further enhance its commitment to achieving carbon neutrality before 2060. The TA is in line with ADB's country partnership strategy for the PRC, 2021–2025, which focuses on combating climate change and fostering low carbon development.¹¹

A. Impact and Outcome

11. The TA is aligned with the following impact: effective climate change-related planning and management in Ningxia achieved. The TA will have the following outcome: knowledge and capacity on innovative solutions for climate change mitigation and adaptation in Ningxia applied.¹²

B. Outputs, Methods, and Activities

12. **Output 1: Research on technological innovations to improve climate mitigation and resilience in Ningxia produced.** The research will analyze global innovative technologies and practices used to manage climate change adaptation and mitigation in the agriculture, energy, and heavy industries sectors in Ningxia. Further, the research studies will assess the effectiveness of current policy measures and identify policy areas that strengthen climate resiliency. This output will review climate change management initiatives in Ningxia in these three sectors and provide an opinion on its adequacy in comparison with international best practices, list an inventory of current sector-specific policies on climate change management, and identify potential investment opportunities and activities that can be financed by ADB in future.

13. **Output 2: Climate change measurement indicators for the identified key industries in Ningxia developed.** The output will develop a list of key indicators and develop a database of key indicators for climate change mitigation in Ningxia in the agriculture, energy, and heavy industries sectors. Database system development will include establishing business process and data management initiatives to update and monitor the database system while ensuring data quality. This output will track the NHAR's compliance with the national carbon emissions peaking and neutrality targets.

⁹ ADB. 2018. [Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific](#). Manila.

¹⁰ Based on [China's First Nationally Determined Contribution Submission](#).

¹¹ ADB. 2021. [Country Partnership Strategy: People's Republic of China, 2021–2025—Toward High-Quality, Green Development](#). Manila.

¹² The design and monitoring framework is in Appendix 1.

14. **Output 3: Knowledge on Ningxia’s approach to manage climate change effects enhanced.** The output will produce knowledge products on mitigating climate change in the agriculture, energy, and heavy industries sectors in Ningxia. This will roll out knowledge sharing programs such as workshops, publications, and training sessions involving staff from the NHAR’s Department of Agriculture and Rural Affairs, Energy Bureau, and Department of Industry and Information Technology, and STDN. Training participants from participating departments will include at least 25% women. The output will further support and strengthen interagency coordination through organizing interdepartmental workshops, seminars and trainings. This activity will help developing a convergence of thoughts and actions with regard to climate change matters across multiple government agencies.

15. The outputs will focus on identifying scalable investment opportunities to mitigate and develop resilience to climate change in Ningxia. The TA will identify policies and measures to promote public and private sector participation, disseminate knowledge, and conduct outreach. The TA outputs are in line with ADB’s priority of developing low carbon solutions and demonstrating innovative approaches in the YRB. The project and its activities to address climate change mitigation and resilience are part of the Yellow River Ecological Corridor program, which has been shaped by ADB’s experience from the PRC’s Yangtze River Economic Belt Development Plan and the Rural Vitalization Strategy.¹³

C. Cost and Financing

16. The TA is estimated to cost \$324,000, of which \$300,000 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.

17. The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, and other in-kind contributions.

D. Implementation Arrangements

18. ADB, through the Sustainable Infrastructure Division of the East Asia Department, will administer the TA. The TA will be implemented from October 2021 to July 2024. Individual consultants and a consulting firm with relevant experience will be recruited for TA implementation, and resource persons will be engaged as needed. ADB will engage the consultants and carry out the procurement following the ADB Procurement Policy (2017, as amended from time to time) and its associated project administration instructions and/or staff instructions.

19. Implementation arrangements are summarized in the table.

Implementation Arrangements	
Aspects	Arrangements
Indicative implementation period	October 2021–July 2024
Executing agency	Science and Technology Department of Ningxia
Implementing agency	Science and Technology Department of Ningxia
Consultants	To be selected and engaged by ADB

¹³ Government of the PRC. 2018. *National Strategic Plan for Rural Vitalization, 2018–2022*. Beijing; and Government of the PRC. 2017. [Ecological and Environmental Protection Plan of Yangtze River Economic Belt](#). Beijing.

Aspects	Arrangements		
	Firm through quality- and cost-based selection (80:20)	International consultants (5 person-months) National consultants (8 person-months)	\$150,000
	Individual consultant selection (sector and technology experts)	National consultants (5 person-months)	\$37,500
Procurement	To be procured by consultants (software, hardware, and computing equipment)		
Disbursement	Shopping	3 contracts	\$5,000
Disposal arrangement upon TA completion	Disbursement of TA resources will follow ADB's <i>Technical Assistance Disbursement Handbook</i> (2020, as amended from time to time). The maintenance update and purchased information technology equipment and goods will be turned over to the executing agency after completion of the TA.		

ADB = Asian Development Bank, TA = technical assistance.

Source: ADB estimates.

20. **Consulting services.** ADB will engage the consultants as outlined in the terms of reference for consultants.¹⁴

IV. THE PRESIDENT'S DECISION

21. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$300,000 on a grant basis to the Government of the People's Republic of China for Research on Addressing Climate Change in Ningxia through the Use of Science and Technology, and hereby reports this action to the Board.

¹⁴ Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 3).

Results Chain	Performance Indicators	Data Sources and Reporting Mechanisms	Risks and Critical Assumptions
	management in Ningxia (2021 baseline: 0) (OP 2.3.1, OP 3.1.2) 3b. At least 50 participants (of which at least 13 are women) in two provincial knowledge sharing sessions report improved knowledge on climate change resiliency (2021 baseline: 0)		of local officials and their knowledge retention
	3c. At least one online publication or sector-specific report released (2021 baseline: 0)	3c. Web link of the publication(s)	

Key Activities with Milestones

1. Research on technological innovations to improve climate change mitigation and resilience in Ningxia produced

- 1.1 Assessment of current status of application of technologies and innovations in Ningxia (Q4 2021–Q1 2022)
- 1.2 Formulation of the scope of the research by identifying benchmarking entities (Q3 2021–Q4 2022)
- 1.3 Conduct Workshop to discuss the study findings and prioritization of recommendations (Q1 2023)
- 1.4 Development of potential investment opportunities list likely to be financed by ADB (Q2 2023)
- 1.5 Development of inventory of policy measures undertaken since 2015 in the three identified sectors (Q3 2023)
- 1.6 Publication of final report and opinion letter (Q4 2023)

2. Climate change measurement indicators for the identified key industries in Ningxia developed

- 2.1 Workshops and surveys to scan the environment and collect baseline indicators (Q1 2022)
- 2.2 Stakeholder engagement and development of a new and updated indicator framework (Q3 2022–Q3 2022)
- 2.3 Development or upgrade of database system (Q4 2022–Q2 2023)
- 2.4 Development of guidelines for data governance (Q3 2023)
- 2.5 Development of maintenance manuals (Q4 2023)

3. Knowledge on Ningxia's approach to manage climate change effects enhanced

- 3.1 Design and implement knowledge sharing workshops on recommendations of the TA (Q1 2024)
- 3.2 Release of online publications of the sector-specific reports on recommendations on climate change (Q2 2024)
- 3.3 Organize interdepartmental workshops, seminars and trainings to develop convergence of thoughts (Q2 2024)
- 3.4 Organize department specific training workshops on new approaches in climate change management (Q1 2024–Q2 2024)

TA Management Activities

Mobilize consultant team by Q4 2021

Prepare inception report and conduct inception meeting by Q1 2022

Prepare interim report on technology and innovation research by Q3 2022

Conduct midterm review of the TA activities by Q2 2023

Develop testing of updated and new indicators by Q3 2023

Inputs

Asian Development Bank: \$300,000 (Technical Assistance Special Fund-other sources)

Note: The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, and other in-kind contributions.

DMF = design and monitoring framework, OP = operational priority, Q = quarter, R = risk, STDN = Science and Technology Department of Ningxia, TA = technical assistance.

^a Government of the People's Republic of China. 2021. [The Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of Long-Term Goals for 2035](#). Beijing.

Contribution to Strategy 2030 Operational Priorities:

The expected values and methodological details for all OP indicators to which this TA will contribute results are detailed in Contribution to Strategy 2030 Operational Priorities (accessible from the list of linked documents in Appendix 3 of the TA report). In addition to the OP indicators tagged in the DMF, this TA will contribute results for

OP 5.3.4 Modern knowledge intensive corporate farming models introduced (number)

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Amount
A. Asian Development Bank^a	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	90.0
ii. National consultants	46.0
b. Out-of-pocket expenditures	
i. International and local travel	34.0
ii. Surveys	5.0
iii. Training, seminars, and conferences	60.0
iv. Reports and communications	8.0
v. Preparation of external online publications ^b	2.0
vi. Equipment and software ^c	5.0
vii. Miscellaneous administration and support costs	4.0
2. Miscellaneous technical assistance (TA) administration costs ^d	17.0
3. Contingencies	29.0
Total	300.0

Note: The TA is estimated to cost \$324,000, of which contributions from the Asian Development Bank are presented in the table. The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, and other in-kind contributions. The value of the government contribution is estimated to account for 7.4% of the total TA cost.

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

^b Includes items such as translation, interpretation, and research services.

^c Include hardware such as computers, servers or cloud services, licenses for software related to indicator systems, and broadband communication services. Equipment purchased under the TA will be turned over to the executing agency upon completion of TA activities.

^d Includes items such as interpretation costs during workshops.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/LinkedDocs/?id=55033-001-TAReport>

1. Terms of Reference for Consultants
2. Contribution to Strategy 2030 Operational Priorities