

Project Administration Manual

Project Number: 52230-001
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People's Republic of China: Xiangtan Low-Carbon
Transformation Sector Development Program

ABBREVIATIONS

ADB	–	Asian Development Bank
BEMS	–	building and utility energy management system
COVID-19	–	coronavirus disease
EBA	–	ecosystem-based adaptation
EDGE	–	Excellence in Design for Greater Efficiencies
EMP	–	environmental management plan
GDP	–	gross domestic product
GHG	–	greenhouse gas
GPP	–	green procurement policy
HPG	–	Hunan Provincial Government
ICT	–	information and communication technology
IEE	–	initial environmental examination
IFC	–	International Finance Corporation
IMF	–	International Monetary Fund
iRAP	–	International Road Assessment Programme
LCCI	–	Low-Carbon Cities Initiative
LIBOR	–	London interbank offered rate
PAM	–	project administration manual
PBL	–	policy-based loan
PMC	–	program management consultant
PMO	–	program management office
PRC	–	People's Republic of China
VCRa	–	volume capture ratio of annual rainfall
XCRCT	–	Xiangtan Climate Resilient City Toolbox
XSDP	–	Xiangtan Low-Carbon Transformation Sector Development Program
XMG	–	Xiangtan Municipal Government

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
ktCO ₂ e	–	kilotons of carbon dioxide equivalent
m	–	meter
<i>mu</i>	–	Chinese unit of measurement, 1 <i>mu</i> = 666.67 square meters
MtCO ₂ e	–	million metric tons of carbon dioxide equivalent

CONTENTS

I.	PROJECT DESCRIPTION	1
A.	Rationale	1
B.	Program Description	3
C.	Value Added by ADB	6
II.	IMPLEMENTATION PLANS	7
A.	Project Readiness Activities	7
B.	Overall Project Implementation Plan	8
III.	PROGRAM MANAGEMENT ARRANGEMENTS	9
A.	Program Implementation Organizations: Roles and Responsibilities	9
B.	Key Persons Involved in Implementation	12
C.	Project Organization Structure	13
IV.	COSTS AND FINANCING	14
A.	Cost Estimates Preparation and Revisions	15
B.	Key Assumptions	15
C.	Detailed Cost Estimates by Expenditure Category	16
D.	Allocation and Withdrawal of Project Loan Proceeds	17
E.	Detailed Cost Estimates by Financier	18
F.	Detailed Cost Estimates by Outputs and/or Components	19
G.	Detailed Cost Estimates by Year	20
H.	Contract and Disbursement S-Curve	21
I.	Fund Flow Diagram	22
V.	FINANCIAL MANAGEMENT	23
A.	Financial Management Assessment	23
B.	Disbursement	23
C.	Accounting	25
D.	Auditing and Public Disclosure	25
VI.	PROCUREMENT AND CONSULTING SERVICES	26
A.	Advance Contracting and Retroactive Financing	26
B.	Procurement of Goods, Works, and Consulting Services	26
C.	Procurement Plan	28
VII.	SAFEGUARDS	28
VIII.	GENDER AND SOCIAL DIMENSIONS	30
IX.	PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION	33
A.	Program Design and Monitoring Framework	33
B.	Monitoring	36
C.	Evaluation	37
D.	Reporting	37
E.	Stakeholder Communication Strategy	38
X.	ANTICORRUPTION POLICY	38
XI.	ACCOUNTABILITY MECHANISM	38
XII.	RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL	39

APPENDIXES:

1. PROCUREMENT PLAN
2. TERMS OF REFERENCE- PROGRAM MANAGEMENT CONSULTING FIRM
3. POLICY MATRIX
4. ENVIRONMENTAL MANAGEMENT PLAN
5. STAKEHOLDER COMMUNICATION STRATEGY
6. STRATEGIC PROCUREMENT PLAN

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 policies and procedures of the government and Asian Development Bank (ADB). The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The Xiangtan Municipal Government (executing and implementing agency) is wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and in accordance with the policies and procedures of the government and ADB. ADB staff is responsible for supporting implementation including compliance by executing and implementing agencies of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At loan negotiations, the borrower and ADB shall agree to the PAM and ensure consistency with the loan agreement. Such agreement shall be reflected in the minutes of the loan negotiations. 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 (RRP), 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.

I. PROJECT DESCRIPTION

A. Rationale

1. **Economic performance of the People's Republic of China and its commitment to climate change.** Since the PRC's economic reforms began in 1978, its gross domestic product (GDP) growth has averaged almost 10% a year, and more than 850 million people have been lifted out of poverty. Income inequality has improved but the PRC lags in labor productivity and human capital.¹ Its high growth is based on energy- and resource-intensive manufacturing. Rapid growth has exceeded the pace of institutional development, which has led to economic, social, and environmental imbalances. The PRC is the world's largest emitter of greenhouse gases (GHGs), so its engagement with climate change issues is necessary. The PRC is a signatory to the Paris Agreement, which was adopted at the 21st Conference of the Parties to the United Nations (UN) Framework Convention on Climate Change. As such, the PRC is committed to its nationally determined contribution, with the ambitious target to peak carbon emissions by 2030.

2. The coronavirus disease (COVID-19) pandemic has impacted the PRC's economy with global spillover effects. The International Monetary Fund (IMF) assessment indicated that real GDP contracted by 6.8% in the first quarter of 2020 compared to the first quarter of 2019—the first contraction since 1976.² The IMF predicted that domestic activity will recover from March 2020 onward, projecting real GDP to grow at 1.2 % in 2020, while Asian Development Bank (ADB) predicted the GDP growth at 1.8% in 2020 and 7.4% in 2021. The IMF also projects the growth to improve to 9.2% in 2021 as the economy returns to its pre-virus trend. Facing many complex development challenges, the PRC needs new models for sustainable, low-carbon, resilient, and prosperous growth. Witnessing rapid urbanization and recognizing the strategic role that cities can play in GHG reduction, the PRC implemented its Low-Carbon Cities Initiative (LCCI). The LCCI encourages cities to create new development models for inclusive, environmentally sustainable, and prosperous cities, and to share their learning.

3. **Xiangtan's commitment to low-carbon development.** Xiangtan is an old industrial city undergoing rapid urbanization and industrial transformation. It is located 40 kilometers (km) south of Hunan's capital, Changsha, and had a population of about 3 million and an urbanization rate of 62% in 2019. Situated within the Changsha–Zhuzhou–Xiangtan (CZT) city cluster, Xiangtan with least population among them has been a key economic driver for Hunan province. Its growth has also led to GHG emissions increasing by 4.5% per year during 2005–2016, reaching 39.69 million metric tons of carbon dioxide equivalent (MtCO_{2e}). Xiangtan has a higher GHG intensity per unit of GDP than the average for Hunan province or the PRC. In 2018 Xiangtan became a low-carbon city under the LCCI and is committed to achieving carbon peaking by 2028 to localize the PRC's nationally determined contribution target. The XMG's measures to reduce carbon emissions have included allocation of financial support for industrial transformation, promotion of low-carbon technologies, deployment of clean vehicles, expansion of a public bicycle program, restoration of wetland and forests, and expansion of green areas.³ However, much more effort needs to be done to substantially reduce GHGs in a very limited time frame without impacting economic growth.

¹ Detailed economic performance of the PRC is provided in the Fiscal and Debt Management Assessment (accessible from the list of supplementary documents in Appendix 2 of the report and recommendation of the President to the Board).

² IMF Assessment Letter (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President to the Board). This letter refers to the PRC assessment letter for the Asian Development Bank, issued on 1 May 2020.

³ Public expenditure on initial low-carbon works was CNY951.6 million (\$135 million) during 2017–2019.

4. **Xiangtan's development challenges.** In 2016, GHG emissions in Xiangtan were from the following sources: energy processing (18%), industry (52%), transport (8%), building (12%), agriculture (10%), waste (1%), and carbon sink from land-use change and forestry (1%).⁴ As part of its industrial transformation support by policy, the XMG has closed down heavily polluting industrial plants and taken measures to attract high-tech, information and communication technology (ICT), and research and development-oriented industries. Energy and resource-intensive industries remain as the critical economic drivers, but knowledge and technology-based industries are expected to grow. Coal contributes to 96% of the energy source supplied to the grid from Xiangtan.⁵ Solar and wind energy resources are limited in Xiangtan, but other alternative energy sources, particularly industrial waste heat, show great potential to transition to a low-carbon urban energy system. Emissions from the energy used in buildings grew by 330% during 2005–2016, reflecting Xiangtan's rapid urbanization. As the total floor area of urban buildings is expected to grow further, substantial GHG emissions growth is expected if green building interventions are not in place. Emissions from transport increased by 400% from 2005 to 2016 and passenger car ownership increased by 467% during 2008–2018. The urban road network in Xiangtan grew by 43% in 3 years to 500 km, and further expansion is planned. The use of public transport in Xiangtan is low, and without transforming mobility patterns, transport emissions from growing private cars will continue to grow rapidly. Xiangtan has worked closely with Changsha and Zhuzhou for better cluster city planning while controlling urban sprawl.⁶ Xiangtan experiences annual flood events that cause significant economic losses and distress.⁷ Recovery, reconstruction, and rehabilitation of infrastructure and systems damaged by floods require substantial resources and energy, resulting in additional GHG emissions. Improved flood resilience of the city will avoid such GHG increases. The XMG initiated sponge city works but needs better knowledge and capacity to integrate more progressive resilience measures into its city development plan.

5. **Asian Development Bank engagements and lessons.** The Asian Development Bank (ADB) has provided support on low-carbon city development in the PRC through technical assistance (TA), knowledge-sharing events, and publications. ADB provided TA to Xiangtan during 2015–2017 and initiated GHG inventory development, prepared a city profile covering sector performance and vulnerability to climate change, and provided in-depth assessment and recommendations.⁸ Two follow-up TA projects emphasized the critical roles of local experts and the Hunan Provincial Government (HPG).⁹ Through extensive dialogues and discussions over 2 years, ADB carried out effective knowledge transfer and supported the XMG to design and own its unique low-carbon development model.

6. **Choice of modality.** The XMG chose a sector development program modality because the investment project will not be sustainable without having relevant reforms in place. The PBL is necessary to create low-carbon norms, reduce sector incoherency, and institutionalize new

⁴ XMG. 2017. *Xiangtan 2016 Greenhouse Gas Emissions Inventory Report*. (internal).

⁵ The Central China Grid Co. Ltd. run by the State Grid Corporation of China covering Chongqing, Hunan, Hubei, Henan, Jiangxi, and Sichuan provinces is fed by 55% coal, 42% hydro, and 3% wind and solar energy. Xiangtan's energy supply to the grid is mainly coal, while others supply more renewable energy to the grid.

⁶ Xiangtan created "green hearts" with reforestation to control city expansion using the compact city development principle; this increased the carbon sink capacity from zero in 2005 to 465 tCO₂e in 2016.

⁷ During 2011–2017, the total direct economic loss was CNY17 billion (\$2.4 billion). These floods affected almost 2.4 million people, including 143,791 who needed relocation.

⁸ ADB. 2015. [*Technical Assistance to the People's Republic of China for Modeling Urban Low-Carbon Development in Xiangtan*](#). Manila.

⁹ ADB. 2017. [*Technical Assistance for Promoting Low-Carbon Development in Central Asia Regional Economic Cooperation Program Cities*](#). Manila. One of the pilot cities is Xiangtan. The TA provided \$1.7 million for the preparation of the XSDP.

ways of doing low-carbon business. As well-designed physical infrastructure can make low-carbon actions easy, and information and knowledge can expand low-carbon know-how, the project loan will demonstrate integrated and multisector solutions to transform infrastructure and install ICT and knowledge platforms. The policy based loan (PBL) will reinforce the project and ensure the replication and continuity of low-carbon transformations.

7. The XSDP is fully aligned with ADB's Strategy 2030.¹⁰ It is directly linked to the following operational priorities: (i) tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability; (ii) making cities more livable; and (iii) strengthening governance and institutional capacity. The XSDP also follows the Strategy 2030 approaches.¹¹ The XSDP is aligned with ADB's country partnership strategy for the PRC, 2016–2020 and the PRC's Thirteenth Five-Year Plan, 2016–2020 to support more inclusive and environmentally sustainable growth.¹²

B. Program Description

8. The XSDP is aligned with the following impact: Xiangtan's target of carbon emission peaking by 2028 achieved. The XSDP will have the following outcome: use of low-carbon enabling systems in Xiangtan increased. The XSDP will have four outputs based on Xiangtan's GHG profile, trends, structural challenges, and opportunities for effective carbon reduction. The project loan will support outputs 1, 2, and 3 and the PBL will support output 4.

9. **Output 1: Low-carbon and resilient infrastructure transformation demonstrated.** Through the project, the XMG will transform the transport system from car-centered infrastructure to people-centered mobility systems, enhancing safety,¹³ inclusiveness,¹⁴ and resilience. The XMG will transform more than 60 km of urban roads by installing medians and peak-hour curbside bus priority lanes; upgrading bus stops using safe, inclusive design; and providing digital bus information integrated with improved walking and cycling facilities for seamless access across modes. The transformation of streets through layout changes, improved facilities, and ecosystem-based adaptation (EBA) measures installed will demonstrate how streets can function as both flood-mitigating measures and enjoyable urban living spaces.¹⁵ The XMG will modify the access layout at two railway stations using enhanced, user-friendly, and inclusive design to facilitate transitions between public low-carbon mobility modes. The school zone transformation at five primary schools will raise road safety awareness while exceeding the requirements for the highest safety rating for walking and cycling under the International Road Assessment Programme (iRAP) Star Rating for Schools.¹⁶ The XMG will deploy clean energy buses equipped with inclusive and gender-sensitive features, and expand electric vehicle charging infrastructure.

¹⁰ ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

¹¹ The approaches emphasize integrated solutions, multisector approaches, digital development and technologies, private sector participation, and innovative features for value addition.

¹² ADB. 2016. *Country Partnership Strategy: Transforming Partnership—People's Republic of China and Asian Development Bank, 2016–2020*. Manila; and Government of the PRC. 2015. Government of the PRC. 2015. *The Thirteenth Five-Year Plan for Economic and Social Development of the People's Republic of China, 2016–2020*. Beijing. The XSDP is also fully aligned with the G20 principles of quality infrastructure.

¹³ Road safety, particularly for pedestrians and cyclists, is a critical factor in promoting low-carbon transportation.

¹⁴ Inclusive design features include tactile paving on sidewalks and at bus stops; designated spaces and seats at bus stops; buses that can accommodate wheelchairs, prams, pregnant women, the elderly, and children; and wide curb ramps and elevated crossings for seamless access for all residents.

¹⁵ EBA with green and blue assets is an effective measure for flood control, drought mitigation, heat stress reduction, and carbon sink, with co-benefits like aesthetic quality, recreational capacity, better air quality, and health benefits.

¹⁶ Safety features include elevated crossings, curb extensions, extensive signs, and road markings for speed and pedestrian crossings. The iRAP provides tools to assess road safety and support safer road infrastructure for casualty reduction. [iRAP](#).

10. The XMG will demonstrate building transformation integrated with advanced technologies and resilience measures. First, the XMG will construct a new hospital with integrated solutions of passive building design; water-saving features; distributed energy systems to generate power, heating, and cooling; and intelligent building energy (and utility) management systems (BEMSs). As it is located in a flood-prone zone, the new hospital will be equipped with extensive EBA measures for flood resilience, resulting in enhanced resilience capacity compared to the PRC sponge city technical standards.¹⁷ Second, the XMG will retrofit an unused government building to house the Asia low-carbon training center, showcasing green and low-carbon building techniques. With support from the HPG and the LCCI, the XMG will run the low-carbon training center to share its experience on low-carbon transformations and to support the replication of their low-carbon models of Xiangtan in other cities in the PRC and in other developing countries in Asia and the Pacific that share similar challenges.¹⁸ Both buildings (i.e., the hospital and the low-carbon training center) will obtain Excellence in Design for Greater Efficiencies (EDGE) certification developed by the International Finance Corporation (IFC), achieving more than 20% savings each in energy, the energy embedded in the buildings' design and materials, and water compared to the relevant PRC standards.¹⁹ Under this output, the XMG will transform 20 aging urban communities into livable low-carbon exemplars.²⁰

11. **Output 2: Information and knowledge platforms for informed decision-making and behavioral changes enabled.** The XMG will develop integrated urban catchment management plans and design for three identified flood-prone zones, which will enhance the XMG's climate resilient city planning knowledge and development.²¹ Also, the XMG will install, upgrade, and/or reprogram several sector ICT platforms to complement output 1 and provide information necessary for better decision-making and actions. Actions under output 2 will include the following:

- (i) The intelligent transport system will be reprogrammed to switch its main purpose from easing car congestion to enhancing pedestrians' road safety and prioritizing mass transportation over private vehicles.²²
- (ii) A smart bus information platform will be installed for better operations and improved predictability for users.
- (iii) A BEMS connecting 200 public buildings will be installed for operational efficiency and building energy data management.

¹⁷ The 2014 sponge city construction technical guide in the PRC describes the volume capture ratio of annual rainfall (VCRa) to quantify a minimum storage volume for drought. The VCRa is set as per the land use and ecological damage sensitivity of a region. As Xiangtan has a VCRa of 75%–85%, the hospital was initially designed to have 740 cubic meters of water detention capacity, but the capacity has since been increased to 6,000 cubic meters.

¹⁸ The program team is preparing a publication titled Xiangtan Climate Actions and Low-Carbon Transformation to support knowledge sharing.

¹⁹ EDGE certification and its online platform are designed to determine the most cost-effective options for green buildings. EDGE makes it easy to quantify savings, while the PRC's green building labeling system (using points) cannot do so in a straightforward manner. EDGE ensures more than 20% savings in each of the three areas of energy, water, and materials savings compared to the relevant PRC standards. The PRC's 3-star (highest) green building label cannot guarantee 20% savings in all three areas. Compared to the PRC building energy efficiency standards, the new hospital has 26% energy savings and the retrofitted government building will have 23% energy savings. Two EDGE-certified building cases will be shared globally through the EDGE and Green Building Certification Inc. websites. [EDGE](#); and [Green Building Certification Inc.](#)

²⁰ Low-carbon and resilient features include building insulation, rooftop solar systems for hot water, light-emitting diode lighting, e-bicycle sharing, EBAs at parking lots, drainage improvement, improved streets for safer walking and cycling, and installation of natural gas for cooking.

²¹ Three identified flood-prone zones are: (i) Railway station block; (ii) Yaowan Park, and (iii) Yangmeizhou Island.

²² The reprogramming, which does not require additional components or cost increases, will include the following features: pedestrian crossing lights will always be turned on, and self-optimized traffic lights will give green wave (priority) signals to buses.

- (iv) A community-scale multi-energy and utility management system will be installed connecting more than 1,300 companies in an industrial zone to optimize operational efficiency and drive a culture of collaboration among companies within the zone.
- (v) An intelligent early flood warning system will be built for quick data processing and rapid forecasting to achieve early and improved flood response management.
- (vi) A comprehensive environmental monitoring and assessment system (EMAS) will be installed with automated monitoring and intelligent data processing and management to support science-based decision-making.
- (vii) All these will be consolidated into an open and scalable citywide ICT platform that can continuously expand with new functionalities.

12. **Output 3: Capacity building and program management enhanced.** The XMG will engage a program management consultant (PMC) firm consisting of highly experienced sector, safeguards, and project management consultants to improve the XMG's technical expertise. The PMC firm will (i) support the XMG with the successful implementation of the XSDP and (ii) implement a range of capacity building activities so the XMG can sustain its low-carbon transformations and successfully manage the Asia low-carbon training center in Xiangtan.²³

13. **Output 4: Low-carbon transformation policy reforms adopted.** Policy actions are grouped into the following reform areas: (i) low-carbon, resilient, and smart city development strategy and policies issued; (ii) low-carbon mobility systems enhanced; and (iii) low-carbon energy and building systems enhanced. Tranche 1 of the PBL has 11 policy actions and tranche 2 of the PLB has 9 policy actions, which will reinforce outputs 1 and 2 and drive low-carbon innovations and system transformation. Under the first reform area, the Xiangtan low-carbon development plan, 2018–2030 (policy action 1) will set a clear vision and target for the XMG's low-carbon development. The plan will provide clear directions on sector relevance and priority areas, bind the responsibilities of all the XMG bureaus to plan and implement relevant low-carbon works, institutionalize an integrated and holistic approach, and support cross-sector collaboration and cooperation. Policy actions on sponge city-promoting EBA measures will advance city resilience beyond the national sponge city standards (footnote 16). The policy action on smart city development will highlight the integrated approach and cross-sector consolidation for efficient use of public investment. Green procurement policy (GPP) actions, adopted for the first time in the PRC, will lower GHG emissions in the public sector; generate environmental, health, and economic co-benefits; and develop the market for green products and service innovations.²⁴ Under the second and third reform areas, sector policies will create the right incentives, financing models, and other enabling mechanisms to mobilize private sector investments and activate wide participation from all economic actors, including the public. Policy actions under tranche 1 will focus on the XMG's policies, which include sector-specific plans.²⁵ Policy actions under tranche 2 will include management rules for operational reforms, regulations for developing better incentive mechanisms, technical standards to promote low-carbon technologies, and design guides to improve urban infrastructure that supports low-carbon actions and practices of people, and an improved resilience capacity.

²³ Capacity building activities include trainings on integrated city planning, compact and transit-oriented development planning, bus priority and traffic light system integration and operation, EDGE tools, district energy systems, operation of a range of ICT platforms, GHG inventory and calculation, procurement, financial management, and safeguards.

²⁴ GPPs institutionalize the process of public authorities in procuring goods, services, and works that lower GHG emissions and other negative environmental impacts when compared to goods, services, and works with the same primary functions that would otherwise be procured.

²⁵ These sector-specific plans describe mandates and institutional reforms at the bureau and provide rationale to secure appropriate budget and human resources for the relevant works.

C. Value Added by ADB

14. Through early involvement at the concept stage, ADB helped the XMG to define low-carbon development, highlighting ‘system thinking’ with holistic and integrated approaches correcting the siloed development of each sector.²⁶ ADB assisted the XMG in redesigning the project and selecting an effective loan modality considering the XMG’s challenges and ambitious carbon peaking target. ADB supported the XMG (i) in developing appropriate and well-articulated incentive mechanisms to activate all stakeholders for low-carbon decisions and behavior changes, and (ii) in creating effective policies (a) to mobilize domestic financing and private sector investment in low-carbon businesses, and (b) to stimulate the market for low-carbon products and innovations through TA.²⁷ ADB engaged (i) an iRAP assessor to evaluate the road safety in five school zones and to recommend safety features; (ii) green building and energy experts to redesign two buildings to secure EDGE certification; and (iii) climate adaptation experts to develop the Xiangtan Climate Resilient City Toolbox (XCRCT), a customized touch-table and web-based platform. Using the XCRCT, ADB facilitated collaborative planning among the XMG’s bureaus and the consensus-based selection of EBA measures for the project. ADB engaged GPP experts to support the XMG with GPP training and policy drafting, which led to the XMG’s commitment to adopt GPP.

²⁶ Low-carbon development refers to sustainable development grounded in systems thinking and guided by quantifiable indicators of GHG emissions. This type of development encourages integrated city planning, collaborative and coherent sector development, resilience improvement by taking a preventive approach, and active governance through engaging and activating all stakeholders by providing the right incentives.

²⁷ ADB. 2017. [Technical Assistance to the People’s Republic of China for Supporting Project Preparation](#). Manila. This project includes the support for the XSDP.

II. IMPLEMENTATION PLANS

A. Project Readiness Activities

Table 1: Project Readiness Activities

Indicative Activities	2020												2021			Responsible Unit/Agency/Government
	Q1			Q2		Q3			Q4			Q1				
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	
Engaging a procurement agency																XMG
Advance contracting actions																XMG
Retroactive financing actions																MOF, HPG, XMG
Establish project implementation arrangements																MOF, HPG, XMG
ADB Board approval																ADB
Loan signing																ADB, MOF
Government legal opinion provided																ADB, XMG
Government budget inclusion																ADB, XMG
Loan effectiveness																ADB, MOF

ADB=Asian Development Bank, HPG=Hunan Provincial Government, XMG=Xiangtan Municipal Government

Source: Asian Development Bank estimate.

B. Overall Project Implementation Plan

Table 2: Overall Project Implementation Plan

Activities	2020				2021				2022				2023				2024				2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A. Design and Monitoring Framework																								
Output 1: Low carbon and resilient infrastructure transformation demonstrated																								
1.1 Engaging design institutes and carrying out engineering design and construction supervision																								
1.2 Preparing bidding process, procurement packages and awarding contracts																								
1.3 Undertaking civil works for mobility systems transformation																								
1.4 Procurement of battery-electric buses and electricity chargers																								
1.5 Constructing Xiangtan First Traditional Chinese Medicine Hospital																								
1.6 Retrofitting an old government building civil works																								
1.7 Low-carbon community improvement civil works																								
Output 2: Information and knowledge platforms for informed decision-making and behavioral changes enabled																								
2.1 Undertaking assessment and preparing all ICT platforms bidding process																								
2.2 Installing ICT platforms																								
2.3 Developing integrated urban catchment plans and design for Railway station block, Yaowan Park and Yangmeizhou Island																								
Output 3: Capacity building and program management enhanced																								
3.1 Engage program management consultants																								
3.2 Supervise project implementation																								
3.3 Plan and execute trainings & capacity building activities																								
3.4 Draft and finalize project completion report																								
Output 4: Low-carbon transformation policy reforms adopted																								
4.1 Approving policies, guidelines and regulations related to low-carbon transformation																								

ICT = information and communication technology

Source: Asian Development Bank estimate.

III. PROGRAM MANAGEMENT ARRANGEMENTS

A. Program Implementation Organizations: Roles and Responsibilities

15. The XMG is the executing and implementing agency. A program management office (PMO) was established under the XMG led by Secretary-General of the XMG. PMO is comprised of representatives from Finance Bureau, Development and Reform Commission, Transportation Bureau, Housing and Urban-Rural Construction Bureau, Municipal Health Commission, Xiangtan Big tata Center, Water Conservation Bureau, Ecology and Environment Bureau, Xiangtan Jiuhua Industrial Zone Management Committee. For effective project implementation, the PMO will closely coordinate with the heads of the following bureaus and collaboratively working on the sub-components.

16. The PMO Head will report directly to XMG Mayor on project administration and implementation and will be the main point of contact for communication between XMG and ADB. The PMO Head will provide overall direction and day-to-day management to the PMO as well as report to XMG Mayor on matters pertaining to the project.

17. The PMO will be responsible for (i) undertaking procurement for and managing contracts with consultants, construction supervision companies (CSCs), contractors and suppliers; (ii) supervising and monitoring consultants', CSCs', contractors' and suppliers' progress; (iii) maintaining control of schedule, quantity, quality, cost, and safety of physical and non-physical investments under the program; (iv) ensuring compliance with ADB covenants; (v) complying with ADB safeguard requirements; (vi) maintaining program account and submitting its audited financial statements; (vii) facilitating payments under advance account; (viii) preparing withdrawal applications, acquiring HPG's endorsement and submitting the same to ADB; and (x) submitting progress reports, semi-annual environmental and social monitoring reports and project completion report to ADB. Except for bid evaluation report and consultant selection reports which are confidential to the Tender Committee and ADB (if requiring ADB review), copies of reports to be provided to ADB will be provided to HPG and Ministry of Finance (MOF) for information and coordination purposes. A qualified and experience procurement agency was engaged already, who provides support to the PMO in all the procurement activities.

18. An international consulting firm will be engaged as program management consultant (PMC) to support the XMG PMO in undertaking its responsibilities in connection with program implementation. In addition, PMC will assist PMO in (i) preparing the bidding documents; (ii) preparing bid evaluation reports; (iii) negotiating contracts; (iv) supervising and monitoring the performance of consultants, contractors and suppliers in accordance with their respective contractual agreements; and (v) validating invoices and payment claims from consultants, contractors and suppliers in accordance with payment terms under their respective contracts. Design institutes for detailed engineering design and construction supervision will also be engaged to assist PMO in preparing the designs for the needed construction, installation and rehabilitation works. The terms of reference for the PMC is provided in Appendix 2.

19. The implementation arrangements are described in detail in Table 3.

Table 3: Project Implementation Organizations: Roles and Responsibilities

Project Implementation Organizations	Management Roles and Responsibilities
Ministry of Finance (MOF), Borrower	<ul style="list-style-type: none"> Represent external borrowing and enter into loan agreement with Asian Development Bank (ADB);

Project Implementation Organizations	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Ensure loan proceeds are used in accordance with Loan Agreement and On-Lending Agreement; • Handle program issues related to taxes and duties; • Primarily responsible for supporting Xiangtan Municipal Government (XMG) in the implementation of the project; and • Practical training of XMG on ADB financial documentation requirements, as needed.
Hunan Provincial Government (HPG)	<ul style="list-style-type: none"> • Enter into an on-lending Agreement together with XMG with MOF for the program; • Establish and maintain program advance account; • Oversee the program progress; • Monitor the financial aspects of project implementation and providing respective coordination and facilitation; • Endorse withdrawal applications (WAs) processing; and • If required, endorse the request for reallocating the loan proceeds.
Xiangtan Municipal Government (XMG), executing agency (EA)/implementing agency (IA)	<ul style="list-style-type: none"> • Take overall responsibility for the program implementation and coordination; • Enter into an on-lending Agreement together with HPG for the program; • Establish program financial management system; • Ensure timely preparation of financial audits; and • Review a withdrawal application for submission to HPG.
Program Management Office	<ul style="list-style-type: none"> • Responsible for day-to-day project implementation through its program management office; • Submit the following reports to ADB: audit report, quarterly progress reports, and safeguard monitoring reports; • Take responsibility for day-to-day implementation of the program, including organization and coordination with all relevant bureaus; • Take responsibility for preparing terms of reference, organize and recruit a procurement agency, program management consulting firm (PMC), construction supervision companies, and consulting services under the project outputs; • Report the progress of project implementation and compliance monitoring to ADB; • Prepare and submit WAs and loan disbursement requests to XMG; • Ensure the timely submission of annual audit reports and financial statements of project account; • Ensure the project will be implemented in accordance with ADB's safeguards policy; • Take responsibility for the submission of bidding documents, bid evaluation reports, and other necessary documentation to ADB for necessary approval; • Coordinate the approval of detailed engineering design and construction supervision, and capacity development plans; • Coordinate and assist ADB to conduct review of project progress and performance; • Establish a good monitoring systems for the progress and project benefits including greenhouse gas (GHG) emissions impacts; • Monitor and evaluate the program outcome and activities, and proposing the recommendations and suggestions;

Project Implementation Organizations	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Liaise with ADB on all project problems and issues, including obtaining ADB approvals required for the project; • Assist ADB or its authorized representatives to visit, inspect, and evaluate the project, and review the retention records and documents of the implementing agencies; • Update procurement plan on a regular basis; • Coordinate and implement project performance evaluation, and disseminate the project experiences, lessons learned, and knowledge gained; • Perform other relevant coordination activities; • Plan and provide logistic arrangement for capacity building activities for the relevant bureaus; • Arrange and ensure the availability of necessary counterpart funding; • Establish grievance redress mechanism and implement environmental management plan, social and gender action plan, communication strategy; • Ensure quality in project activities necessary to meet objectives; • Prepare withdrawal applications for submission to the XMG, then, HPG for endorsement; • Supervise program management consultants, construction supervision companies, and other loan implementation consultants for their activities and progress, and provide guidance and coordination to implement all the project components with success; • Manage the subprojects, including procurement, subproject management, counterpart funding, financial administration, and project audit; and • Take responsibility for management of project assets and operation and maintenance.
Asian Development Bank (ADB), Lender	<ul style="list-style-type: none"> • Provide timely guidance to the EA/ IA at each stage of the program implementation in accordance with the agreed implementation arrangements; • Conduct inception mission, periodic review missions, midterm review mission/s and program completion review mission(s); • Review all documents requiring ADB approval; • Monitor compliance with all loan covenants including safeguards; • Timely processing of withdrawal applications and releasing eligible funds; • Review annual audit reports and follow-up on audit recommendations; • Regularly update the project performance review reports in coordination with EA/ IA; and • Regularly update the project information documents for public disclosure at ADB website, including the safeguard documents.

Source: Asian Development Bank.

B. Key Persons Involved in Implementation

Executing/Implementing Agency

Xiangtan Municipal Government
(XMG)

Officer's Name: Chen, WeiWen
Position: Deputy Secretary-General of XMG
Telephone: +86 13873229899
Fax: +86 731-58570000
Email address: xiangtanpmo@163.com
Office Address: Room 105, Block A, Office building of XMG

Asian Development Bank

Sustainable Infrastructure Division,
East Asia Department

Staff Name: Sujata Gupta
Position: Director
Telephone No.: +63 2 8632 4901
Fax: +63 2 8632 2302
Email address: sgupta@adb.org

Mission Leader

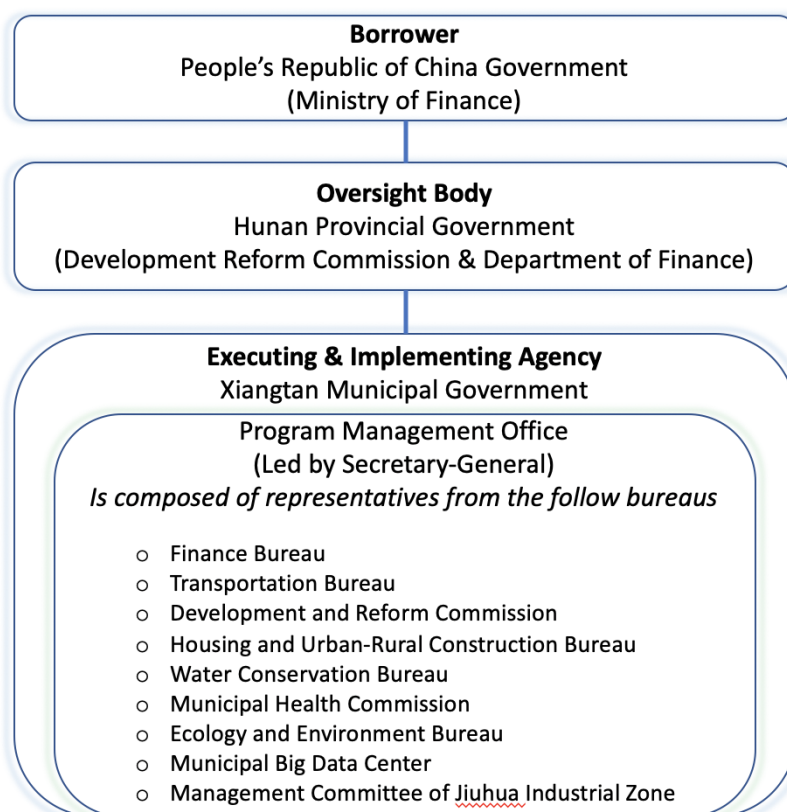
Staff Name: Na Won Kim
Position: Senior Urban Development Specialist
Telephone No.: +63 2 8632 1503
Email address: nawonkim@adb.org

and

Staff Name: Nicolas Dei Castelli
Position: Senior Transport Specialist
Telephone No.: +63 2 8632 6989
Email address: ndeicastelli@adb.org

C. Project Organization Structure

Figure 1: Organization Structure for the XSDP



IV. COSTS AND FINANCING

20. **Overall program financing.** The overall XSDP is estimated to cost \$395.88 million (Table 1), of which ADB will provide \$150 million for the project and \$50 million for the PBL.

Table 4: Summary XSDP Financing Plan

Source	Amount (\$ million)	Share of Total (%)	Share of Project (%)
Asian Development Bank			
Ordinary capital resources (policy-based loan)	50.00	12.63	
Ordinary capital resources (project loan)	150.00	37.89	43.37
Government	195.88	49.48	56.63
Total	395.88	100.00	

Source: Asian Development Bank estimates

21. **Development financing plan.** The government has requested a regular loan of \$50 million from ADB's ordinary capital resources (OCR) to help finance the reforms. The PBL will be available to the XMG through on-lending from the PRC government to the HPG, then to the XMG under the same terms as the original loan. The PBL will have a 15-year term including a grace period of 3 years, an annual interest rate determined in accordance with ADB's London Interbank offered rate (LIBOR)-based lending facility, a commitment charge of 0.15% per year, and such other terms and conditions set forth in the draft loan agreement. The PBL may be withdrawn upon full compliance of respective tranche conditions and is expected to be disbursed in July 2020 and July 2022.

22. **Project investment plan.** The government has requested a regular loan of \$150 million from ADB's ordinary capital resources, which will be available to the XMG through on-lending from the PRC government to the HPG, then to the XMG under the same terms as the original loan to finance the project. The loan will have a 25-year term, including a 5-year grace period, an annual interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.15% per year, and such other terms and conditions set forth in the draft loan agreement. ADB will finance civil works, goods, and consulting services including capacity building, taxes and duties and program management expenditures. The XMG will finance civil works, goods, and taxes and duties amounting to \$195.88 million.

Table 5: Project Investment Plan
(\$ million)

Item	Amount ^a
A. Base Cost^b	
1. Output 1: Low-Carbon and Resilient Infrastructure Transformation Demonstrated	246.36
2. Output 2: Information and Knowledge Platforms for Informed Decision-Making and Behavioral Changes Enabled	55.33
3. Output 3: Capacity Building and program Management Enhanced	1.50
Subtotal (A)	303.19
B. Contingencies^c	
1. Physical	15.16
2. Price	19.20
Subtotal (B)	34.36
C. Financial Charges During Implementation^d	8.34
Total (A+B+C)	345.88

Notes: numbers may not sum precisely because of rounding.

- ^a Includes taxes and duties of \$17.58 million. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of \$8.73 million through cash contribution. The balance of \$8.86 million will be from the Asian Development Bank loan.
- ^b In 2020 prices as of April 2020.
- ^c Physical contingencies computed at 5% of base costs. Price contingencies on foreign currency costs computed at 1.6% from 2021 to 2025. Price contingencies on local currency costs computed at 2.1% from 2021 to 2025.
- ^d Includes interest and commitment charges. Interest during construction for the ADB loan was computed at the 5-year fixed swap rate plus a spread of 0.5% and maturity premium of 0.1% per year to be charged on the disbursed and outstanding loan amount. Commitment charges for the ADB loan were computed at 0.15% per year to be charged on the undisbursed loan amount.
- Source: Asian Development Bank estimates.

A. Cost Estimates Preparation and Revisions

23. **Preparation.** The cost estimates were prepared based on the feasibility study in accordance with ADB's Guidelines on Preparing and Presenting Cost Estimates for Projects and Programs Financed by ADB.

24. **Revisions.** The cost estimates may be updated prior to approval and during the implementation of the project.

B. Key Assumptions

25. The following key assumptions underpin the cost estimates and financing plan of the project loan:

- (i) Physical contingencies are estimated at 5% of base costs;
- (ii) Price contingencies account for cumulative cost inflation over the construction period; and
- (iii) Domestic and international cost escalation shown in Table 6: Escalation Rates for Price Contingency Calculation.

Table 6: Escalation Rates for Price Contingency Calculation

Item	2020	2021	2022	2023	2024	2025	2026	Average
Foreign rate of price inflation	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.58%
Domestic rate of price inflation	2.2%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.11%

Source: Asian Development Bank.

- (iv) Exchange rate: CNY6.9772= \$1.00 (as of 14 February 2020);
- (v) Components are financed using the ADB loan and counterpart funds from XMP. The project loan period for the ADB loan is 25 years including a 5-year grace period; and
- (vi) Financing costs for the ADB loan include interest during implementation and commitment fee charges. Interest during implementation is computed at 7 February 2020, 5-year fixed swap rate of 1.515% plus a ADB spread of 0.5% and a maturity premium of 0.1%. The commitment fee is levied at 0.15% against the undisbursed amount of the loan each year. Interest during repayment period is computed at 10-year fixed swap rate of 1.658% plus an ADB spread of 0.5% and a maturity premium of 0.1%.

C. Detailed Cost Estimates by Expenditure Category

Table 7: Detailed Project Cost Estimates by Expenditure Category

Item	CNY million			\$ million			% of Total Base Cost
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total ^a Cost	
A. Investment Costs^b							
1. Civil works and installation (Low-Carbon and Resilient Infrastructure Transformation Demonstrated)	257.07	1,028.28	1,285.35	36.84	147.38	184.22	60.76
2. Equipment and installation							
a. low-carbon and resilient infrastructure transformation demonstrated)	141.03	94.02	235.05	20.21	13.48	33.69	11.11
b. information and knowledge platforms established for informed decision making and behavior changes	222.85	148.57	371.42	31.94	21.29	53.23	17.56
3. International Finance Corporation-Excellence in Design for Greater Efficiencies Certification fee ^c	0.00	0.03	0.03	0.00	0.00	0.00	0.00
4. Detailed engineering design & construction supervision	106.55	106.55	213.10	15.27	15.27	30.54	10.07
5. Program management enhancement	5.23	5.23	10.47	0.75	0.75	1.50	0.49
Subtotal (A)	732.73	1,382.68	2,115.41	105.02	198.17	303.19	100.00
B. Contingencies^d							
1. Physical	36.64	69.13	105.77	5.25	9.91	15.16	5.00
2. Price	46.40	87.55	133.95	6.65	12.55	19.20	6.33
Subtotal (B)	83.03	156.68	239.72	11.90	22.46	34.36	11.33
C. Financial Charges During Implementation^e							
1. Interest during implementation	0.00	54.17	54.17	0.00	7.76	7.76	2.56
2. Commitment charges	0.00	4.01	4.01	0.00	0.57	0.57	0.19
Subtotal (C)	0.00	58.17	58.17	0.00	8.34	8.34	2.75
Total Project Cost (A+B+C)	815.77	1,597.53	2,413.30	116.92	228.96	345.88	114.08

Notes: numbers may not sum precisely because of rounding.

^a Includes taxes and duties of \$17.58 million. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of \$8.73 million through cash contribution. The balance of \$8.86 million will be from the Asian Development Bank loan.

^b In 2020 prices as of April 2020.

^c IFC-EDGE certification fee is \$0.0039 million.

^d Physical contingencies computed at 5% of base costs. Price contingencies on foreign currency costs computed at 1.6% from 2021 to 2025. Price contingencies on local currency costs computed at 2.1% from 2021 to 2025.

^e Interest during construction for the ADB loan was computed at the 5-year fixed swap rate plus a spread of 0.5% and maturity premium of 0.1% per year to be charged on the disbursed and outstanding loan amount. Commitment charges for the ADB loan were computed at 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

D. Allocation and Withdrawal of Project Loan Proceeds

Table 8: Summary Allocation and Withdrawal of Project Loan Proceeds*

Number	Item	Total Amount Allocated for ADB Financing (US\$)	Basis for Withdrawal from the Loan Account
1	Works, equipment and consulting services	150,000,000	Up to 100% total expenditure claimed
	TOTAL	150,000,000	

* Detailed categories, amounts and disbursement percentages to be used during disbursement are in Table 9 (Allocation and Withdrawal of Loan Proceeds by category)
Source: Asian Development Bank estimate

Table 9: Detailed Allocation and Withdrawal of Project Loan Proceeds

Number	Item	ADB FINANCING		
		Total Amount Allocated for ADB Financing (US\$)		Basis for Withdrawal from the Loan Account
		Category	Sub-category	
1	Civil Works and Installation (Low Carbon and Resilient Infrastructure Transformation Demonstrated)	85,573,442		46.45% of total expenditure claimed
2	Equipment and Installation	44,123,114		
02a	(a)Equipment and installation for low-carbon and resilient infrastructure transformation demonstrated		18,490,747	54.89% of total expenditure claimed
02b	(b)Equipment and installation for information and knowledge platforms established for informed decision making and behavior changes		25,632,367	48.15% of total expenditure claimed
3	Consulting Services	20,303,444		
03a	(a)Engineering design and construction supervision and integrated urban catchment management plans and design development consulting services		18,803,444	61.57% of total expenditure claimed
03b	(b)Capacity building and program management consulting service		1,500,000	100% of total expenditure claimed
	Total	150,000,000		

Source: Asian Development Bank estimates.

E. Detailed Cost Estimates by Financier

Table 10: Detailed Cost Estimates by Financier
(\$ million)

Item	ADB		Counterpart Fund		Total Cost ^a	
	Amount	% of cost category	Amount	% of cost category	Amount	% of cost category
A. Investment Costs^b						
1. Civil works and installation (Low-Carbon and Resilient Infrastructure Transformation Demonstrated)	85.57	46.45	98.65	53.55	184.22	53.26
2. Equipment and installation						
a. low-carbon and resilient infrastructure transformation demonstrated)	18.49	54.89	15.20	45.11	33.69	9.74
b. information and knowledge platforms established for informed decision making and behavior changes	25.63	48.15	27.60	51.85	53.23	15.39
3. International Finance Corporation-Excellence in Design for Greater Efficiencies Certification fee ^c	0.00	0.00	0.00	100.00	0.00	0.00
4. Detailed engineering design & construction supervision	18.80	61.57	11.74	38.43	30.54	8.83
5. Program management enhancement	1.50	100.00	0.00	0.00	1.50	0.43
Subtotal (A)	150.00	49.47	153.19	50.53	303.19	87.66
B. Contingencies^d						
1. Physical	0.00	0.00	15.16	100.00	15.16	4.38
2. Price	0.00	0.00	19.20	100.00	19.20	5.55
Subtotal (B)	0.00	0.00	34.36	100.00	34.36	9.93
C. Financial Charges During Implementation^e						
1. Interest during implementation	0.00	0.00	7.76	100.00	7.76	2.24
2. Commitment charges	0.00	0.00	0.57	100.00	0.57	0.17
Subtotal (C)	0.00	0.00	8.34	100.00	8.34	2.41
Total Project Cost (A+B+C)	150.00	43.47	195.88	56.63	345.88	100.00

Notes: numbers may not sum precisely because of rounding.

^a Includes taxes and duties of \$17.58 million. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of \$8.73 million through cash contribution. The balance of \$8.86 million will be from the Asian Development Bank loan.

^b In 2020 prices as of April 2020.

^c IFC-EDGE certification fee is \$0.0039 million.

^d Physical contingencies computed at 5% of base costs. Price contingencies on foreign currency costs computed at 1.6% from 2021 to 2025. Price contingencies on local currency costs computed at 2.1% from 2021 to 2025.

^e Interest during construction for the ADB loan was computed at the 5-year fixed swap rate plus a spread of 0.5% and maturity premium of 0.1% per year to be charged on the disbursed and outstanding loan amount. Commitment charges for the ADB loan were computed at 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates

F. Detailed Cost Estimates by Outputs and/or Components

Table 11: Detailed Cost Estimates by Outputs
(\$ million)

Item	Total Cost ^a	Output 1: Low Carbon Resilient Infrastructure Transformation Demonstrated	Output 2: Information and Knowledge Platforms Established for Informed Decision Making and Behavior Changes	Output 3: Capacity Building and Program Management Enhanced
A. Investment Costs^b				
1. Civil works and installation (Low-Carbon and Resilient Infrastructure Transformation Demonstrated)	186.22	186.22	0.00	0.00
2. Equipment and installation	84.92	33.69	53.23	0.00
3. International Finance Corporation-Excellence in Design for Greater Efficiencies Certification fee ^c	0.00	0.00	0.00	0.00
4. Detailed engineering design & construction supervision	30.54	28.44	2.10	0.00
5. Capacity building and program management enhancement	1.50	0.00	0.00	1.50
Subtotal (A)	303.19	246.36	55.33	1.50
B. Contingencies^d				
1. Physical	15.16	12.32	2.77	0.08
2. Price	19.20	15.51	3.60	0.09
Subtotal (B)	34.36	27.83	6.36	0.16
C. Financial Charges During Implementation^e				
1. Interest during implementation	7.76	6.39	1.29	0.08
2. Commitment charges	0.57	0.45	0.12	0.01
Subtotal (C)	8.34	6.84	1.41	0.09
Total Project Cost (A+B+C)	345.88	281.03	63.11	1.75

Notes: numbers may not sum precisely because of rounding.

^a Includes taxes and duties of \$17.58 million. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of \$8.73 million through cash contribution. The balance of \$8.86 million will be from the Asian Development Bank loan.

^b In 2020 prices as of April 2020.

^c IFC-EDGE certification fee is \$0.0039 million.

^d Physical contingencies computed at 5% of base costs. Price contingencies on foreign currency costs computed at 1.6% from 2021 to 2025. Price contingencies on local currency costs computed at 2.1% from 2021 to 2025.

^e Interest during construction for the ADB loan was computed at the 5-year fixed swap rate plus a spread of 0.5% and maturity premium of 0.1% per year to be charged on the disbursed and outstanding loan amount. Commitment charges for the ADB loan were computed at 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

G. Detailed Cost Estimates by Year

Table 12: Detailed Cost Estimates by Year
(\$ million)

Item	Total Cost ^a	2021	2022	2023	2024	2025
A. Investment Costs^b						
1. Civil works and installation (Low-Carbon and Resilient Infrastructure Transformation Demonstrated)	184.22	0.00	51.78	63.01	50.89	18.54
2. Equipment and installation						
a. low-carbon and resilient infrastructure transformation demonstrated)	33.69	0.00	18.04	8.78	4.75	2.12
b. information and knowledge platforms established for informed decision making and behavior changes	53.23	1.28	7.26	21.82	18.13	4.75
3. International Finance Corporation-Excellence in Design for Greater Efficiencies Certification fee ^c (in 2025, \$0.0039 million)	0.00	0.00	0.00	0.00	0.00	0.00
4. Detailed engineering design & construction supervision	30.54	17.08	4.65	3.70	3.69	1.42
5. Capacity building and program management enhancement	1.50	0.32	0.32	0.32	0.32	0.24
Subtotal (A)	303.19	18.67	82.05	97.62	77.77	27.07
B. Contingencies^d						
1. Physical	15.16	0.93	4.10	4.88	3.89	1.35
2. Price	19.20	0.36	3.37	6.07	6.52	2.87
Subtotal (B)	34.36	1.30	7.47	10.95	10.41	4.23
D. Financial Charges During Implementation^e						
1. Interest during implementation	7.76	0.11	0.63	1.54	2.46	3.03
2. Commitment charges	0.57	0.22	0.18	0.12	0.05	0.01
Subtotal (C)	8.34	0.32	0.81	1.66	2.51	3.04
Total Project Cost (A+B+C)	345.88	20.29	90.33	110.24	90.69	34.33
% Total Project Cost	100.00%	5.87%	26.12%	31.87%	26.22%	9.93%

Notes: numbers may not sum precisely because of rounding.

^a Includes taxes and duties of \$17.58 million. Such amount does not represent an excessive share of the project cost. The government will finance taxes and duties of \$8.73 million through cash contribution. The balance of \$8.86 million will be from the Asian Development Bank loan.

^b In 2020 prices as of April 2020.

^c IFC-EDGE certification fee is \$0.0039 million.

^d Physical contingencies computed at 5% of base costs. Price contingencies on foreign currency costs computed at 1.6% from 2021 to 2025. Price contingencies on local currency costs computed at 2.1% from 2021 to 2025.

^e Interest during construction for the ADB loan was computed at the 5-year fixed swap rate plus a spread of 0.5% and maturity premium of 0.1% per year to be charged on the disbursed and outstanding loan amount. Commitment charges for the ADB loan were computed at 0.15% per year to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates

H. Contract and Disbursement S-Curve

Table 13: Project Contract Awards and Disbursement (ADB OCR)^a

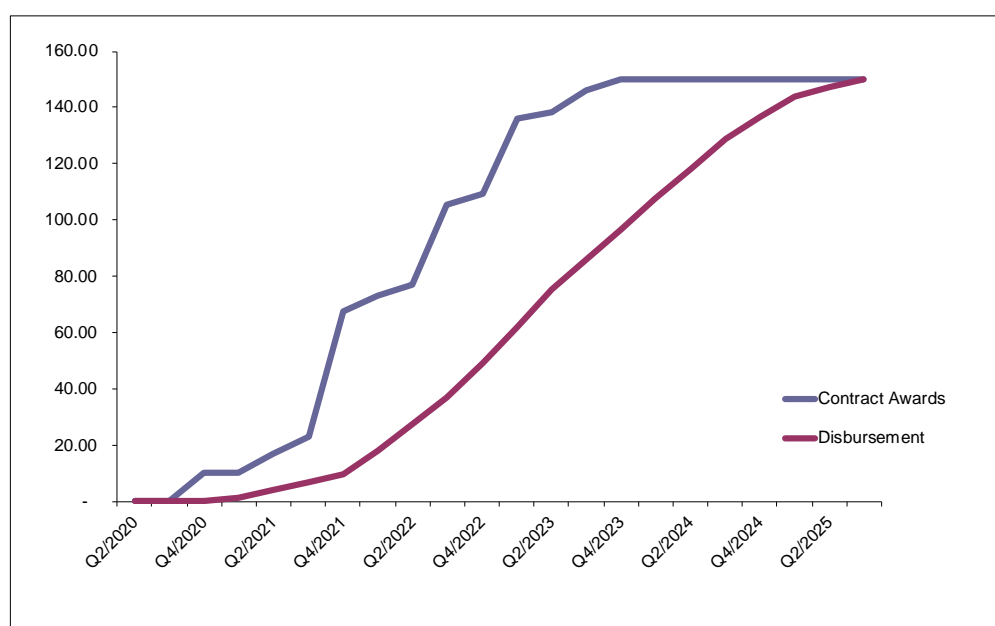
Year	Contract Awards					Disbursement				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
2020	0.00	0.00	0.00	10.21	10.21	0.00	0.00	0.00	0.00	0.00
2021	0.00	6.65	6.13	44.57	57.35	1.60	2.53	2.53	3.30	9.97
2022	5.43	4.21	28.47	3.63	41.75	8.10	9.45	9.27	12.44	39.26
2023	26.76	2.10	7.93	3.91	40.69	12.89	13.38	10.28	10.59	47.15
2024	0.00	0.00	0.00	0.00	0.00	11.37	10.78	10.42	7.56	40.12
2025	0.00	0.00	0.00	0.00	0.00	7.10	3.68	2.73	0.00	13.51
Total					150.00					150.00

^a Excluding the \$50 million policy based loan (\$25 million expected to be disbursed upon the loan effectiveness (Q4 2020) and the remaining \$25 million in 2022).

**Table 14: Project Contract Awards and Disbursement (ADB OCR)
(cumulative)**

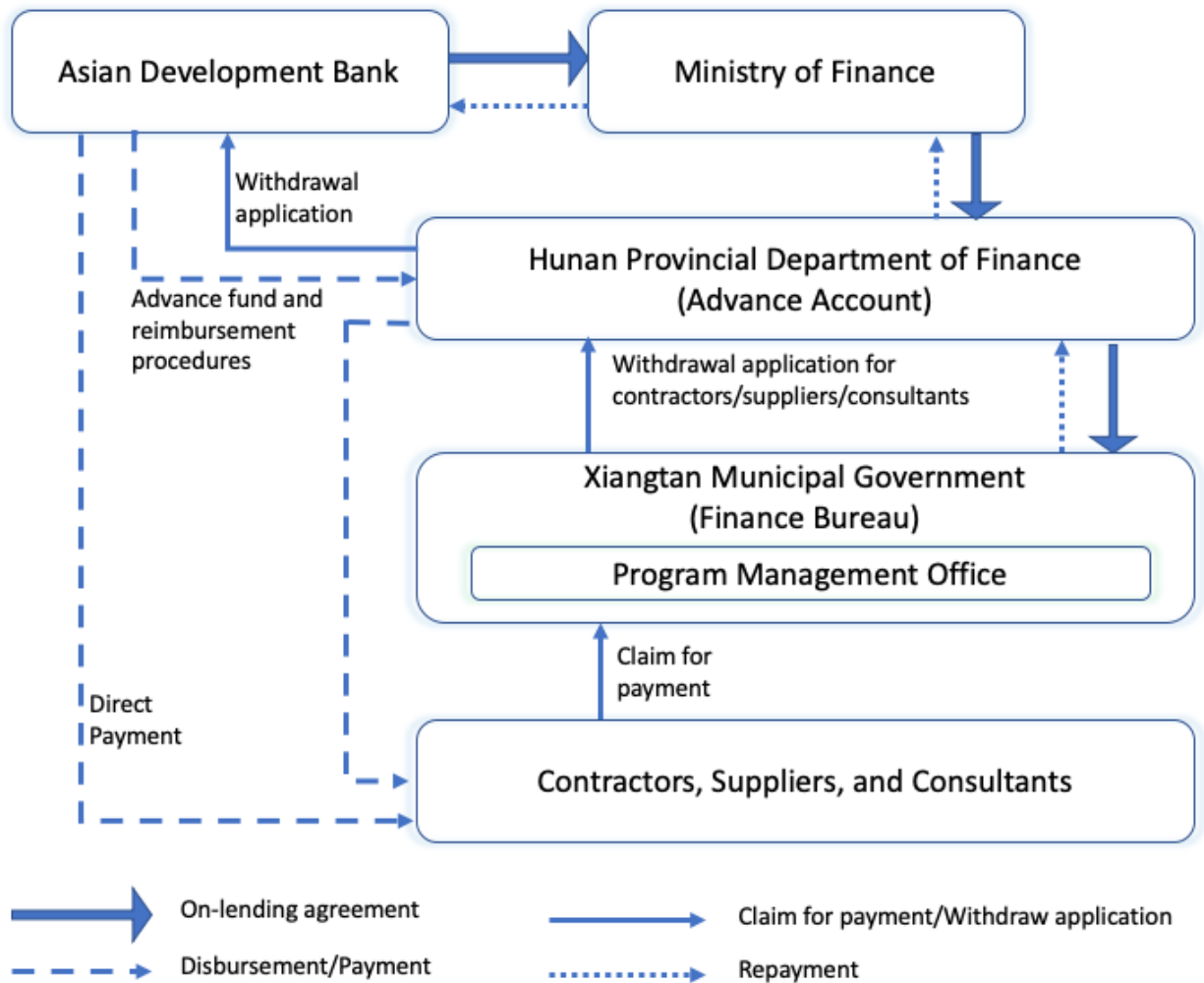
Item	2020	2021	2022	2023	2024	2025
Contract Awards	10.21	67.56	109.31	150.00	150.00	150.00
Disbursement	0.00	9.97	49.23	96.37	136.49	150.00

Figure 2: Contract Awards and Disbursement Projections (ADB OCR)



I. Fund Flow Diagram

Figure 3: Fund flow diagram



V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

26. The financial management assessment (FMA) is conducted in accordance with ADB's Guidelines for the Financial Management and Analysis of Projects (2015), Financial Due Diligence: A Methodology Note, and Technical Guidance Note: Financial Management Assessment. The FMA assesses the financial management capacity of the Hunan Provincial Government (HPG) who will manage the advance fund, Xiangtan Municipal Government (XMG) as executing agency (EA) and implementing agency (IA), and Transport Bureau, Housing and Urban-rural Construction Bureau, Water Resource Bureau, Ecology and Environment Bureau, Development and Reform Commission, Municipal Health Commission, Jiuhua Industrial Zone, and Big Data Center under the municipality, which would be closely involved in project implementation. The assessment covers funds-flow arrangements, staffing, accounting and financial reporting systems, internal and external auditing arrangements, and financial information systems. The assessment was conducted between September 2019 and February 2020.

27. The assessment showed the HPG, the EA/IA, has satisfactory financial management capability to (i) record required financial transactions and balances, (ii) provide regular and reliable financial statements and monitoring reports, and (iii) safeguard financial and non-financial fixed assets.

28. The assessment identified the main financial management risks as: (i) implementation risk - lack of familiarity with ADB disbursement procedures and requirements which could delay project implementation; (ii) compliance risk - lack of familiarity with ADB financial management requirements, particularly on accounting, reporting and auditing, which may delay project reporting and detail identification of issues on the use of loan proceeds; (iii) financing risks/delays in provision of or inadequate counterpart funds which could delay project implementation; and (iv) operational risk/inadequate experience in building some project components such as cloud-based transport information system that could impact project progress and quality of the services to be provided after project completion. The overall financial management risk-rating of the project before considering mitigating measures is moderate.

B. Disbursement

1. Disbursement Arrangements for ADB Funds

29. The loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2017, as amended from time to time),²⁸ and detailed arrangements agreed upon between the government and ADB. Online training for project staff on disbursement policies and procedures is available.²⁹ Project staff are encouraged to avail of this training to help ensure efficient disbursement and fiduciary control.

30. XMG Finance Bureau, with close collaboration with the HPG Department of Finance (DOF), will be responsible for (i) collecting supporting documents and (ii) preparing and sending withdrawal applications to ADB. Endorsement from the HPG Department of Finance will be secured prior to withdrawal application submissions to ADB.

²⁸ The handbook is available electronically from the ADB website (<http://www.adb.org/documents/loan-disbursement-handbook>)

²⁹ Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning.

31. **Advance fund procedure.** To facilitate project implementation through timely release of the loan proceeds, an advance account will be established at the HPG Department of Finance (DOF). The currency of the advance account is in US dollar and to be used exclusively for ADB's share of eligible expenditures. HPG DOF has adequate capacity to manage the advance account for the loan. The HPG DOF, who administers the advance account is (i) accountable and responsible for proper use of advances to the advance account, and (ii) will maintain and manage the advance account. The head of HPG DOF will be the authorized signatory of the advance account.

32. The total outstanding advance to the advance account should not exceed the estimate of ADB's share of expenditures to be paid through the advance account for the forthcoming 6 months. The EA/IA through its program management office may request for initial and additional advances to the advance account based on an Estimate of Expenditure Sheet³⁰ setting out the estimated expenditures to be financed through the account for the forthcoming 6 months. Supporting documents should be submitted to ADB or retained by the EA/IA in accordance with ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) when liquidating or replenishing the advance account.

33. **Statement of expenditure procedure.** The statement of expenditure (SOE) procedure may be used for reimbursement of eligible expenditures or liquidation of advances to the advance 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.

34. Before the submission of the first withdrawal application (WA), the Borrower should submit to ADB sufficient evidence of the authority of the person(s) who will sign the withdrawal applications on behalf of the government, together with the authenticated specimen signatures of each authorized person. The minimum value per WA is stipulated in the *Loan Disbursement Handbook* (2017, as amended from time to time). Individual payments below such amount should be paid (i) by the EA/IA and subsequently claimed to ADB through reimbursement, or (ii) through the advance fund procedure, unless otherwise accepted by ADB. The Borrower should ensure sufficient category and contract balances before requesting disbursements. Use of ADB's Client Portal for Disbursements (CPD)³¹ system is encouraged for submission of withdrawal applications to ADB.

2. Disbursement Arrangements for Counterpart Fund

35. **Counterpart funds will come from the EA.** The EA will finance expenditures of civil works, goods, and taxes and duties, which would be a cash contribution of \$195.88 million and provide counterpart support in kind for counterpart staff, translation and office accommodation facilities.

³⁰ Estimate of Expenditure sheet is available in Appendix 8A of ADB's *Loan Disbursement Handbook* (2017, as amended from time to time).

³¹ The CPD facilitates online submission of WA to ADB, resulting in faster disbursement. The forms to be completed by the Borrower are available online at <https://www.adb.org/documents/client-portal-disbursements-guide>.

C. Accounting

36. The EA/IA (Finance Bureau) will maintain, or cause to be maintained, separate books and records by funding source for all expenditures incurred on the project following the PRC's National Accounting Standard. The EA/IA will prepare annual project financial statements in accordance with the government's accounting laws and regulations which are consistent with international accounting principles and practices.

D. Auditing and Public Disclosure

37. The EA/IA (Finance Bureau) will cause the detailed project financial statements to be audited in accordance with International Standards on Auditing and with the PRC's national standards, by an independent auditor acceptable to ADB. The audited project financial statements together with the auditor's opinion will be presented in the English language to ADB within 6 months from the end of the fiscal year by the executing/implementing agency.

38. The audit report for the project financial statements will include a management letter and auditor's opinions, which cover (i) whether the project financial statements present an accurate and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting standards; (ii) whether the proceeds of the loan were used only for the purpose of the project; and (iii) whether the borrower or EA/IA was in compliance with the financial covenants contained in the legal agreements (where applicable).

39. 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.

40. The government, EA/IA have been made aware of ADB's approach to delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements.³² 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.

41. Public disclosure of the audited project financial statements, including the auditor's opinion on the project financial statements, will be guided by ADB's Access to Information Policy.³³ After

³² ADB's approach and procedures regarding delayed submission of audited project financial statements:

- (i) When audited project financial statements are not received by the due date, ADB will write to the EA/IA advising that (a) the audit documents are overdue; and (b) if they are not received within the next 6 months, requests for new contract awards and disbursement such as new replenishment of advance accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed.
- (ii) When audited project financial statements are not 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 advance accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (a) inform the EA/IA of ADB's actions; and (b) advise that the loan may be suspended if the audit documents are not received within the next 6 months.
- (iii) When audited project financial statements are not received within 12 months after the due date, ADB may suspend the loan.

³³ Available at: <https://www.adb.org/sites/default/files/institutional-document/450636/access-information-policy.pdf>

the review, ADB will disclose the audited project financial statements and the opinion of the auditors on the project financial statements no later than 14 days of ADB's confirmation of their acceptability by posting them on ADB's website. The management letter and additional auditor's opinions will not be disclosed in accordance with the ADB's Access to Information Policy (footnote 33).

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

42. Advance contracting and retroactive financing were requested by the XMG, which will be undertaken in conformity with ADB Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time). Advance contracting and retroactive financing will be subject to ADB approval. The borrower, the EA/IA have been advised that approval of advance contracting and retroactive financing does not commit ADB to finance the project. Advance contracting will be sought for five consulting service packages, including one package for capacity building implementation program management and support consulting firm, and four packages for engineering designs and construction supervision. Retroactive financing will be allowed up to 20% of the ADB loan amount for eligible expenditures incurred prior to loan effectiveness but not earlier than 12 months prior to the signing of the project loan agreement.

B. Procurement of Goods, Works, and Consulting Services

43. All procurement of goods, works, and consulting services will be undertaken in accordance with ADB Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time). Before the start of any procurement, ADB and the government will review the public procurement laws of the central and state governments to ensure consistency with ADB Procurement Policy (2017, as amended from time to time) and Procurement Regulations for ADB Borrowers (2017, as amended from time to time). The XMG already engaged a qualified and experienced procurement agency to support the XMG on all the procurement activities.

44. Open competitive bidding (OCB) will be used for all ADB-financed procurement packages in this project. Based on the nature of contracts and market assessment, the use of OCB (advertised nationally) method and OCB (advertised internationally) method was determined. Strategic procurement planning describes the details (Appendix 6). The Xiangtan Public Resource Trading Center e-procurement platform was assessed and was found to be suitable as an advertising channel for OCB (advertised nationally) packages but not suitable to be adopted for the entire procurement workflow. As such, all ADB financed packages will follow the ADB procedures.

45. All the consulting services for engineering designs and construction supervision, project management and capacity building, and integrated urban catchment management plan and design development will be engaged using the quality- and cost-based selection (QCBS) method with a quality–cost ratio of 90:10.

46. The procurement documents will be reviewed based on the review type defined in the procurement plan. The review requirement may be adjusted based on the outcome of the re-assessment on IA's capacity which will be conducted during the ADB review mission in the second year of implementation. The relevant sections of ADB's Anticorruption Policy (1998, as amended

from time to time) will be included in all procurement documents and contracts.

47. **Value for money.** Strategic procurement planning was carried out to identify procurement risks, develop mitigating measures, review procurement options and agree on fit-for-purpose procurement arrangements. Value for money will be achieved through combining similar works into large packages to ensure better competition and through innovative IT packages for development of the smart city ICT platforms. The overall procurement risk is moderate. The works involved under the program include roads (retrofit or expansion), building (new hospital building and government building upgrade), community upgrade (buildings and landscaping) and landscaping (rain garden). These works are common in PRC and the market is highly competitive with sufficient providers. In order to achieve better value for money, the works of similar natures are combined to form large sized packages to attract larger contractors and encourage competition. Taking into account that foreign bidders are very unlikely to participate in bidding for civil works, OCB with national advertisement will be used to save resources and cost on procurement management. One stage and one envelope procurement method will be adopted. All procurement packages for works will be awarded to the lowest evaluated price, where cost is the main contributor to value for money.

48. The Goods (General) involved under the program include bus information boards, sensors for various smart subsystems (ITS, flood early warning, heat sensors), various environmental equipment, green product, low carbon equipment (tri-generation and PV panels), e-bus and charging piles. Strategy used for these goods vary. For e-bus and charging piles, because the market is already very competitive with sufficient suppliers, larger sized packages are used to attract better qualified contractors and to encourage competition to reduce overall cost, and national advertisement is used to save resource on procurement management. For the bus information board, sensors, and green products that are mostly standard product with transparent market price, they are integrated into other packages, i.e. the green products are integrated in the building upgrade works contract, the sensors are integrated into relevant sub-system contracts, to minimize the resource and cost for procurement management. For low-carbon equipment, which is specialized, they are packaged into individual contract packages to reduce the contract complexity. One stage and one envelope procurement method will be adopted. All procurement packages for works will be evaluated based on the lowest evaluated price, where cost is the main contributor to value for money, and contracts will be awarded to the lowest evaluated substantially responsive bidder. However, for the equipment especially for the Tri-generation and PV panels, life-cycle cost will be considered in the determination of lowest evaluated price.

49. The Goods (Information Technology Product and Service) involved under this program include the subsystem for building energy management, for environmental monitoring, for ITS, for flood early warning, for smart city platform, etc. The strategies for these sub-systems vary. To reduce risks for all these subsystems that are highly specialized, they are packaged into individual packages. Because the market has been fairly developed with sufficient suppliers available, customization is required for local conditions. Thus, international advertisement will be used, except for a building energy management system for the hospital. In addition, combination of conformity and performance based technical specification will be used to encourage better quality, which will also ensure value for money. For the subsystem for the community-based energy management, the domestic market has not been well developed. Thus, OCB with international advertisement will be used to ensure wider participation of the international bidders, which can bring higher quality solutions and product.

50. The consulting services involved under this program include various design services, the project management and capacity building, and integrated urban catchment management plan

and design development. Due to the nature of such services and the extreme reliance of PMO on the external consulting services, quality instead of price will be the focus in evaluation. Thus, QCBS procedure with a quality and cost ratio of 90:10 will be adopted. In addition, international advertisement and full technical proposal will be used to attract highly experience firms in the competition to improve the quality of the service and deliverables. Weighted and scored non-cost (quality) criteria will be used in the evaluation. The contract will be awarded to the first-ranked consultant with the highest combined score.

51. For the non-consulting services, especially the EDGE certification fees for which the competition is very limited, and pricing is transparent, domestic procedure will be used to minimize the need of resource in the procurement. Counterpart funding will be used to financing such contracts.

52. Advance contracting will be used for five consulting service packages- all the design services and the project management and capacity building package. Retroactive financing will apply up to 20% of the loan amount for expenditures incurred prior to loan effectiveness, but not earlier than 12 months prior to the signing of the loan agreement. By advancing some of these contracts, the EA/IA can minimize their implementation schedule and reduce their up-front cost in the project preparation.

53. At the very beginning of each contract execution, an effective contract management plan will be developed to ensure that the contracts are successfully implemented and that the deliverables are met as agreed in the contract.

C. Procurement Plan

54. A draft 18-month procurement plan, indicating procurement or selection methods, estimated costs of contracts, and review procedures for goods, works, and consulting service contract packages, has been prepared and presented in Appendix 1.

55. The terms of reference for program management and capacity building consulting service are detailed in Appendix 2. All other terms of reference for the remaining five consulting services are under preparation and will be attached upon readiness.

VII. SAFEGUARDS

56. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows:

57. **Environment (Category B).** An initial environmental examination (IEE), including environmental management plan (EMP) was prepared in accordance with the ADB Safeguard Policy Statement (SPS 2009). The project will have positive impacts on the environment, GHG reduction, and flood and other climate resilience. Construction dust, noise, wastewater, and solid wastes; worker health and safety risks, and traffic disruptions will be primary adverse impacts during the construction. These impacts are short-term and localized. Good construction practice management measures will be implemented to reduce impacts to acceptable levels. Potential negative operation phase impacts include air pollution, noise, wastewater, and waste which are considered in the IEE, and mitigation measures and monitoring are included in the EMP. The project specific grievance redress mechanism will be established. The XMG is committed to implement the EMP; carry out the capacity building training plan on ADB SPS on environmental safeguards, EMP, grievance redress mechanism (GRM); and recruit a loan implementation

environment consultant who can support the XMG in EMP and GRM implementation, monitoring and reporting. Despite the COVID-19 outbreak, meaningful consultations were carried out using WeChat, the most popular social network app and obtained over 1,000 responses from the project affected people. Even though virtual consultation met the ADB SPS requirements, XMG will continue to carry out in-person public consultation during the implementation, and to duly implement the communication strategy developed for XSDP. Environmental impact matrix of the policy actions under the PBL were also prepared and included in the IEE, confirming that policy actions are not expected to involve adverse environmental impacts. The IEE and EMP were disclosed on ADB website on 17 April 2020.

58. **Grievance redress mechanism.** A project-specific GRM will be established prior to the commencement of civil work, to receive and manage any public environmental and/or social issues that may arise due to the project. All relevant PMO staff, CSCs, contractors will be trained on the GRM and will take an active role in supporting the GRM when necessary.

59. **Climate Risks and Vulnerability.** As the climate risks screening was medium, a Climate Risk and Vulnerability Assessment (CRVA) was carried out. The CRVA confirmed that the increased rainfall intensity of individual storm events may result in higher flood peak flows and impose higher flooding risks to Xiangtan. It also found out that the urban areas of Xiangtan is currently less impacted by fluvial flooding thanks to extensive dyke systems around the Xiangjiang river. Yet, some areas of Xiangtan are impacted by pluvial flooding as insufficient drainage capacity in these vulnerable areas. Another team of experts was engaged to carry out more detailed risk assessment on pluvial flooding.³⁴ They also developed the 'Xiangtan Climate Resilience City Toolbox (XCRCT)', a touch-table based platform that enable actual urban resilience planning with EbA measures. The XCRCT, where hazard, exposure and vulnerability analysis results are embedded, gives each EbA information, design guides, and allows users to select specific EbA interventions, situate them in their determined areas, and immediately see an estimated resilience capacity improvement as well of associated costs for implementation. Using the XCRCT, EbA measures are incorporated in various project subcomponents. Climate adaptation costs for the project is \$12.04 million.

60. **Involuntary resettlement (Category C).** Under the project, 80.03 *mu* and 8.03 *mu* land areas are required for construction of the hospital and Liwei Substation, respectively. Other components will not induce any physical or economic displacement. Prior land acquisition was conducted which was not in anticipation of ADB financing. Due diligence confirmed that there is no outstanding or legacy issue on the land allocated for the project. On the PBL, safeguard assessment confirmed that policy actions are not expected to involve involuntary resettlement impacts. The social safeguards due diligence report was disclosed on the ADB website on 17 April 2020.

61. **Indigenous peoples (Category C).** Population of scattered ethnic minorities in Xiangtan Municipality accounts for 0.49% of the total municipal population. On the PBL, safeguard assessment confirmed that the policy actions will not result in impacts on indigenous peoples communities.

62. **Impacts on Greenhouse Gas Emissions Reduction.** Integrated Assessment Models (IAMs) presented by the Intergovernmental Panel on Climate Change (IPCC) were used after

³⁴ It included the analysis of flood hazards, topography analysis, land-use assessment, damage sensitivity, and assessment of the required retention, detention, and/or storage capacity against floods. Then, the Xiangtan pluvial flood hazards map is developed for a rainstorm with a 100-year return period.

scaling down for Xiangtan city to develop the worst-case and best-case emission trajectories for the period 2020 to 2045. The models show that Xiangtan's target of carbon peaking by 2028 is too ambitious even under the most optimistic scenario, where emissions peak in 2032. In the first year after project completion, GHG emissions reduction would be over 337 kilotons of carbon dioxide equivalent (ktCO₂e). Combined project and policy actions are expected to reduce emissions more than 770 ktCO₂e in 2026. The total amount of GHG reduction over the project lifetime up to 2045 would be over 7 MtCO₂e with an annual average of 378 ktCO₂e. During the program lifetime up to 2045, a total GHG reduction would be over 48 MtCO₂e with an annual average of 2.4 MtCO₂e. The project would contribute 5% and the combined project and PBL would contribute 29% to the required cumulative abatement.³⁵

63. Prohibited investment activities. Pursuant to ADB's Safeguard Policy Statement (2009), ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the Safeguard Policy Statement (2009). All financial institutions will ensure that their investments are in compliance with applicable national laws and regulations and will apply the prohibited investment activities list (Appendix 5) to subprojects financed by ADB.

VIII. GENDER AND SOCIAL DIMENSIONS

64. Poverty and Social. The project will directly benefit about 1.08 million urban population, including 16,171 urban poor people, among who are 7,223 female and 1,161 elderly and 2,273 disabled people, through (i) enhanced quality of bus service and customer satisfaction with the improvement of trunk roads, feeder roads, bus stops, and addition of new electric buses; (ii) safer travel and more inclusive access for pedestrians and cyclists with the modification of cycling lanes, pedestrian walkways and two intercity multimodal stations; and (iii) reduced economic losses and increased protection from potential flooding with the application of EbA measures in flood-prone areas. As the new hospital is flood resilient, they could ensure that their health care services would be uninterrupted even during flooding events. Improvement of 20 aging communities with low-carbon and resilient features will provide a cleaner, greener, safer, and livable communities benefitting 179,806 residents, including 88,530 female, 49,616 elderly, and 3,672 poor residents. The project alone will directly create over 2,000 job opportunities during construction and over 700 during the operation period. Indirectly, the Program will promote the business and real estate development along the upgraded roads and subsequently the employment generation from pertinent industries.

65. Gender. The project is categorized as some gender elements. Surveys show no significant difference between male and female on distance, frequency, and mode choice of travel, although the proportion of women who travel mainly by walking and bus is higher than that of men. Men are the main users of the household vehicle in 81.9% of the households sampled that indicated owning a car. When walking, women indicated being more worried about road safety, particularly children's safety, than men. Elderly women, in particular, indicated feeling unsafe when crossing the road and they perceived that the green traffic light was too short to meet their walking speed, also when they walk with children. Among the female respondents using prams or looking after elderly in wheelchairs, many complained about the difficult access to pedestrian sidewalks that have either no curb ramp, or steep and narrow curb ramp. Also, women

³⁵ Supplementary documents 24-28 were prepared, including methodology and models (accessible from the list of linked documents in Appendix 2). The modelling results and GHG calculation methods were shared and discussed with the XMG in-depth, helping the XMG to reassess the carbon peaking commitment and monitor the low-carbon development progress.

in the sample are more concerned with the quality of sanitation as this aspect is among their primary responsibility for their families. Women in the sample also indicated being more cautious on energy, water and gas savings. Women in the sample indicated a higher demand for central heating system than men. Women were also keener on green space in their communities. Even though women show better attitudes towards low-carbon behaviors and lifestyles, their participation rates in such behaviors appears similar to that of men, but the degree of involvement seems lower. 62% female respondents indicated that public communication via mass media is the most effective for information sharing and awareness raising. Most of the female respondents support the project as it will enhance their quality of life through improved urban environment and generation of job opportunities for themselves and family members. The social and gender action plan developed for the XSDP will help ensure women's participation in public hearings; awareness raising; and economic, social, and decision-making activities related to the program. The social and gender action plan is in Table 15. At least 40% women will participate in the awareness raising activities on road safety, green travel, urban climate resilience, and energy use, and public consultation meetings. Qualified female bus drivers would be given priority over male for new opening. A social and gender development consultant will be engaged as a part of PMC to support the XMG in implementing and monitoring gender sensitive actions.

Table 15: Social and Gender Action Plan

Action	Indicator	Responsible institution	Time	Budget
Output 1: Low-Carbon and Resilient Infrastructure Transformation Demonstrated				
1. Incorporate social and gender-responsive features into the design	<p>(1) Inclusive design to increase the road accessibility and safety, considering of the characteristics and demands of various groups (e.g. the elderly, the disables, the women, the students and the children) (note: <i>Inclusive design features</i> include: <i>tactile installation on sidewalks and bus stops; designated spaces at bus stops and buses, and bus ramps for wheelchairs and prams; designated seats for pregnant women, elderly, and children at bus stops and buses; barrier free sidewalks for wheelchairs and prams; wide curb ramps for seamless access for vulnerable people, elevated pedestrian crossings, extended curbs, and extensive street markings and signboards for safe walking and cycling.</i>)</p> <p>(2) Community sub-components give priority to benefit local poor, e.g. external wall and rooftop insulation, replacing energy-saving windows and doors, installation of solar hot water panel, and replacing water saving facets</p> <p>(3) Local people, especially the poor, can afford the potential bus fare</p>	PMO, design institutes, social/gender specialist, WF, DF	2020-2025	Included in the Project

Action	Indicator	Responsible institution	Time	Budget
	increase and potential cost share of community sub-project			
2. Promote wide and effective participation	(1) Various groups to be involved in consultation meetings of design; at least 40% local women to participate (2) Various groups to be involved in road safety, green travel, climate resilience, energy saving, and low-carbon lifestyle awareness campaign; at least 40% local women to participate (3) at least 40% local women and 20% local poor to attend the hearing meetings if there is bus fare increase or cost share of community subproject	PMO, design institutes, social/gender specialist, WF, DF, communities	2020-2025	Included in the Project
3. Provide local people with job opportunities	(1) New job opportunities given with priority to local poor people (2) At least 20% local women to be employed for unskilled jobs created during construction and operation period (3) Qualified female bus drivers would be given priority over male for new opening.	PMO, construction contractors, social/gender specialist, WF	2020-2025	Included in the Project
Output 2 : Information and Knowledge Platforms Established for Informed Decision and Behavior Changes				
Incorporate social and gender-responsive features into the design	Inclusive design to consider for the characteristics and demands of various groups	PMO, social/gender specialist, WF	2020-2025	Included in the Project
Output 3: Capacity Building and Program Management Enhanced				
Increase female staff's capacity of EA and IA	(1) Recruit a social/gender specialist to support SGAP implementation (2) Appoint a PMO staff responsible for SGAP implementation and reporting (3) At least 30% female staff in EA and IA are included in appropriate trainings and workshops	PMO, social/gender specialist	2020-2025	Included in the Project
Output 4: Low-carbon transformation policy reforms adopted				
See the Environment and Social Impact Assessment of Policy Matrix Report				

DF=Disables' Federation, EA = executing agency, IA = implementing agency, PMO=program management office, SGAP = social and gender action plan, WF=Women' Federation.

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION

A. Program Design and Monitoring Framework

Table 16: Program Design and Monitoring Framework

Impact the Project is Aligned with			
Xiangtan's target of carbon emission peaking by 2028 achieved (Xiangtan Low-Carbon City Pilot Implementation Plan, 2017–2030) ^a			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Use of low-carbon enabling systems in Xiangtan increased	By 2026: a. At least 337 ktCO ₂ e reduced per year (2019 baseline: NA) (OP3.1) b. Public transport and nonmotorized transport users increased by 10% (2019 baseline: 32% walking, 2% cycling, and 19% bus) (OP 4.3.1) c. Savings of more than 20% each in energy, the energy embedded in design and materials, and water achieved in at least two additional public buildings (2019 baseline: NA) (OP 3.1.3, OP 4.3.1) d. At least 100,000 residents, including 50,000 females and 2,000 low-income residents, have benefited from community improvements with low-carbon and resilient features (2019 baseline: 0) (OP 4)	a. Xiangtan annual progress report on low-carbon action plan (2018–2030) b. Xiangtan Transportation Bureau annual report c–d. Xiangtan Housing and Urban–Rural Construction Bureau annual report	COVID-19 pandemic impacts on local economy, public fiscal management, and government priorities worsen. Management change in the XMG and reorganization. XMG's overall public financial management issues may impact the project results.
Outputs 1. Low-carbon and resilient infrastructure transformation demonstrated	By 2025: 1a. 60 km of urban roads improved with bus priority lanes, safer cycling lanes, and walkways (2019 baseline: 0) (OP 3.1.3) 1b. iRAP Star Rating for Schools ^b rating of 5 stars for walking and cycling achieved at five schools (2019 baseline: 2 stars for walking and cycling) 1c. 100 more battery electric buses are operational (2019 baseline: 143) (OP 4.3.1) 1d. 750 more electricity chargers have been installed (2019 baseline: 75) (OP 4.3.1) 1e. Energy, energy embedded in building design and materials, and water savings of more than 20% each achieved at the retrofitted government building (2019 baseline: NA) (OP 3.1.3) 1f. EDGE-certified ^c hospital building constructed with clean energy system and BEMS (2019 baseline: NA) (OP 3.1.3, OP 4.1.1) 1g. Water retention, detention, and/or storage capacity of 6,000 m ³ built (2019 baseline: 0) (OP 3.2.5) 1h. Aging urban communities are equipped with at least 300,000m ² of building wall and roof insulated, 10,000m ² of rooftop solar PV for hot water, and 5,000 LED lights ^d (2019 baseline: 0) (OP 4.1.2)	1a–1d. Xiangtan Transportation Bureau annual report 1e. IFC website (GBCI report) on EDGE certification 1f. Xiangtan Health Commission annual report 1g–1h. Xiangtan Housing and Urban–Rural Construction Bureau annual report	Changes in administrative processes delaying the provision of counterpart funding

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
2. Information and knowledge platforms for informed decision-making and behavioral changes enabled	2a. Integrated urban catchment management plans and design developed for three identified flood-prone zones ^e (2019 baseline: NA) (OP 4.3.2) 2b. City-wide ICT platform consolidating sector ICT systems is operational (2019 baseline: NA) (OP 4.1.1 and OP 4.1.2) 2c. BEMSs covering 200 government buildings are operational (2019 baseline: NA) (OP 4.1.1 and OP 4.1.2) 2d. CMEUMS in Xiangtan Jiuhua Economic and Technology Development Zone is operational (2019 baseline: NA) (OP 4.1.1 and OP 4.1.2) 2e. Xiangtan-wide EMAS is operational (2019 baseline: NA) (OP 4.1.1, OP 4.1.2) 2f. Early flood warning system covering at least 700 km ² in urban Xiangtan districts is operational (2019 baseline: NA) (OP 4.1.1, OP 4.1.2)	2a. Xiangtan consultant report and Xiangtan PMO annual report. 2b. Xiangtan Big Data Center annual report 2c. Xiangtan Housing and Urban–Rural Construction Bureau annual report 2d. Xiangtan Jiuhua Economic and Technology Development Zone annual report 2e. Xiangtan Ecology and Environmental Bureau annual report 2f. Xiangtan Water Conservation Bureau	Reduced capacity to sustain ICT systems and others
3. Capacity building and program management enhanced	3a. Capacity building and training activities for XMG staff on integrated city planning, compact city and transit-oriented development planning, bus priority with intelligent traffic light management, EDGE-certified green buildings, and district energy system implemented (2019 baseline: NA) (OP 4.3.2, OP 3.1.2) 3b. At least 15 female XMG staff trained and report enhanced knowledge on low-carbon and resilient city infrastructure and system development (2019 baseline: 0) (OP 3.1.2) 3c. Behavior change communication strategy implemented with at least 50 participants to increase green transport modes and energy efficiency in 20 aging urban communities (2019 baseline: NA) 3d. Women comprised at least 40% of the participants who joined the public consultations on road safety, low-carbon mobility, urban climate resilience, and clean energy use (2019 baseline: 0)	3a–3d. XMG PMO annual report 3a–3d. Post-training surveys of participants	
4. Low-carbon transformation policy reforms adopted	4a. A parking policy and fees are introduced (2019 baseline: NA) 4b. School zones have been expanded from 50 to 150 meters (2019 baseline: 50 meters) 4c. Tariff-setting rules for clean district heating and/or cooling using waste heat and renewable energy announced (2019 baseline: NA) 4d. Sponge city action plan and urban design standards on EBA developed (2019 baseline: NA) (OP3.2.4)	4a–4d. Xiangtan Development and Reform Commission annual report	The leadership change in XMG may weaken the accountability and enforcement of the policy actions under the program

Key Activities with Milestones

1. Low-carbon and resilient infrastructure transformation demonstrated

1.1 Engage design institutes for detailed engineering design (Q3 2020–Q2 2023)

1.2 Prepare the bidding process, tendering of procurement packages, and awarding of contract (Q3 2020–Q3 2024)

1.3 Undertake civil works for mobility systems transformation (Q4 2022–Q3 2025)
1.4 Procure battery electric buses and electricity chargers (Q1 2022–Q4 2024)
1.5 Construct the Xiangtan First Traditional Chinese Medicine Hospital (Q1 2022–Q3 2025)
1.6 Retrofit an old government building (Q4 2023–Q3 2025)
2. Information and knowledge platforms for informed decision-making and behavioral changes enabled
2.1 Undertake assessment and prepare the ICT platforms bidding process (Q2 2021–Q3 2023)
2.2 Install ICT platforms (Q4 2021–Q1 2025)
2.3. Develop integrated urban catchment management plans and design for three identified flood-prone zones ^e (Q3 2025)
3. Capacity building and program management enhanced
3.1 Engage program management consultants (Q2 2020–Q1 2021)
3.2 Supervise project implementation (Q1 2021–Q3 2025)
3.3 Plan and execute training programs and capacity building activities (Q3 2021–Q3 2025)
3.4 Draft and finalize project completion report (Q3 2025)
4. Low-carbon transformation policy reforms adopted
4.1 Validate issued policies, guidelines, and regulations related to low-carbon transformation (Q1 2020–Q3 2022)
Inputs
ADB: \$50.00 million (policy-based loan)
\$150.00 million (project loan)
Government: \$195.88 million
Assumptions for Partner Financing NA
ADB = Asian Development Bank, BEMS = building and utility energy management system, CMEUMS = community-scale multi-energy and utility management system, COVID-19 = coronavirus disease, EBA = ecosystem-based adaptation, EDGE = Excellence in Design for Greater Efficiencies, EMAS = environmental monitoring and assessment system, GBCI = Green Business Certification Inc., ICT = information and communication technology, IFC = International Finance Corporation, iRAP = International Road Assessment Programme, km = kilometer, km ² = square kilometer, ktCO ₂ e = kilotons of carbon dioxide equivalent, LED = light-emitting diode, m ² = square meter, m ³ = cubic meter, NA = not applicable, OP=operation priorities. PMO = program management office, PV = photovoltaic, Q = quarter, RFI = results framework indicator, tCO ₂ e = tons of carbon dioxide equivalent, XMG = Xiangtan Municipal Government.
^a Government of Xiangtan. 2020. <i>Xiangtan Low-Carbon City Pilot Implementation Plan, 2017–2030</i> . Xiangtan.
^b iRAP assesses roads all over the world and aims to significantly reduce road casualties by improving the safety of road infrastructure. iRap .
^c EDGE, an innovation of IFC (a member of the World Bank Group), empowers emerging markets to scale up resource-efficient buildings in a fast, easy, and affordable way. EDGE enables developers and builders to quickly identify the most cost-effective ways to reduce energy use, water use, and embodied energy in materials. EDGE .
^d Other low-carbon features include electric bicycle stations, EBA measures in parking areas, drainage system improvement, street improvements for safe walking and cycling, installation of natural gas distribution pipes for cooking, and community center retrofitting.
^e Three identified flood-prone zones are: (i) Railway station block; (ii) Yaowan Park, and (iii) Yangmeizhou Island.
Contribution to Strategy 2030 Operational Priorities::
OP 3.1. Total annual greenhouse gas emissions reduction (tCO ₂ e/year). Expected: 700,000 tCO ₂ e reduced in 2026.
OP 3.1.2 People with increased capacity in implementing mitigation and low-carbon development actions. Expected: 20 female XMG staff and 20 male XMG staff.
OP 3.1.3. Low-carbon infrastructure assets established or improved. Expected: 60 km of urban roads with bus priority lanes incorporated with improved cycling and walkways, one new green hospital construction with clean energy system, and one government building retrofit with energy- and water-saving features.
OP 3.2.4. National and subnational disaster risk reduction and/or management plans supported in implementation. Expected: 2 policy actions relevant to the Xiangtan sponge city development and management plan.
OP 3.2.5. New and existing infrastructure assets made climate- and disaster-resilient. Expected: 1 new hospital building and Fuxing middle road.
OP 4.1. People benefiting from improved services in urban areas. Expected: 179,806 residents in 20 aging urban communities, including 88,530 females and 3,672 low-income residents, benefit from building insulation and other infrastructure upgraded with energy and water savings and resilient features.
OP 4.1.1. Service providers with improved performance. Expected: 6 XMG agencies (Xiangtan Big Data Center for the Smart City ICT platform, Xiangtan Health Commission for hospital BEMS, Xiangtan Housing and Urban–Rural Construction Bureau for the government building BEMS, Xiangtan Jiuhe Economic and Technology Development Zone management committee for CMEUMS, Xiangtan Water Conservation Bureau for early flood warning system, and Xiangtan Ecology and Environment Bureau for EMAS).
OP 4.1.2. Urban infrastructure assets established or improved. Expected: 60 km of urban roads improved for low-carbon mobility, 1 Smart City ICT platform, 1 BEMS at the new hospital, one Xiangtan-wide EMAS, 1 BEMS to cover 200 government buildings, 1 CMEUMS and 1 power substation constructed to expand the power distribution system at Xiangtan Jiuhe Economic and Technology Development Zone, 1 early flood warning system, and 20 aging urban communities upgraded with building insulation.

OP 4.3.1. Solutions to enhance urban environment implemented. Expected: 1 natural-gas based trigeneration and solar hybrid energy system, 100 battery electric buses, 778 e-charging units. Energy- and water-saving features and appliances at the government building retrofit.

OP 4.3.2. Urban climate and disaster resilience capacity development initiatives implemented. Expected: At least 2 capacity building training events on EBA and climate resilience conducted.

Source: ADB.

B. Monitoring

66. **Project performance monitoring.** Within 3 months of loan effectiveness, the EA will establish a project performance monitoring system (PPMS).³⁶ The PPMS will monitor the following:

- (i) **Project progress.** The EA/IA will monitor on a yearly basis data corresponding to the indicators and targets set in the design and monitoring framework. The indicators will be submitted as part of the quarterly progress reports to ADB.³⁷ They will provide information necessary to update ADB's PPMS.
- (ii) **Component progress.** Information on the progress of each component will be monitored by the EA/IA to ADB; information includes (a) baseline social and environmental data; and (b) procurement, physical, and financial progress. The EA/IA will update the information on a quarterly basis and report in the quarterly progress reports. Within 6 months after the completion of a subproject, the EA/IA will update social data, finalize physical and financial information, and reevaluate economic benefits based on new traffic count results.

67. **Compliance monitoring.** The EA/IA will submit reports and information to ADB concerning the use of the loan proceeds, project implementation, project implementation performance, and compliance of loan and project covenants.³⁸ These reports will include (i) quarterly progress reports on project implementation; and (ii) mid-term adjustment report, and (iii) a project completion report, which should be submitted not later than three months after the completion of the project facilities. The compliance status of loan and project covenants will be reported and assessed through the quarterly progress report. ADB review missions will verify status.

68. **Environmental Safeguards (EMP) monitoring.** XMG shall ensure that the project fully complies with the applicable PRC laws, regulations, standards, and approval requirements of the environmental impact report which is equivalent to the ADB's Safeguard Policy Statement (2009). XMG shall ensure any grievance will be adequately addressed under the PRC laws and regulations. The EA/IA will monitor the progress of the environmental management plan and submit to ADB annual environmental safeguards (EMP) monitoring reports during the project implementation and operation.

69. **Social Safeguards monitoring.** The project will not involve any involuntary resettlement impacts and any impacts on ethnic minority under the ADB SPS. The EA/IA shall inform ADB on any unanticipated social safeguards concerns, and prepare corrective actions in accordance with the ADB SPS.

³⁶ ADB's project performance reporting system is available at <http://www.adb.org/Documents/Slideshows/PPMS/default.asp?p=evaltool>

³⁸ The format of the progress report can be found in PAI 5.01 Appendix 1.

³⁸ The assurances/loan covenants is in Appendix 2.

70. **Gender and social dimensions monitoring.** The SGAP implementation will be ensured by an assurance in the project agreement, through a social and gender development specialist to be engaged as a part of the PMC under output 3, and the SGAP monitoring will be carried out annually.

C. Evaluation

71. ADB and the EA/IA will undertake an annual review mission to evaluate the progress of project implementation. ADB, the EA/IA will undertake a comprehensive midterm review two year after the start of project implementation to have a detailed evaluation of the scope, implementation arrangements, achievement of scheduled targets, and progress on the agenda for policy reform and capacity building measures. Feedback from the PPMS activities will be analyzed. Within three months of physical completion of the project, the EA/IA will submit a project completion report to ADB.³⁹

D. Reporting

72. The EA/IA 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) progress achieved by output as measured through the indicator's performance targets, (b) key implementation issues and solutions, (c) updated procurement plan, and (d) updated implementation plan for the next 12 months; (iv) annual environmental safeguards (EMP) monitoring reports; (v) annual social report containing (a) SGAP implementation progress and results, and (b) stakeholder communication plan implementation progress and results; (vi) audited project accounts and financial statements; and (vii) a project completion report within 6 months of physical completion of the project. To ensure that projects will continue to be both viable and sustainable, project accounts audited financial statement together with the associated auditor's report should be adequately reviewed.

Table 17: Reporting Requirements to ADB

Report	Timing
Audited financial statements	Not later than 6 months after the close of the fiscal year
Quarterly project progress reports	Quarterly, within 15 days after the end of each reporting period
Environmental safeguard: (i) Construction phase: Environmental safeguard (EMP) monitoring reports (ii) Operations phase: Environmental safeguard (EMP) monitoring reports	(i) Annually, after the commencement of civil works till the completion of all the project components (ii) Annually, until the project completion
Social report (i) SGAP implementation progress and results (ii) Stakeholder communication plan implementation progress and results	(i) Annually, until the project completion (ii) Annually, until the project completion
Project completion report	Not later than 3 months after the physical completion of the project

³⁹ Project completion report format is available at: <http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar>

E. Stakeholder Communication Strategy

73. Project information will be communicated through public consultation meetings, interviews, focus group discussions and, information will be disclosed on ADB's and government's website, in accordance with ADB's requirements of Access to Information Policy (footnote 33). Consultations with communities have taken place and will continue through the project implementation. Special attention will be paid for women's participation including other vulnerable groups, such as the poor during consultation.

74. **Implementation.** This communication strategy (Appendix 5) will be implemented by the PMO, supported by communication consultants. These consultants will provide technical support to assess the communication capacity and needs of the IA and assist in implementing this communication strategy.

X. ANTICORRUPTION POLICY

75. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the project.⁴⁰ All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the executing agency and all project contractors, suppliers, consultants, and other service providers. Individuals and/or entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.⁴¹

76. To support these efforts, relevant provisions are included in the loan agreement, and the bidding documents for the project. ADB's Anticorruption Policy (1998, as amended to date) will be explained to and discussed with executing agency and the implementing agency. Consistent with its commitment to good governance, accountability and transparency, ADB reserves the right to investigate any alleged corrupt, fraudulent, collusive, or coercive practices relating to the project. To address the risks on governance and corruption related to procurement of equipment, relevant provisions of ADB's Anticorruption Policy will be included in the loan agreement and the bidding documents for the project. In particular, all contracts financed by ADB in connection with the project will include provisions specifying the right of ADB to audit and examine the records and accounts of executing agency and the implementing agency, contractors, suppliers, consultants, and other service providers as they relate to the project. The executing agency has indicated its commitment to promote good governance and establish a corruption-free environment under the project. Further to this, a number of good governance and anticorruption provisions have been included in the loan and project agreements.⁴²

XI. ACCOUNTABILITY MECHANISM

77. 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 an effort in good faith to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still

⁴⁰ Anticorruption Policy: <https://www.adb.org/documents/anticorruption-policy>

⁴¹ ADB's Integrity Office web site: <https://www.adb.org/site/integrity/contacts>

⁴² Governance and Anticorruption Action Plan II Guidelines. <https://www.adb.org/documents/guidelines-implementing-adbs-second-governance-and-anticorruption-action-plan-gacap-ii>.

dissatisfied, should they approach the Accountability Mechanism.⁴³

XII. RECORD OF CHANGES TO THE PROJECT ADMINISTRATION MANUAL

78. The PAM 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 program management office's to effectively implement and monitor the project.

No.	Changes/Updates	Date	Remarks
1	PAM initial draft agreed	April 2020	Agreed during the loan fact finding mission
2	Updated PAM agreed	21 August 2020	Agreed during the loan negotiation

⁴³ Accountability Mechanism. <https://www.adb.org/site/accountability-mechanism/main>.

APPENDIX 1: PROCUREMENT PLAN

Basic Data		
Project Name: Xiangtan Low-Carbon Transformation Sector Development Program		
Project Number: 52330-001	Approval Number: TBD	
Country: People's Republic of China	Executing Agency: Xiangtan Municipal Government (XMG)	
Project Procurement Classification: A	Implementing Agency: Xiangtan Municipal Government (XMG)	
Procurement Risk: Moderate		
Project Financing Amount: \$395,880,000 ADB Financing: \$200,000,000 (Project loan: \$150,000,000; and policy-based loan: \$50,000,000) Co-financing (ADB Administered): Non-ADB Financing: \$195,880,000	Project Closing Date: TBD	
Date of First Procurement Plan: 01/03/2020	Date of this Procurement Plan: 01/04/2020	
Procurement Plan Duration: 18 months	Advance contracting: Yes	eGP: No

A. Methods, Review and Procurement Plan

1. Except as the Asian Development Bank (ADB) may otherwise agree, the following methods shall apply to procurement of goods, works, non-consulting services, and consulting services.

Procurement of Goods, Works and Non-consulting Services	
Method	Comments
Open Competitive Bidding (OCB) for works	Nationally advertised. All packages will be subject to ADB's prior review except for low value contract packages.
Open Competitive Bidding (OCB) for goods (general)	Nationally or internationally advertised. All packages will be subject to ADB's prior review.
Open Competitive Bidding (OCB) for goods (ICT)	Nationally or internationally advertised. All packages will be subject to ADB's prior review.

Consulting Services	
	Comments
Quality- and cost-based selection (QCBS)	90:10. All packages will be subject to prior review.
Consultant qualification selection (CQS)	All packages are subject to prior review.
Individual consultant selection	All packages are subject to prior review.

List of Active Procurement Packages (Contracts)

2. The following table lists goods, works, non-consulting, and consulting services contracts for which the procurement activity is either ongoing or expected to commence within the procurement plan's duration.

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (\$ million)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
CW101	Civil works (median and peak-hour curbside bus priority lanes, bus stops, cycling lanes, walkways, safe islands, and safety features at two elementary school zones) in Yuhu District	16.75	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW103	Civil works for building (Xiangtan First Traditional Chinese Medicine Hospital building structure)	47.63	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW104	Civil works for hospital building internal structure and for resilient rain garden/EbA facilities	32.53	OCB	Prior	1S1E	Q2/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW106	Civil works for the Yuhu District low-carbon communities	21.33	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW107	Civil works for the Yuetang District low-carbon communities	20.19	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
G101	Provision of e-Buses (urban city buses:100 e-bus)	11.18	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G102	Provision and installation of e-charging stations (778 charging piles at 30 locations)	10.86	OCB	Prior	1S1E	Q4/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (\$ million)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
G103	Provision and installation of pedestrian crossing sound/countdown, digitalized bus information system; and monitors and computers for smart bus control room.	5.74	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G201-ICT	Development, provision installation and commissioning of the smart city-wide ICT platform operation system	10.22	OCB	Prior	1S1E	Q2/2021	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G202	Provision and installation of monitors and computers for city dispatch room	5.73	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G203-ICT	Provision and installation of BEMS for 200 public buildings and sensors	5.73	OCB	Prior	1S1E	Q2/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No

CW = civil works, EbA = ecosystem-based adaptation, G=goods, ICT=information and communication technology, OCB = open competitive bidding, Q = quarter, QCBS = quality- and cost-based selection, SBD = standard bidding document.

Consulting Services							
Package No.	General Description	Estimated value (\$ million)	Selection method	Review	Type of Proposal	Advertisement Date (quarter, year)	Comments
CS101	Engineering design and construction supervision (bus priority, bus stops, cycling and walkways; road safety; multi-modal station; and Fuxing Middle Road)	6.74	QCBS	Prior	FTP	Q4/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS102	Engineering design and construction supervision for Xiangtan First Traditional Chinese Medicine Hospital	14.12	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents:

Consulting Services							
Package No.	General Description	Estimated value (\$ million)	Selection method	Review	Type of Proposal	Advertisement Date (quarter, year)	Comments
							SBD (ADB) Advance contracting: Yes
CS103	Engineering design and construction supervision for government building retrofit ('Asia Pacific Low-Carbon Development Training Center')	1.35	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS104	Engineering design and construction supervision for Yuhu and Yuetang low-carbon communities	6.23	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS301	Program Management Consulting for capacity building and loan implementation	1.50	QCBS	Prior	FTP	Q2/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes

CS = consulting service, EOI = expression of interest, FTP = full technical proposal, OCB = open competitive bidding, Q = quarter, QCBS = quality- and cost-based selection.

B. List of Indicative Packages (Contracts) Required under the Project

3. The following table lists goods, works, non-consulting, and consulting services contracts for which the procurement activity is expected to commence beyond the procurement plan duration and over the life of the project (i.e. those expected beyond the current procurement plan's duration).

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (\$ million)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
CW102	Civil works (median and peak-hour curbside bus priority lanes, bus stops, cycling lanes, walkways, safe islands, and safety features at three elementary school zones) in Yuetang District	36.82	OCB	Prior	1S1E	Q3/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW105	Civil works for government building retrofit ('Asia Pacific Low-Carbon	8.98	OCB	Prior	1S1E	Q2/2023	Advertisement: National Prequalification of Bidders: No

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (\$ million)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
	Development Training Center')						Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
G104	Provision and installation of low-carbon equipment (Tri-gen, PV) for Xiangtan First Traditional Chinese Medicine Hospital	3.19	OCB	Prior	1S1E	Q3/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G105-ICT	Provision and installation of building energy management system (BEMS) at Xiangtan First Traditional Chinese Medicine Hospital	0.72	OCB	Prior	1S1E	Q3/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G204-ICT	Development, provision installation and commissioning of early flood warning system (including Model-building, flood assessment) and relevant sensors	4.55	OCB	Prior	1S1E	Q3/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G205	Provision and installation of power transmission system expansion at Jiuhua industrial zone	11.47	OCB	Prior	1S1E	Q2/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G206-ICT	Provision and installation community-scale multi-energy and utility management system+sensors at Jiuhua industrial zone	4.54	OCB	Prior	1S1E	Q3/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G207-ICT	Development, provision installation and commissioning of environmental monitoring and assessment system	3.61	OCB	Prior	1S1E	Q4/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No

CW = civil works, EbA = ecosystem-based adaptation, ICT=information and communication technology, MOF=ministry of finance, OCB = open competitive bidding, PV=photo voltaic, Q = quarter, SBD = standard bidding document.

Consulting Services							
Package No.	General Description	Estimated value (\$ million)	Selection method	Review	Type of Proposal	Advertisement Date (quarter, year)	Comments
CS201	Integrated Urban Catchment Management Plan and Design Development for Railway block, Yangmaizhou island and Yaowang - shazilin parks (flood hazards assessment and modelling, conception design, development guideline, and Capacity building)	2.10	QCBS	Prior	FTP	Q3/2023	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: No

CS = consulting service, EOI = expression of interest, FTP = full technical proposal, OCB = open competitive bidding, Q = quarter, QCBS = quality- and cost-based selection.

C. List of Awarded and Completed Contracts

4. The following table lists the awarded contracts and completed contracts for goods, works, non-consulting, and consulting services.

Goods, Works and Non-consulting Services					
Package Number	General Description	Contract Value	Date of ADB Approval of Contract Award	Date of Completion	Comments
None					

Consulting Services					
Package Number	General Description	Contract Value	Date of ADB Approval of Contract Award	Date of Completion	Comments
None					

D. Non-ADB Financing

5. The following table lists goods, works, non-consulting, and consulting services contracts over the life of the project, financed by non-ADB sources.

Goods, Works and Non-consulting Services				
General Description	Estimated Value (cumulative, \$ million)	Estimated Number of Contracts	Procurement Method	Comments
IFC-EDGE certification fee (post-construction) for Xiangtan First Traditional Chinese Medicine Hospital	0.0013	1	Government procurement	Estimated schedule: Q3/2023
IFC-EDGE certification fee (post-construction) for Low carbon building	0.0013	1	Government procurement	Estimated schedule: Q2/2023

Green Public Procurement Piloting - Procurement of low-carbon green products (LED lights, AC high efficiency, water saving toilets, facets, computers,)	2.01	1	Government procurement	Estimated schedule: Q4/2022
Atmospheric Environment Monitoring Networks;	2.97	1	Government procurement	Estimated schedule: Q2/2023
Surface Water Monitoring Networks (12 mobile units)	4.25	1	Government procurement	Estimated schedule: Q2/2023
Ground Water Monitoring Networks	0.17	1	Government procurement	Estimated schedule: Q2/2023

AC=air conditioner, CS = consulting service, EDGE=Excellence in Design for Greater Efficiency, IFC=International Finance Corporation, LED=light-emitting diode, Q = quarter.

Consulting Services				
General Description	Estimated Value (cumulative, mil \$)	Estimated Number of Contracts	Recruitment Method	Comments
None				

E. Open Competitive Bidding (Advertised Nationally)

6. The Borrowers Law of Tendering and Bidding of the People's Republic of China promulgated by Order No. 21 of the President of the People's Republic of China on August 30, 1999, are subject to the following clarifications required for compliance with the Guidelines:

- (i) All invitations to pre-qualify or to bid shall be advertised in the national press, or official gazette, or a free and open access website in the Borrowers country. Such advertisement shall be made in sufficient time for prospective bidders to obtain pre-qualification or bidding documents and prepare and submit their responses. In any event, a minimum preparation period of thirty (30) days shall be given. The preparation period shall count (a) from the date of advertisement, or (b) when the documents are available for issue, whichever date is later. The advertisement and the pre-qualification and bidding documents shall specify the deadline for such submission.
- (ii) Qualification requirements of bidders and the method of evaluating the qualification of each bidder shall be specified in detail in the bidding documents, and in the pre-qualification documents if the bidding is preceded by a pre-qualification process.
- (iii) If bidding is preceded by a pre-qualification process, all bidders that meet the qualification criteria set out in the pre-qualification document shall be allowed to bid and there shall be no limit on the number of pre-qualified bidders.
- (iv) All bidders shall be required to provide a performance security in an amount sufficient to protect the Borrower/Project Executing Agency in case of breach of contract by the contractor, and the bidding documents shall specify the required form and amount of such performance security.
- (v) Bidders shall be allowed to submit bids by mail or by hand.
- (vi) All bids shall be opened in public; all bidders shall be afforded an opportunity to be present (either in person or through their representatives) at the time of bid opening, but bidders shall not be required to be present at the bid opening.

- (vii) All bid evaluation criteria shall be disclosed in the bidding documents and quantified in monetary terms or expressed in the form of pass/fail requirements.
- (viii) No bid may be rejected solely on the basis that the bid price falls outside any standard contract estimate, or margin or bracket of average bids established by the Borrower/Project executing agency.
- (ix) Each contract shall be awarded to the lowest evaluated responsive bidder, that is, the bidder who meets the appropriate standards of capability and resources and whose bid has been determined (a) to be substantially responsive to the bidding documents and (b) to offer the lowest evaluated cost. The winning bidder shall not be required, as a condition of award, to undertake responsibilities for work not stipulated in the bidding documents or otherwise to modify the bid as originally submitted.
- (x) Each contract financed with the proceeds of the Loan shall provide that the suppliers and contractors shall permit ADB, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by ADB.
- (xi) Government owned enterprises in the Borrower's country may be permitted to bid if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law, and (c) are not a dependent agency of the Borrower/Project Executing Agency.
- (xii) Rebidding shall not be allowed solely because the number of bids is less than three (3).

APPENDIX 2: TERMS OF REFERENCE - PROGRAM MANAGEMENT CONSULTING FIRM

A. Background

1. Xiangtan, an old industrial town undergoing rapid urbanization and industrial transformation, is located 40 kilometers (km) south of Hunan's capital, Changsha, with an administrative area of 5,006 square kilometers, a population of approximately 2.9 million, and an urbanization rate of 60%–65% in 2016. Located within the Changsha–Zhuzhou–Xiangtan cluster city, Xiangtan has been a key economic driver of Hunan province. Its growth also led to a substantial increase in greenhouse gas (GHG) emissions: from 26,270 kilotons of carbon dioxide equivalent (ktCO₂e) in 2005 to 50,560 ktCO₂e in 2015. Emissions from energy and industrial activities doubled and those from transport activities increased five times. Even with its effort to reduce GHG intensity per unit of gross domestic product (GDP) by 60% during that period, Xiangtan's GHG intensity is still much higher than that in Hunan province or the People's Republic of China (PRC).

2. Xiangtan possesses strategic importance nationally and regionally. Xiangtan is a part of nation-wide initiative as an integrated transport hub, a “two-oriented society comprehensive reform” area, and a low-carbon city. Xiangtan is the first smart pilot and green GDP city selected by the Hunan provincial government. Efforts to implement actions under these schemes are reflected in Xiangtan City Master 2010–2020; City Development plan 2016–2020; Xiangtan Thirteenth Five- Year Plan 2016–2020; and Xiangtan Low-Carbon City Pilot Implementation Plan 2017–2030. The last directly links to the municipal government's carbon peaking commitment by 2028, localizing the PRC's NDC target. An abatement gap of about 11,000 to 40,000 ktCO₂e per year indicates the immense challenge of the scale of GHG reduction. Though the municipal government has begun initial works, more significant and orchestrated actions are needed to achieve the target.

3. The municipal government's low-carbon transformation faces two major challenges. First, while its revenues have reduced over the years, large public investments, supported by debt and with poor financial viability, have continued to finance urban expansion, phaseout of polluting industries, site remediation, and ecological rehabilitation. Second, while utilities and public services remained at minimum cost, accumulated debt put tremendous pressure on the municipal government's financial performance. Energy sector activities, including energy supply and processing, and industrial energy uses, contribute 60%–70% of the total GHG emissions in Xiangtan. However, the municipal government's direct interventions have been constrained because the dominant energy market players are state-owned enterprises. As a first step, the Xiangtan Municipal Government (XMG) seeks Asian Development Bank's (ADB) assistance to find new solutions to help the municipal government construct innovative and progressive paths for low-carbon transformation.

4. The Xiangtan Low-Carbon Transformation Sector Development Program (the Program) will complement the Xiangtan municipal government's efforts to transform Xiangtan from a carbon intensive, heavily polluting city to a low-carbon, climate resilient, and livable one. The program comprises (i) a project loan to invest in priority infrastructure, and (ii) a policy-based loan to support necessary policy reforms of the municipal government to enable Xiangtan's successful low-carbon transformation. A program management office (PMO) will be established comprising of sector focal from each relevant municipal offices.

B. Objectives and Scope of Work

5. A Consultant (consulting firm, international) will be engaged to assist XMG-PMO to successfully implement the Program. The firm will be responsible for supporting XMG-PMO and provide institutional capacity building by providing technical support in various sector interventions. The firm will also support the XMG-PMO in project administration, design and engineering, services, contract and claims management, management control, procurement and expediting of equipment, materials control, inspection of equipment prior to delivery, shipments, transportation, control of schedule and quality, completion, and handover of Program components.

6. The proposed XSDP will be the first SDP with a holistic, integrated, and multi-sectoral approach in the PRC. The project investment will support a range of transformations demonstrating how physical infrastructure, including transport, buildings, energy systems, and resilience measures are interrelated and can be integrated to complement one another. It will also show how these infrastructure transformations can be reinforced by ICT and knowledge platforms. The PBL will support these project interventions, create an enabling environment for markets to respond quickly and easily, and ensure Xiangtan's successful transformation in the long run.

7. The XSDP is aligned with the following impact: Xiangtan's target of carbon emission peaking by 2028 achieved. The XSDP will have the following outcome: use of low-carbon enabling systems in Xiangtan increased. The XSDP will have four outputs based on Xiangtan's GHG profile, trends, structural challenges, and opportunities for effective carbon reduction. The project loan will support outputs 1, 2, and 3 and the PBL will support output 4.

8. **Output 1: Low-carbon and resilient infrastructure transformation demonstrated.** Through the project, the XMG will transform the transport system from car-centered infrastructure to people-centered mobility systems, enhancing safety,¹ inclusiveness,² and resilience. The XMG will transform more than 60 km of urban roads by installing medians and peak-hour curbside bus priority lanes; upgrading bus stops using safe, inclusive design; and providing digital bus information integrated with improved walking and cycling facilities for seamless access across modes. The transformation of streets through layout changes, improved facilities, and ecosystem-based adaptation (EBA) measures installed will demonstrate how streets can function as both flood-mitigating measures and enjoyable urban living spaces.³ The XMG will modify the access layout at two railway stations using enhanced, user-friendly, and inclusive design to facilitate transitions between public low-carbon mobility modes. The school zone transformation at five primary schools will raise road safety awareness while exceeding the requirements for the highest safety rating for walking and cycling under the International Road Assessment Programme (iRAP) Star Rating for Schools.⁴ The XMG will deploy clean energy buses equipped with inclusive and gender-sensitive features, and expand electric vehicle charging infrastructure.

¹ Road safety, particularly for pedestrians and cyclists, is a critical factor in promoting low-carbon transportation.

² Inclusive design features include tactile paving on sidewalks and at bus stops; designated spaces and seats at bus stops; buses that can accommodate wheelchairs, prams, pregnant women, the elderly, and children; and wide curb ramps and elevated crossings for seamless access for all residents.

³ EBA with green and blue assets is an effective measure for flood control, drought mitigation, heat stress reduction, and carbon sink, with co-benefits like aesthetic quality, recreational capacity, better air quality, and health benefits.

⁴ Safety features include elevated crossings, curb extensions, extensive signs, and road markings for speed and pedestrian crossings. The iRAP provides tools to assess road safety and support safer road infrastructure for casualty reduction. [iRAP](#).

9. The XMG will demonstrate building transformation integrated with advanced technologies and resilience measures. First, the XMG will construct a new hospital with integrated solutions of passive building design; water-saving features; distributed energy systems to generate power, heating, and cooling; and intelligent building energy (and utility) management systems (BEMS). As it is located in a flood-prone zone, the new hospital will be equipped with extensive EBA measures for flood resilience, resulting in enhanced resilience capacity compared to the PRC sponge city technical standards.⁵ Second, the XMG will retrofit an unused government building to house the Asia low-carbon training center, showcasing green and low-carbon building techniques. With support from the HPG and the LCCI, the XMG will run the low-carbon training center to share its experience on low-carbon transformations and to support the replication of their low-carbon models of Xiangtan in other cities in the PRC and in other developing countries in Asia and the Pacific that share similar challenges.⁶ Both buildings (i.e., the hospital and the low-carbon training center) will obtain Excellence in Design for Greater Efficiencies (EDGE) certification developed by the International Finance Corporation (IFC), achieving more than 20% savings each in energy, the energy embedded in the buildings' design and materials, and water compared to the relevant PRC standards.⁷ Under this output, the XMG will transform 20 aging urban communities into livable low-carbon exemplars.⁸

10. **Output 2: Information and knowledge platforms for informed decision-making and behavioral changes enabled.** The XMG will develop integrated urban catchment management plans and design for three identified flood-prone zones, which will enhance the XMG's climate resilient city planning knowledge and development.⁹ Also, the XMG will install, upgrade, and/or reprogram several sector ICT platforms to complement output 1 and provide information necessary for better decision-making and actions. Actions under output 2 will include the following:

- (i) The intelligent transport system will be reprogrammed to switch its main purpose from easing car congestion to enhancing pedestrians' road safety and prioritizing mass transportation over private vehicles.¹⁰
- (ii) A smart bus information platform will be installed for better operations and improved predictability for users.
- (iii) A BEMS connecting 200 public buildings will be installed for operational efficiency and building energy data management.

⁵ The 2014 sponge city construction technical guide in the PRC describes the volume capture ratio of annual rainfall (VCRa) to quantify a minimum storage volume for drought. The VCRa is set as per the land use and ecological damage sensitivity of a region. As Xiangtan has a VCRa of 75%–85%, the hospital was initially designed to have 740 cubic meters of water detention capacity, but the capacity has since been increased to 6,000 cubic meters.

⁶ The program team is preparing a publication titled Xiangtan Climate Actions and Low-Carbon Transformation to support knowledge sharing.

⁷ EDGE certification and its online platform are designed to determine the most cost-effective options for green buildings. EDGE makes it easy to quantify savings, while the PRC's green building labeling system (using points) cannot do so in a straightforward manner. EDGE ensures more than 20% savings in each of the three areas of energy, water, and materials savings compared to the relevant PRC standards. The PRC's 3-star (highest) green building label cannot guarantee 20% savings in all three areas. Compared to the PRC building energy efficiency standards, the new hospital has 26% energy savings and the retrofitted government building will have 23% energy savings. Two EDGE-certified building cases will be shared globally through the EDGE and Green Building Certification Inc. websites. [EDGE](#); and [Green Business Certification Inc.](#)

⁸ Low-carbon and resilient features include building insulation, rooftop solar systems for hot water, light-emitting diode lighting, e-bicycle sharing, EBAs at parking lots, drainage improvement, improved streets for safer walking and cycling, and installation of natural gas for cooking.

⁹ Three identified flood-prone zones are: (i) Railway station block; (ii) Yaowan Park, and (iii) Yangmeizhou Island.

¹⁰ The reprogramming, which does not require additional components or cost increases, will include the following features: pedestrian crossing lights will always be turned on, and self-optimized traffic lights will give green wave (priority) signals to buses.

- (iv) A community-scale multi-energy and utility management system will be installed connecting more than 1,300 companies in an industrial zone to optimize operational efficiency and drive a culture of collaboration among companies within the zone.
- (v) An intelligent early flood warning system will be built for quick data processing and rapid forecasting to achieve early and improved flood response management.
- (vi) A comprehensive environmental monitoring and assessment system (EMAS) will be installed with automated monitoring and intelligent data processing and management to support science-based decision-making.
- (vii) All these will be consolidated into an open and scalable citywide ICT platform that can continuously expand with new functionalities.

11. Output 3: Capacity building and program management enhanced. The XMG will engage a program management consultant (PMC) firm consisting of highly experienced sector, safeguards, and project management consultants to improve the XMG's technical expertise. The PMC firm will (i) support the XMG with the successful implementation of the XSDP and (ii) implement a range of capacity building activities so the XMG can sustain its low-carbon transformations and successfully manage the Asia low-carbon training center in Xiangtan.¹¹

12. Output 4: Low-carbon transformation policy reforms adopted. Policy actions are grouped into the following reform areas: (i) low-carbon, resilient, and smart city development strategy and policies issued; (ii) low-carbon mobility systems enhanced; and (iii) low-carbon energy and building systems enhanced. Tranche 1 of the PBL has 11 policy actions and tranche 2 of the PLB has 9 policy actions, which will reinforce outputs 1 and 2 and drive low-carbon innovations and system transformation. Under the first reform area, the Xiangtan low-carbon development plan, 2018–2030 (policy action 1) will set a clear vision and target for the XMG's low-carbon development. The plan will provide clear directions on sector relevance and priority areas, bind the responsibilities of all the XMG bureaus to plan and implement relevant low-carbon works, institutionalize an integrated and holistic approach, and support cross-sector collaboration and cooperation. Policy actions on sponge city-promoting EBA measures will advance city resilience beyond the national sponge city standards (footnote 17). The policy action on smart city development will highlight the integrated approach and cross-sector consolidation for efficient use of public investment. Green procurement policy (GPP) actions, adopted for the first time in the PRC, will lower GHG emissions in the public sector; generate environmental, health, and economic co-benefits; and develop the market for green products and service innovations.¹² Under the second and third reform areas, sector policies will create the right incentives, financing models, and other enabling mechanisms to mobilize private sector investments and activate wide participation from all economic actors, including the public. Policy actions under tranche 1 will focus on the XMG's policies, which include sector-specific plans.¹³ Policy actions under tranche 2 will include management rules for operational reforms, regulations for developing better incentive mechanisms, technical standards to promote low-carbon technologies, and design guides to improve urban infrastructure that supports low-carbon actions and practices of people, and an improved resilience capacity.

¹¹ Capacity building activities include trainings on integrated city planning, compact and transit-oriented development planning, bus priority and traffic light system integration and operation, EDGE tools, district energy systems, operation of a range of ICT platforms, GHG inventory and calculation, procurement, financial management, and safeguards.

¹² GPPs institutionalize the process of public authorities in procuring goods, services, and works that lower GHG emissions and other negative environmental impacts when compared to goods, services, and works with the same primary functions that would otherwise be procured.

¹³ These sector-specific plans describe mandates and institutional reforms at the bureau and provide rationale to secure appropriate budget and human resources for the relevant works.

C. Team Compositions and Qualification Requirements of Key Experts

13. The consulting firm should have with adequate international experience in urban planning, architecture or civil engineering, supervision and coordination of contractors, suppliers and consultants, as well as in capacity building related to urban planning, smart urban transportation system, urban climate resilience, sustainable buildings, and smart city ICT applications.

14. The consulting firm will ensure the consultants are appropriately qualified and experienced, fully briefed, and mobilized according to the agreed schedule and will be responsible for producing deliverables effectively on time, and for organizing and carrying out all the tasks indicated. The consulting firm will ensure the consultants are appropriately qualified and experienced, fully briefed, and mobilized according to the agreed schedule and will be responsible for producing deliverables effectively on time, and for organizing and carrying out all the tasks indicated.

15. Proposing consulting firms will determine the number and the nature of experts they will require to achieve the objectives of the contract, in accordance with their proposed approach and methodology. However, at the minimum, the following experts will be required under the consulting assignment. The Consultant, however, is encouraged to propose additional experts together with their respective terms of reference as may deemed necessary and justified in the methodology to ensure successful Program implementation.

Positions	Qualifications	Descriptions
Team Leader (international, 30 person-months [PM]) Deputy Team Leader (national, 48 PM)	<p>The Team Leader (International) must have (i) a postgraduate degree in transport and urban planning, transport, civil, or energy-related engineering, or any other relevant field; (ii) at least 10 years' team leadership on projects related to sustainable infrastructure, (iii) at least 8 years relevant experience on sustainable infrastructure in PRC, and (iv) a good command of English. Knowledge of Chinese language is an advantage.</p> <p>Similarly, the Deputy Team Leader (National) must have (i) a postgraduate degree in transport and urban planning, transport, civil, or energy-related engineering, or any other relevant field; (ii) at least 10 years' team leadership on projects related to sustainable infrastructure in PRC, (iii) at least 5 years relevant experience with international financing institutions such as ADB, and (iv) a good command of English.</p>	<p>The Team Leader will be the primary interface between the consultant and Xiangtan Municipal Government (XMG) in implementing the project and in providing trainings. In particular, he will be responsible in:</p> <ul style="list-style-type: none"> • Leading the consultant team all throughout the project implementation in supporting the XMG-PMO by providing technical advise on project quality control, project progress and investment control, contract management, financial management, social safeguard policy implementation as well as site safety, etc. Overall input planning and arrangement and guidance to consulting team; • Supervising and supporting the XMG-PMO in procurement activities from preparation of procurement documents, tendering, evaluation and contract negotiation; • Supervising supporting the XMG-PMO in the review and revisions (if needed) of designs submitted by the contractors and the delivery of procured goods; • Supporting the XMG-PMO and providing guidance and supervision to the construction supervision company (CSC) in the civil works, construction and installation involved in the project in accordance with contractual arrangements; • Supporting the XMG-PMO and providing guidance and supervision in the preparation

Positions	Qualifications	Descriptions
		<p>of construction quality evaluation report; control construction progress and ensure safety; participating project completion and acceptance if needed;</p> <ul style="list-style-type: none"> • Supporting the XMG-PMO and providing guidance and supervision on the preparation and submission of regular project progress reports and project completion report to ADB on behalf of XMG-PMO; • Supporting the XMG-PMO and providing guidance and supervision on the implementation of EMP and LARP in all stages of the project cycle; • Planning and supervision on the preparation of the training needs assessment, training and study tour plan, and capacity development training program including a series of training events for each of the sub-components; • Leading and carrying out the preparation of training materials and carry out training events throughout the project implementation period and providing day-to-day on-the-job training during implementation; • Supporting the XMG-PMO in reviewing the withdrawal application; providing suggestion on loan disbursement and reviewing project settlement; • Supporting the XMG-PMO in the preparation of project progress reports and project completion report; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO from time to time. <p>The Deputy Team Leader will assist the Team Leader in the performance of above duties and responsibilities.</p>
Sustainable transport planning experts (international, national)	The international expert must have (i) a postgraduate degree in transport and urban planning, transport economics, transport engineering, civil engineering, or other relevant field; (ii) at least 7 years' working experience in sustainable urban transport, travel demand analysis, bus priority systems, non-motorized transport system, traffic signal management, congestion management, clean energy vehicles and e-charging piles, multimodal transport hubs,	<p>The international expert will be responsible in:</p> <ul style="list-style-type: none"> • Supporting the XMG-PMO by providing technical expertise on the review and revisions of designs for sustainable transport components; • Supporting the XMG-PMO by providing technical expertise on the preparation of procurement documents related to sustainable transport components; • Providing technical expertise on the timely implementation, including identification of critical path and sequencing of tasks, of transport components; • Contributing to project progress reports and project completion report;

Positions	Qualifications	Descriptions
	<p>parking policy, road safety; and (iii) a good command of English. Previous similar experience in PRC is an advantage.</p> <p>The national expert must have (i) a degree in transport and urban planning, transport economics, transport engineering, civil engineering, or other relevant field; (ii) at least 5 years' working experience in sustainable urban transport, travel demand analysis, bus priority systems, non-motorized transport system, traffic signal management, congestion management, clean energy vehicles and e-charging piles, multimodal transport hubs, parking policy, road safety; and (iii) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<ul style="list-style-type: none"> • Planning and delivering trainings/workshops on matter related to smart traffic management, intelligent transport system, analysis and forecasting passenger and freight movements, urban transport planning, bus priority system, public transport enhancement and non-motorized activities; • Planning and/or leading study tours on transport related components; • Providing guidance and supervision to construction supervision company on transport related components; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time. <p>The national expert will assist the international expert in the performance of above duties and responsibilities.</p>
Urban climate resilience and ecosystem-based adaptation experts (international, national)	<p>The international expert should have (i) a postgraduate degree in urban planning, hydro-engineering, water management, or in any relevant field; (ii) at least 7 years of working experience on urban climate resilience and adaptation, climate risk and impacts assessment, collaborative climate adaptation planning in urban setting, urban heat stress and cooling effects planning, early flood warning system, and ecosystem-based adaptation measures design; and (iii) a good command of English. Previous similar experience in PRC is an advantage.</p> <p>The national expert should have (i) a degree in urban planning, hydro-engineering, water management, or in any relevant field; (ii) at least 5 years of working experience on urban climate resilience and adaptation, climate risk and impacts assessment, collaborative climate adaptation planning in urban</p>	<p>The international expert will be responsible in:</p> <ul style="list-style-type: none"> • Assisting XMG-PMO in preparing an urban climate resilience and EbA measures implementation workplan using the customized Adaptation Support Tool for Xiangtan to ensure more climate resilient urban infrastructure improvement in Xiangtan; • Providing guidance and technical input on the preparation of the integrated catchment development plans; • Supporting the XMG-PMO by providing technical expertise on the preparation of procurement documents and on the review and revisions of designs for urban climate resilience components and ecosystem-based adaptation measures; • Providing technical expertise on Early Flood Warning systems; • Providing guidance and supervision to CSC on all civil works, construction and installation of urban resilience components; • Providing technical expertise on the timely implementation, including identification of critical path and sequencing of tasks, of urban climate resilience; • Contributing to project progress reports and project completion report;

Positions	Qualifications	Descriptions
	<p>setting, urban heat stress and cooling effects planning, early flood warning system, and ecosystem-based adaptation measures design; and (iii) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<ul style="list-style-type: none"> • Planning and delivering trainings for XMG-PMO staff on urban climate resilience, EbA measures, the AST, and early flood warning system and contribute to the capacity development program implementation, and supervising the preparation of training materials; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time. <p>The national expert will assist the international expert in the performance of above duties and responsibilities.</p>
Sustainable building experts (international, national)	<p>The international expert should have (i) a postgraduate degree in engineering (environmental, civil, energy/HVAC/building or mechanical), energy management, or other relevant field; (ii) at least 7 years relevant experience in sustainable buildings, energy efficiency, renewable energy technologies, and related activities; and (iii) a good command of English. Previous similar experience in PRC is an advantage.</p> <p>The national expert should have (i) a degree in engineering (environmental, civil, or other related fields), energy management, or other relevant field; (ii) at least 5 years relevant experience in sustainable buildings, energy efficiency, renewable energy technologies, and related activities; and (iii) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<p>The international expert will be responsible in:</p> <ul style="list-style-type: none"> • Supporting the XMG-PMO by providing technical expertise on the review and revisions of designs for sustainable building components including green building solutions such as building energy management systems, heat recovery, Multi-Energy Systems (CCHP or trigeneration system), renewable energy, and energy efficiency technologies; • Supporting the XMG-PMO by providing technical expertise on the preparation of procurement documents related to sustainable building components; • Providing guidance and supervision to CSC on all civil works, construction and installation of sustainable building components; • Providing technical expertise on the timely implementation, including identification of critical path and sequencing of tasks, of sustainable building components; • Contributing to project progress reports and project completion report; • Planning and delivering trainings for XMG-PMO staff on sustainable building sub-components and contribute to the capacity development program implementation, and supervising the preparation of training materials; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time. <p>The national expert will assist the international expert in the performance of above duties and responsibilities.</p>

Positions	Qualifications	Descriptions
Low-carbon building architects (international, national)	<p>The international expert should have (i) a postgraduate degree in architecture, city planning, engineering (civil and other related fields), (ii) at least 7 years' relevant experience in sustainable buildings, passive building design, public building retrofit, residential building retrofit, green building features, energy and water saving appliances and systems, and related technologies; (iii) strong knowledge on international and PRC's best practices, and (iv) a good command of English. Previous similar experience in PRC is an advantage.</p> <p>The national expert should have (i) a degree in architecture, city planning, engineering (civil and other related fields), (ii) at least 5 years' relevant experience in sustainable buildings, passive building design, public building retrofit, residential building retrofit, green building features, energy and water saving appliances and systems, and related technologies; (iii) strong knowledge on international and PRC's best practices; and (iv) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<p>The international expert will be responsible in:</p> <ul style="list-style-type: none"> • Supervising and providing technical advice on building retrofit, passive building design; • Providing technical expertise on the review and revisions of designs for public building and residential building retrofit; • Supporting the XMG-PMO by providing technical expertise on the review and revisions of designs for public building and residential building retrofit including passive design, green building features, solutions, energy and water saving appliances and systems, and related technologies; • Supporting the XMG-PMO by providing technical expertise on the preparation of procurement documents related to sustainable building components; • Providing guidance and supervision to CSC on all civil works, overseeing the civil works, construction and installation; • Providing technical expertise on the timely implementation, including identification of critical path and sequencing of tasks, of sustainable building components; • Planning and delivering trainings for XMG-PMO staff on sustainable building sub-components and contribute to the capacity development program implementation, and supervising the preparation of training materials; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time. <p>The national expert will assist the international expert in the performance of above duties and responsibilities.</p>
ICT and smart city applications experts (international, national)	<p>The international expert should have (i) a postgraduate degree in information technology or communications engineering; (ii) at least 7 years of experience in developing and maintaining urban ICT infrastructure; (iii) experience in designing systems, models using machine learning algorithms, and bigdata, and internet of things solutions; (iv) in-depth knowledge of Smart Energy City components, intelligent transport systems, environmental monitoring systems, early warning systems, IT network components</p>	<p>The international expert will be responsible in:</p> <ul style="list-style-type: none"> • Providing advisory consulting services and technical support on citywide ICT platform that allows the integration of different ICT platforms such as Early flood warning system, intelligent transport system, road safety, Building Energy Utilization Management System, Community Energy Management Systems, environmental monitoring system, etc.; • Supervising the XMG-PMO in the successful implementation of ICT components by providing technical inputs in this area;

Positions	Qualifications	Descriptions
	<p>and systems; (v) minimum of 10 years program management experience in the preparation of large scale integrated ICT projects including design, implementation, and maintenance; and (vi) knowledge on international and PRC's best practices. Previous similar experience in PRC is an advantage.</p> <p>The national expert should have (i) a degree in information technology or communications engineering; (ii) at least 5 years of experience in developing and maintaining urban ICT infrastructure; (iii) experience in designing systems, models using machine learning algorithms, and bigdata, and internet of things solutions; (iv) in-depth knowledge of Smart Energy City components, intelligent transport systems, environmental monitoring systems, early warning systems, IT network components and systems; (v) minimum of 5 years program management experience in the preparation of large scale integrated ICT projects including design, implementation, and maintenance, and (vi) knowledge on international and PRC's best practices. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<ul style="list-style-type: none"> • Supporting the PMO by providing technical advice in the screening and selection of ICT related contractors; • Providing advice to and supporting the Big Data Center and XMG on how to strengthen governance structure and functionality; • Contributing to project progress reports and project completion report; • Planning and delivering trainings for XMG-PMO staff and staff of relevant bureaus on various ICT platforms, supervising the preparation of training materials; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time. <p>The national expert will assist the international expert in the performance of above duties and responsibilities.</p>
Financial management, accounting, and disbursement expert (national)	<p>The national financial management and disbursement expert should have (i) a relevant university degree and relevant experience with PRC's project financial management and PRC's financial regulation and laws; Jaofa (ii) strong knowledge on ADB's financial regulations and ADB's disbursement handbook, (iii) at least 10 years of experience in project financial management including experience on internal or external</p>	<p>The national expert will be responsible in:</p> <ul style="list-style-type: none"> • Supporting the XMG-PMO with financial program management and overall financial accounting, advance account management, withdrawal application preparation, financial reporting and auditing etc.; • Advising and assisting the XMG-PMO in preparing fund utilization plan, and assisting the PMO in analyzing the differences between plan projections and project actual project completion; calculating updates for contract awards and disbursement and projections for each following year, and

Positions	Qualifications	Descriptions
	audit; and (iv) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.	<p>assisting in the preparation of fund allocation plans;</p> <ul style="list-style-type: none"> Assisting the HPG and PMOs in establishing project financial management system, including internal control system, independent accounting system, withdrawal application, etc; timely check the financial management status; Advising and assisting the XMG-PMO in preparing financial statements in accordance with ADB's requirement; Integrating into one consolidated report the subcomponents' project financial statement and submit to XMG-PMO; Advising and assisting the XMG-PMO on annual project financial audit, and with the required data for the said audit. Advising and assisting the XMG-PMO in conducting assets registration and turn over after project completion; Supporting management and supervision of all accounts and use of funds, including revolving advance/escrow account, and interest differential account; Contributing to project progress reports and project completion report; Conducting training for XMG-PMO staff on financial management and contributing to the capacity development program implementation and preparation of training materials; and Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time.
Procurement and contract management expert (national)	The national procurement and contract management expert should have (i) a relevant university degree; (ii) at least 8 years of experience in procurement of civil works and goods contracts for the provision of public goods and services, as well as contract management of the same; (iii) knowledge on procurement procedures and regulations, FIDIC forms and rules and bidding document preparation, bid evaluation report preparation, contract design, and other related areas; and (iv) a good command of English. Relevant experience with	<p>The national expert will be responsible in:</p> <ul style="list-style-type: none"> Supervising and assisting XMG-PMO and IAs in preparing and reviewing bidding documents; Assisting in tendering procurement packages and providing guidance to XMG-PMO with all concerns and activities related to procurement of the project civil works, goods and consulting services contracts; Advising and supporting the work of the procurement agency; Contributing to project progress reports and project completion report; Conducting training for XMG-PMO staff and contributing to the capacity development program implementation and preparation of training materials; and

Positions	Qualifications	Descriptions
	international financing institutions such as ADB is an advantage.	<ul style="list-style-type: none"> • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time.
Environmental safeguard expert (national)	<p>The national environmental safeguard expert should have (i) a degree in environmental engineering or similar field; (ii) at least 5 years relevant project experience related to environmental impact assessment and environmental management plan preparation and implementation and monitoring; (iii) strong knowledge on domestic environment management requirement the domestic environmental protection legislation and with ADB's environment safeguards and management policies, (iv) solid experience and demonstrated ability to carry out and preparation of environmental monitoring and report writing according the ADB's standards; (v) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.</p>	<p>The national expert will be responsible in:</p> <ul style="list-style-type: none"> • Supporting the PMO to engage an environmental impact assessment (EIA) firm to monitor environmental impact data; • Providing technical guidance to XMG, PMO, and the EIA firm in updating IEEs and EMPs based on the final detailed designs; • Assessing the capacity of the PMOs and implementing agencies; • Supervising and planning of capacity-building interventions (such as workshops and trainings) during EMP updating to strengthen knowledge and expertise in carrying out EMP activities; • Assisting in carrying out meaningful consultations. The section on consultation in the updated EMPs should include the summary of consultation and disclosure activities carried out during updating of EMPs and implementation of EMPs by the contractors; • Providing guidance to the EIA firm in assessing existing grievance redress process of the government and agreeing with the government on a localized grievance redress mechanism with clear responsibilities, reporting requirements and budget necessary in order for the committee to function effectively; • Providing guidance on the required training specific to handling grievances and advise on documenting them in the updated EMPs. The EMPs should also include the required follow-up trainings to be carried out during EMP implementation. Training programs and materials on grievances should be attached to the updated EMPs. • Assisting XMG, PMO, EIA firm, and implementing agencies in the setting up of monitoring and evaluation and reporting; • Supervising the preparation of a schedule for EMP activities in conjunction with the agreed implementation schedule for the project; • Contributing to project progress reports and project completion report; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time.

Positions	Qualifications	Descriptions
Social Development and Gender expert (national)	The specialist should have (i) a relevant university degree; (ii) at least 5 years of relevant project experience from social and gender development in urban development and infrastructure projects; (iii) strong knowledge on ADB's social development and gender development policy and regulation as well as Chinese social safeguard policies; and (ii) a good command of English. Relevant experience with international financing institutions such as ADB is an advantage.	<p>The national expert will be responsible in:</p> <ul style="list-style-type: none"> • Update social and gender action plan based on the affected people survey and social investigation; • Collecting information for community participation to ensure the updated social and gender action plan meet ADB's social safeguard policy; • Assisting the PMO and IA in the implementation of the social and gender action plan, ensure effective implementation is also reflected in the project progress reports and project completion report; • Providing suggestions on social and gender development; • Monitoring implementation of the project sub-components ensure that they do not involve land acquisition, resettlement, and other adverse social impacts; • Ensuring that any redundant workers are registered with employment centers and they get related support; • Updating the social and gender section and indicator achievement in the PPMS and DMF; • Monitoring and updating the matrix of social safeguard impacts of project sub-components and policy actions; • Implementing the identified activities/channels in the stakeholder communication strategy in order to achieve the expected outcomes of low carbon behavior change; • Conducting a project impact survey amongst affected people to determine the extent of low carbon behavior change; • Providing training on social and gender development; • Contributing to project progress reports and project completion report; • Conducting training for XMG-PMO staff and contribute to the capacity development program implementation and preparation of training materials; and • Undertaking other relevant tasks as may be assigned by the XMG-PMO and Team Leader from time to time.

16. In addition to the above required key experts, the proposing consulting firms should also include in their technical proposal, in the personnel work plan and in their financial proposal all other “non- key experts” required in accordance with their proposed approach and methodology. The proposing entity must also determine and indicate the number of person-months for which

each key or non-key expert will be required. The proposal will specify where the experts will be based (i.e., home or field) together with the expected durations.

17. All experts engaged under the contract, whether key or non-key experts, must be citizens of one of the ADB member countries.

D. Duration and location of the assignment

18. The assignment will be implemented over **48** months tentatively from July 2020 to June 2025 on an intermittent basis. The consulting firm will be recruited using the quality- and cost-based selection method, using a quality–cost ratio of 90:10 and full technical proposal according to ADB Procurement Policy (2017, as amended from time to time).

19. The terms of reference (TOR) and contractual arrangements may be revised based on consultations between the parties involved in the assignment according to changes and or additional requirements identified during the course of implementation.

E. Preparation of Proposal

20. Proposing consulting firms are requested to prepare a detailed description of how they propose to deliver on the outputs of the contract in the section of their proposal called “Approach and Methodology”. In this narrative, the consulting firms should be explicit in explaining how they will achieve the outputs and include any information on their existing activities upon which they may eventually build as well as the details of what staff will comprise the project team.

21. Consulting firms must also describe their experience in the People’s Republic of China and their ability to operate in the Chinese language.

22. Only one curriculum vitae (CV) must be submitted for each key and non-key expert included in the proposal. Only the CVs of key experts will be scored as part of the technical evaluation of proposals. The CVs of non-key experts will not be scored, however ADB will review and individually approve or reject each CV for each non-key expert position in the proposal.

23. All positions under the contract, both key and non-key experts, must be included and budgeted for in the financial proposal in accordance with the person-month allocation required for each as defined by the proposing consulting firm.

APPENDIX 3: POLICY MATRIX

	Tranche 1 (prior actions before August 2020)		Tranche 2 (by 24 months from Tranche 1)
Reform area: Low-Carbon, Resilient, and Smart City Development Strategy and Policy Issued			
1	<p>XMG shall have issued the Xiangtan low-carbon development plan 2018–2030 to set the carbon peaking target by 2028 and provide a framework for low-carbon development that includes priorities and requirements by sector, governance and institutional coordination mechanisms, and resource allocation.</p> <p>(Document required: XMG to provide the copy of officially issued Xiangtan low-carbon development plan 2018–2030) (completed in March 2020)</p>		
2	<p>XMG shall have issued the Xiangtan sponge city specific plan 2019-2035 to improve climate resilient infrastructure development by including mechanisms for cross-sectoral coordination, training, and clear adoption deadlines for updated design standards that incorporate eco-system based adaptation (EbA) measures.</p> <p>(Document required: XMG to provide the copy of the issued Xiangtan sponge city specific plan 2019-2035)</p>	12	<p>XMG shall have issued Xiangtan design standards on EbA measures that provide technical specifications on EbA measures for infrastructure development to improve quality and resilience in infrastructure development.</p> <p>(Document required: XMG to provide the copy of the issued Xiangtan design standards on ecosystem-based adaptation measures)</p>
3	<p>XMG shall have endorsed the smart Xiangtan construction master plan submitted by Xiangtan Big Data Center to strengthen consolidated efforts to develop various ICT platforms, institutionalize Xiangtan Big Data Center to ensure integration in management, operation, data standards, data sharing, data security, and research and development.</p> <p>(Document required: XMG to provide the copy of the official approval of smart Xiangtan construction master plan) (completed in March 2020)</p>	13	<p>XMG shall have issued Xiangtan management rules on integration of ICT platforms to provide details on management rules on the use of centralized server, improve institutional arrangement, provide user-fee calculation methods, regulate data sharing, and strengthen data security.</p> <p>(Document required: XMG to provide the copy of the issued Xiangtan management rules on integration of ICT platforms)</p>
4	<p>XMG shall have issued the Xiangtan framework low-carbon procurement policy to set the goals, principles, institutional arrangements and coordination mechanisms for prioritization and integration of low-carbon procurement in goods and services in government procurement.</p> <p>(Document required: XMG to provide the copy of the issued Xiangtan framework low-carbon procurement policy)</p>	14	<p>XMG shall have issued Xiangtan low-carbon procurement implementing rules, including design of e-procurement system and implementation of required capacity buildings activities.</p> <p>(Document required: XMG to provide the copy of the issued Xiangtan low-carbon procurement implementing rules)</p>
Reform area: Low-Carbon Mobility Systems Enhanced			

	Tranche 1 (prior actions before August 2020)		Tranche 2 (by 24 months from Tranche 1)
5	<p>XMG shall have issued an addendum to the Xiangtan city public transport plan 2014–2030 to implement the bus priority system, create public transport promotion fund, provide capacity building activities to enhance integrated land use and transport planning, and carry out feasibility and appropriateness of implementing demand-driven bus routes.</p> <p>(Document required: XMG to provide the copy of the officially issued addendum to the Xiangtan city public transport specific plan 2014–2030) (completed in April 2020)</p>	15	<p>XMG shall have issued Xiangtan management rules on city-express and neighborhood buses to expand public bus services and introduce demand-driven bus routes and fare operation.</p> <p>(Document required: XMG to provide Xiangtan management rules on city-express and neighborhood buses)</p>
6	<p>XMG shall have issued an addendum to the Xiangtan cycling and pedestrian development specific plan to enhance safer and more comfortable access for pedestrians, better integration between non-motorized transport facilities and public bus facilities, and improve public awareness on active transportation like walking and cycling.</p> <p>(Document required: XMG to provide the copy of the officially issued addendum to the Xiangtan cycling and pedestrian development specific Plan) (completed in March 2020)</p>	16	<p>XMG shall have issued Xiangtan low-carbon sustainable urban road design guidelines that provide design specifications for people-oriented transport infrastructure, including dedicated walk and cycleways, dedicated bus lanes, public transport prioritization, hubs, 150 meter school zones, and enhanced road safety features.</p> <p>(Document required: XMG to provide the copy of the officially issued Xiangtan low-carbon sustainable urban road design guidelines)</p>
7	<p>XMG shall have issued an addendum to Xiangtan regulations on strengthening the management of electric motorbikes to control e-motorbike's speed and regulate the use of e-motorbikes in the area with high volume pedestrians and cyclists and school zones.</p> <p>(Document required: XMG to provide the copy of the officially issued addendum to Xiangtan regulations on strengthening the management of electric motorbikes) (completed in August 2019)</p>	17	<p>XMG shall have issued Xiangtan management rules on electric motorbikes free zones to designate zones to prevent any access to e-motorbikes, develop penalty mechanism, and improve parking facilities nearby the motorbike free zones so to enhance safety of pedestrians and cyclists.</p> <p>(Document required: XMG to provide the copy of the officially issued Xiangtan management rules on electric motorbikes free zones)</p>
8	<p>XMG shall have issued Xiangtan rules on vehicle parking management to introduce vehicle parking management and parking fee.</p> <p>(Document required: XMG to provide the copy of the officially issued Xiangtan rules on vehicle parking management)</p>		
Reform area: Low-Carbon Energy and Building Systems Enhanced			
9	<p>XMG shall have issued the Xiangtan 13th five-year plan comprehensive work program for energy conservation and emission reduction, identifying objectives and priority projects which promote clean and renewable</p>	18	<p>XMG shall have issued Xiangtan management rules on industrial zone autonomy regarding the use of energy and resource to support each industrial zone to create their own management schemes and</p>

	Tranche 1 (prior actions before August 2020)		Tranche 2 (by 24 months from Tranche 1)
	energy technologies, EPC and ESCOs, and green buildings. (Document required: XMG to provide the copy of the issued Xiangtan 13th five-year-plan comprehensive work program for energy conservation and emission reduction) (completed in March 2019)		rules, including mandatory connection to smart energy/utility management system, if available at a zone level (Document required: XMG to provide the copy of the issued Xiangtan management rules on industrial zone autonomy regarding the use of energy and resource)
10	XMG shall have issued Xiangtan implementing rules on the use of concession contracts for developing district energy to provide clear roles and responsibilities of contractors to encourage private investment in energy development and market-based district energy tariff setting. (Document required: XMG to provide the copy of the issued Xiangtan implementing rules on the use of concession contracts for developing district energy) (completed in March 2019)	19	XMG shall have issued Xiangtan management rules on urban centralized energy supply systems (i.e. heating and cooling) that outline key technical specifications and requirements for low-carbon technologies (including waste heat), connection requirements, and consumption-based tariff setting. (Document required: XMG to provide the copy of Xiangtan management rules on urban centralized energy supply systems)
11	XMG shall have issued an addendum to Xiangtan implementing regulations regarding green buildings to promote the use of EPC for public institution buildings' energy efficiency, support local banks to develop green financing products for building energy efficiency, green buildings, and pilot building energy management for public buildings. (Document required: XMG to provide the copy of the issued addendum to Xiangtan implementing regulations regarding green buildings) (completed in March 2020)	20	XMG shall have issued Xiangtan green building management rules to promote quantifiable green buildings certification, EPC and ESCO for building energy efficiency, building energy audit and statistics system. (Document required: XMG to provide the copy of the issued Xiangtan green building management rules)

EbA = ecosystem-based adaptation, EPC = energy performance contracts, ESCO = energy service companies, ICT = information and communication technologies, NMT = non-motorized transport, XMG = Xiangtan Municipal Government.

APPENDIX 4: ENVIRONMENTAL MANAGEMENT PLAN

A. Introduction

1. This Environmental Management Plan (EMP) for the proposed Xiangtan Low-Carbon Transformation Sector Development Program (Xiangtan LCT SDP) in Xiangtan City, Hunan Province, in the People's Republic of China (PRC).
2. The program will have four outputs: (i) low-carbon and resilient infrastructure transformation demonstrated; (ii) information and knowledge platforms established for informed decision making and behavioral changes; (iii) low-carbon transformation policy reforms adopted; and, (iv) capacity building and program management enhanced. Outputs (i), (ii), and (iv) will be under the project loan, while output (iii) will be supported by the policy-based loan. The program's physical works are primarily in output (i) and to a lesser extent output (ii), and are the primary focus of this IEE report.
3. The EMP was report has been prepared based on domestic Feasibility Study Reports (FSRs); technical due diligence reviews of the FSRs undertaken by ADB PPTA technical specialists; additional baseline data collection and analyses undertaken by ADB PPTA technical specialists; site visits and analyses conducted by the ADB PPTA team; ADB review missions discussions and agreements with relevant government agencies; and consultations with affected persons and stakeholders.
4. 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) program compliance with the PRC's relevant environmental laws, standards and regulations and ADB's SPS. Organizational responsibilities and budgets are identified for EMP execution, monitoring and reporting.
5. The EMP is to be implemented in all phases of the program – detailed design, pre-construction, construction, and operation. The EMP will be updated at the end of the detailed design. The final EMP will be disclosed on the ADB public website (www.adb.org) and be included in the project administration manual (PAM).
6. The EMP will also be included as a separate annex in all bidding and contract documents. The contractors will be informed of their obligations to implement the EMP, and to provide for EMP implementation costs in their bids for program works.

B. EMP implementation arrangement

7. The Xiangtan Municipal Government (XMG) will be the program executing agency (EA) and implementing agency (IA). All program procurement will be carried out by XMG and all assets procured and acquired will remain as XMG's properties. The Hunan Provincial Government (HPG) will provide guidance and supervision to the municipal government in project processing and implementation.
8. A project management office (PMO) has been established under the EA to manage the project implementation on a daily basis. The primary responsibilities of the PMO at the project preparation stage include (i) coordination with central/provincial governments, ADB, and related government agencies; (ii) preparing required reports and obtaining approvals from upper level governments/authorities; (iii) organizing project preparation activities, like consultant recruitment and report preparation (project proposal, feasibility studies, land acquisition and resettlement

plan, environment and social assessments, etc.); and, (iv) arranging project implementation.

9. During implementation, the PMO will be responsible for (i) coordination among central/provincial governments, ADB, the EA, and related government agencies and entities; (ii) implementation planning, arrangement, and quality control; (iii) loan disbursement and financial management; (iv) compliance of environment and social safeguards; and, (v) procurement and contract management including supervision of contractors and construction supervision company (CSC).

10. The PMO will be led by the Secretary General of the XMG. It will be suitably staffed, including a full-time qualified **Environment and Safety Officer (PMO ESO)**, who will take overall responsibility for supervising the implementation of environment mitigation measures, coordinating the project level GRM and preparing monitoring reports for submission by the IA to ADB. The PMO will include representatives from the XMG and the private sector:

- Transportation Bureau
- Housing, Urban and Rural Construction Bureau
- Water Conservation Bureau
- Ecology and Environment Bureau
- Municipal Health Commission
- Municipal Big Data Center
- Jiuhua Industrial Zone.

11. A **Project Management Consultant (PMC)** will be provided to support the PMO in project management, technical support, safeguards policy compliance and monitoring, social development and gender action plan and communication strategy implementation.

12. The PMC will include a **Loan Implementation Environmental Consultant (LIEC)**, a part-time national environmental, health and safety specialist, who will support the PMO in mitigation implementation, environmental monitoring, reporting, and addressing any environment related issues that arise including grievances. The LIEC will also support contractors in developing site-specific Construction Environmental Management Plans (CEMPs) prior to construction and operation.

13. A qualified **Construction Supervision Company** will be responsible for supervising and guiding construction contractors during project construction phase. The CSC will have a qualified Health, Safety and Environment Supervision Engineer who will be responsible for supervising construction contractors to ensure proper the implementation of EMP and CEMPs; and preparing and submitting consolidated quarterly environmental monitoring reports to the PMO based on the CEMPs implementation.

14. A qualified 3rd party **Environmental Monitoring Company** will be engaged by the IA to undertake construction and operation phase ambient environmental monitoring, as per the requirements of the Environmental Monitoring Plan (EMoP) presented in this EMP.

15. **Construction Contractors** will be responsible for implementing the mitigation measures during construction under supervision of the IA and the PMO. In their bids the contractors will prepare CEMPs which detail the means by which the contractors will comply with the EMP. Each contractor will identify a lead focal point for environmental issues (e.g. Environment, Health and Safety Officer), who will oversee CEMP implementation, take all reasonable measures to minimize the impact of construction activities on the environment, develop and prepare monthly reports for submission to the IA. Contractors are also required to report any spills, near misses, accidents, and grievances received, and take appropriate action. The Environment, Health and Safety Officer will also be responsible for developing CEMPs and an Occupational Health and

Safety Plan (OHSP).

16. **ADB** will conduct environmental compliance review of the project during project review missions. ADB will also review and perform quality control on the annual environmental monitoring reports submitted by the PMO and will disclose the reports on its website. If the PMO fails to meet safeguards requirements described in the EMP, ADB will seek corrective measures and advise the EA/IA on items in need of follow-up actions.

17. The project implementing agencies and their roles and responsibilities for the EMP are presented in Table 1. The project implementation arrangement chart is presented in Figure 1.

Table 1: Agencies involved in implementation of the project EMP

Organization	Role and Responsibility for the EMP
Xiangtan Municipal Government (XMG)	- The project executing agency (EA) implementing agency (IA), and project contact point for ADB. Responsible for overall implementation and compliance with loan assurances and the EMP.
Project Management Office (PMO)	- Responsibilities at the project preparation stage include (i) coordination with central/provincial governments, ADB, and related government agencies; (ii) preparing required reports and obtaining approvals from upper level governments/authorities; (iii) organizing project preparation activities, like consultant recruitment and report preparation (project proposal, feasibility studies, land acquisition and resettlement plan, environment and social assessments, etc.); and, (iv) arranging project implementation. - Responsibilities at implementation include: (i) coordination among central/provincial governments, ADB, the EA, and related government agencies and entities; (ii) implementation planning, arrangement, and quality control; (iii) loan disbursement and financial management; (iv) compliance of environment and social safeguards; (v) procurement and contract management; and (iv) direct implementation of some project subcomponents.
Implementation Consultants (Project Management Company-PMC)	- Will assist the PMO in day to day activities of the project including project management, construction supervision, capacity building program implementation, and financial auditing.
Loan Implementation Environmental Consultant (LIEC), under PMC	- Review the updated IEE and EMP. - Confirm that mitigation measures have been included in detailed engineering design. - Review bidding documents to ensure that the EMP clauses are incorporated. - Review CEMPs to ensure compliance with the EMP. - Provide technical assistance and support to the PMO and contractors on mitigation measures and EMP implementation. - Deliver the construction and operation phase capacity building programs to the staff of the IA, PMO, and contractors. - Conduct site inspections in compliance with the environmental monitoring plan. - Review reports prepared by contractors and the EM, and assist the PMO in preparing annual environmental monitoring reports.
Environmental Monitoring Company	- Qualified local environmental monitoring company, recruited to implement the ambient monitoring portion of the environmental monitoring plan.
CSC	- Responsible for supervising and guiding construction contractors during project construction phase. - The CSC will have a qualified Environmental Supervision Engineer who will be responsible for supervising construction contractors to ensure proper the implementation of EMP and CEMPs; and preparing and submitting consolidated quarterly environmental monitoring reports to the PMO based on the CEMPs implementation
Contractors	- Ensure sufficient funding and human resources for proper and timely implementation of required mitigation and monitoring measures in the EMP throughout the construction phase. - Prepare CEMP(s) prior to the construction commencement. - Appoint an environment, health and safety (EHS) officer to oversee EMP implementation related to environment, occupational health and safety on construction site - Ensure health and safety

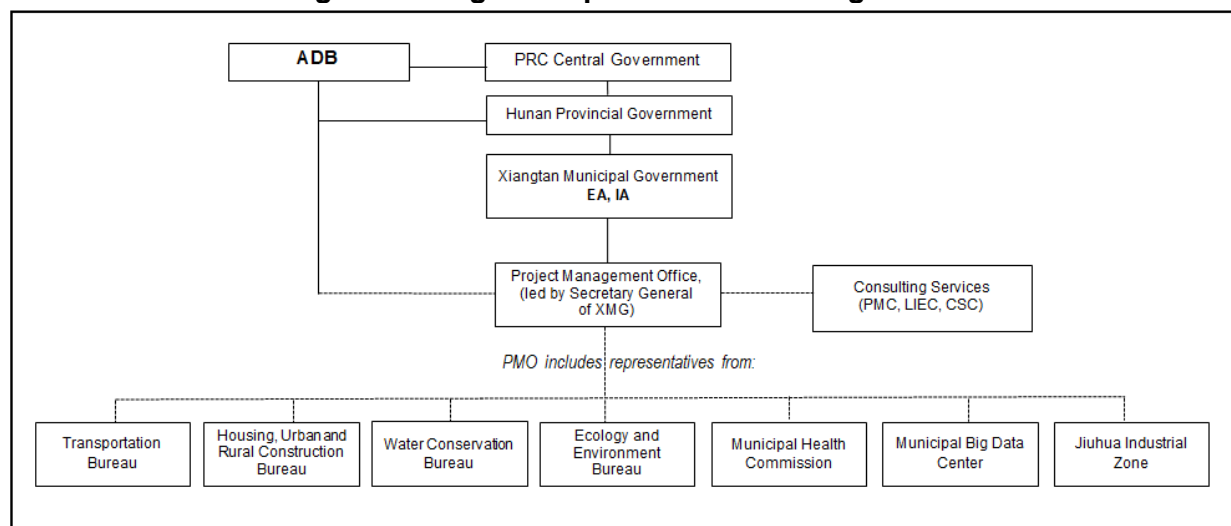
Organization	Role and Responsibility for the EMP
	<ul style="list-style-type: none"> - Implement mitigation measures - Act as a local entry point for the project GRM
XEEB	<ul style="list-style-type: none"> - Review and approve EIT (when available) - Review project monitoring results at their discretion. - Conduct periodic monitoring and inspections at their discretion. - Conduct acceptance inspections on completion of the project.
ADB	<ul style="list-style-type: none"> - Review and approve the IEE and EMP and disclose on ADB website. - Approve updated IEE/EMP, and disclose on ADB website - Provide guidance to the executing and implementing agencies. - Conducting review missions. - Monitoring status of compliance with loan and project covenants, including safeguards. - Regularly updating the project performance review reports with the assistance of executing and implementing agencies. and - Regularly updating the project information documents for public disclosure at ADB web site, including the safeguards documents.

C. Potential Impacts and Mitigation Measures

18. Potential impacts of the program during each phase have been identified and appropriate mitigation measures developed (Section V of the project IEE) in accordance with PRC requirements and the *EHS Guidelines*. Potential impacts and the mitigation measures are presented in Table 2.

19. The mitigation measures defined in the EMP will be (i) checked and, where necessary, updated during detailed design and other project implementation stages (see Section J. Mechanisms for Feedback and Adjustment); (ii) incorporated into tender documents (where appropriate), construction contracts, and O&M manuals; and (iii) implemented by contractors under supervision of the PMO. The effectiveness of these measures will be evaluated based on the results of the compliance inspections undertaken by the PMO ESO and LIEC and environmental quality monitoring conducted by a qualified environmental monitoring company.

Figure 1: Program implementation arrangements



ADB = Asian Development Bank, CSC = construction supervision consultants, LIEC = Loan Implementation Environmental Consultant, PMC = project management consultants, PMO = project management office, XMG = Xiangtan Municipal Government.

Source: ADB PPTA consultant, 2020

Table 2: Potential impacts and mitigation measures

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
Pre-Construction Phase					
Sensitive receptors			- Carry out verification, confirmation and record of any changes in sensitive receptors prior to the start of construction.	PMO, LIEC	EA
Institutional strengthening	Human Resources	Lack of environment management capacity within PMO	Recruitment, including:	PMO	EA, ADB
			- appointment of a qualified Environment and Safety Officer (PMO ESO) within the PMO; - contracting of an external Loan Implementation Environmental Consultant (LIEC) by the IA (as part of the PMC); and - contracting of a qualified 3rd party Environmental Monitoring Company by the IA to conduct environmental quality monitoring.		
			Capacity Building:	LIEC	EA, ADB
			- Prior to the start of construction, the institutional strengthening and training program will be delivered by the LIEC (Table A-7).		
GRM	Program Affected Persons (APs)	Inadequate complaint mechanisms	- The PMO ESO will assume overall responsibility for the GRM. - GRM training will be provided for PMO members and GRM access points. - The PMO will issue public notices to inform the public within the project area of the GRM, and contact information (GRM website address, PMO address and telephone number, PMO contact point email address) for the PMO and local entry points (e.g. contractors) will be disseminated at all major access points. - PMO ESO will develop and maintain a Complaints Register to document all complaints.	PMO	EA, ADB
EMP update	Revised project detailed design	Out of date EMP/IEE	- Review mitigation measures defined in this EMP and the EMoP, and update to reflect detailed design. - Any changes in sensitive receptors to the project will be checked, and the sensitive receptors tables will be updated in the IEE or as an addendum to the IEE to reflect any significant changes. - Submit to ADB for approval, and disclose updated IE/EMP on ADB website.	EIA Institute, PMO, LIEC,	EA, ADB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
	Sensitive receptors	As Xiangtan is undergoing massive new urban development, sensitive receptors may change overtime	- Any changes in sensitive receptors to the program shall be checked, and the sensitive receptors tables will be updated in the IEE or as an addendum to the IEE to reflect any significant changes.	EIA Institute, PMO, LIEC,	EA, ADB
Tender documents	Various	Various	- All EMP obligations will be included in tender documents and will explicitly reference the EMP and EMoP.	PMO, LIEC	EA, ADB
Construction Phase					
			- Sensitive receptors	PMO, LIEC	EA
Good construction site soil management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Soil resources	Spoil erosion and spoil management	<ul style="list-style-type: none"> - At each construction site the potential for storm water runoff will be assessed and appropriate storm water drainage systems to minimize soil erosion will be implemented, including perimeter bunds and establishment of temporary detention and settling ponds to control topsoil runoff. - Land excavation and filling will be balanced so as minimize the requirement for fill transportation. - During earthworks the area of soil exposed to potential erosion at any one time will be minimized through good project and construction management. - Topsoil will be stripped and stored in a stockpile for reuse in restoration. - Temporary spoil storage sites will be identified, designed, and operated to minimize impacts. Spoil sites will be restored at the conclusion of storage activities. - Spoil will be reused on-site to the maximum extent feasible as fill. - Excess spoil that cannot be used on-site will be transported to a spoil disposal site approved by designated by Xiangtan Civil Affairs Bureau. - Spoil and aggregate piles will be covered with landscape material and/or regularly watered. - Waste construction material such as residual concrete, 	Contractors	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p>asphalt, etc. will be properly handled for re-use or disposal.</p> <ul style="list-style-type: none"> - Construction and material handling activities will be limited or halted during periods of rains and high winds. - 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 revegetated. To the extent possible and practical, selected plant species will be (a) native (i.e. naturally occurring) to Guizhou province; (b) sourced from local stock within Guizhou province. No species listed on the PRC's "Database of Invasive Alien Species" (http://www.chinaias.cn) will be permitted. - Conduct project completion audit to confirm that spoil disposal site rehabilitation meets required standard, hold contractor liable in case of non-compliance. 		
Good construction site air quality management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Air quality	Dust (TSP) during construction	<ul style="list-style-type: none"> - Transport routes and delivery schedules will be planned to avoid densely populated and sensitive areas, and high traffic times. - Trucks transporting earth materials will be equipped with covers or tarpaulin, and will not be overloaded. Fine materials will be transported in fully contained trucks. - Vehicles will maintain legal speeds while on public roads, and low speeds while on construction sites. - Muddy or dusty materials on public roads outside the exits of works areas will be cleaned immediately. - Water will be sprayed on sites with the potential to cause fugitive dust including unpaved areas, backfill areas and unpaved haul roads, as necessary. - Construction piles (spoil, aggregate other construction materials) with the potential to generate dust will be covered and/or watered if necessary. Powdered materials such as cement and lime will be stored in sealed bags or containers. - Particular attention will be paid to dust suppression near sensitive receptors identified in the IEE such as schools, hospitals, and residential areas. - Construction and material handling activities will be 	Contractors	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p>limited or halted during periods of high winds if nuisance dusts are being generated.</p> <ul style="list-style-type: none"> - Vehicles and equipment will be properly maintained and will use quality fuels. - Asphalt and concrete will be purchased commercially, with no need for mixing on site. - On-site burning of wastes is prohibited. - Disturbed sites will be revegetated as soon as possible after the completion of works. 		
Good construction site noise management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Noise	Noise from Powered Mechanical Equipment (PME) and vehicles	<ul style="list-style-type: none"> - Construction and renovation activities will be planned in consultation with local authorities and local communities so that activities with the greatest potential to generate noise and vibration are planned during periods of the day that will result in the least disturbance. - Multiple high-noise activities will be avoided to the extent practical near sensitive sites identified in the IEE. - Construction sites will have sound attenuating fences. - Sensitive sites will be protected with temporary sound barriers during high noise activities such that WHO guidelines are achieved. - Construction is not prohibited between the hours of 22:00 and 06:00 and 12:00 to 14:00. If circumstance requires construction during those times: <ul style="list-style-type: none"> - approval should be obtained from the local environment department; and, - nearby residents should be notified in advance. - Low-noise equipment that conforms to PRC noise standard GB12523-2011 will be selected as much as possible. - Equipment and machinery 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 personnel protective equipment (PPE) will be provided to workers in accordance with the PRC Labor Law (1994), Occupational Disease Prevention and Control Law (2001 and other relevant requirements, and the <i>EHS Guidelines</i> health and safety requirements. 	Contractors	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<ul style="list-style-type: none"> - 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. - Construction phase noise monitoring will be undertaken at sensitive sites and compared to WHO guidelines, and mitigation measures will be adjusted if necessary based on the monitoring results. 	3rd party qualified environmental monitoring company	PMO, XEEB
Good construction site water quality management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Water quality	Pollution of adjacent water resources	<ul style="list-style-type: none"> - Sufficient portable toilets will be provided for the workers (at minimum 1 per every 10 males, and 2 per every 10 females) and will be cleaned and discharged to the municipal sewerage system on a regular basis - Construction wastewater from each site will be directed to temporary detention and settling ponds or tanks, and then treated water will be recycled for use in dust control. - All necessary measures will be undertaken to prevent construction materials and waste from entering drains and water bodies. - Maintenance of construction equipment and vehicles will not be allowed on sites so as to reduce wastewater generation. 	Contractors	PMO, LIEC, CSC
Good construction site solid waste management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Solid waste	Construction and demolition (C&D) waste and domestic refuse	<ul style="list-style-type: none"> - C&D wastes will be reused or recycled to the extent possible. Existing building rubble at bus and charging stations sites (where relevant) will be tested and either reused as fill if appropriate or treated as hazardous if testing so indicates. Sites will be excavated and resurfaced with clean fill in accordance with relevant PRC regulations and <i>EHS Guidelines</i>. If assessment determines any hazardous wastes are present they will be collected and disposed at a sanitary landfill in an appropriate manner. - C&D waste dumpsters will be provided at all work sites. C&D 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 	Contractors, Waste Management Companies	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p>requirements.</p> <ul style="list-style-type: none"> - Littering by workers will be prohibited. - Domestic waste containers will be provided at all work sites. Domestic waste will be collected on a regular basis by the local sanitation departments and transported for recycling, reuse, or disposal at a licensed landfill, in accordance with relevant PRC regulations and requirements. - 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. 		
Good construction site hazardous waste management practices in accordance with PRC requirements and <i>EHS Guidelines</i>	Hazardous materials	Soil, surface and groundwater contamination	<p>Good waste management practices implemented:</p> <ul style="list-style-type: none"> - Storage facilities for fuels, oil, chemicals and other hazardous materials will be within secured areas on impermeable surfaces provided with dikes with a storage capacity of at least 110% of the capacity of the hazardous materials stored, and at least 300 m from drainage structures, important water bodies and other sensitive receptors identified in the IEE. - In addition, storage facilities will be required to be in compliance with <i>Standard for Pollution Control on Hazardous Waste Storage (GB18597-2001)</i> and the No. 36 Announcement of the Ministry of Environmental Protection in 2013 "Announcement on Issuing the Modification List of <i>Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes (GB18599-2001)</i> and Two Other National Pollutant Control Standards". - Signs will be placed at chemicals and hazardous materials storage sites to provide information on type and name of chemicals and hazardous materials. - Suppliers of chemicals and hazardous materials must hold proper licenses and follow all relevant protocols and PRC regulations and requirements. - A spill and environmental emergency response plan will be developed in accordance with <i>Management Method</i> 	Contractors, Suppliers	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p><i>of Enterprises and institutions for Filing of Emergency Plans for Environmental Incidents (Trial)</i>, including:</p> <ul style="list-style-type: none"> - Maintaining a stock of absorbent materials (e.g. sand, earth or commercial products) on site to deal with spillages and training staff in their use. - If there is a spill take immediate action to prevent entering drains, watercourses, unmade ground or porous surfaces. Do not hose the spillage down or use any detergents use oil absorbents and dispose of used absorbents at a waste management facility. - Record any spill events and actions taken in environmental monitoring logs and report to PMO and LIEC. - Asbestos response procedure: <ul style="list-style-type: none"> - If materials containing asbestos are encountered, the contractor's Environment, Health and Safety Officer PMO ESO should be alerted. - A qualified asbestos removal specialist should be hired to dispose of the asbestos materials before beginning any other work. Workers are prohibited from working with, or disposing, asbestos materials. - Vehicles and equipment will be properly maintained and refueled either off-site in local garages or other similar facilities. Washing or repair of machinery in or near surface waters is prohibited. 		
Good construction site ecological protection and enhancement in accordance with PRC requirements and <i>EHS Guidelines</i>	Ecology	Protection of vegetation and restoration of disturbed areas	<ul style="list-style-type: none"> - Access roads to stations must not traverse any forested areas. - Green landscaping will be implemented at bus stations and along roads as per the revegetation and EbA requirements in the FSRs. To the extent possible and practical, selected plant species will be (a) native (i.e. naturally occurring) to Hunan Province; (b) sourced from local stock within Guizhou province. No species listed on the PRC's "Database of Invasive Alien Species" (http://www.chinaiaas.cn) will be permitted. 	Contractors	PMO, LIEC, CSC
Good construction site PCR protection in	Physical cultural	Destruction of cultural relics	Training will be provided by the LIEC on what constitutes as a PCR, and the Chance Find Procedure.	LIEC	PMO

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
accordance with PRC requirements and <i>EHS Guidelines</i>	resources (PCRs)		Chance find procedure: <ul style="list-style-type: none"> - Construction activities will be immediately suspended if any PCRs are encountered. - Destroying, damaging, defacing, or concealing PCRs will be strictly prohibited. - The local Cultural Heritage Bureau will be promptly informed and consulted. - Construction activities will resume only after thorough investigation and with the permission of the local Cultural Heritage Bureau. 	Contractor	PMO, LIEC, CSC, Cultural Heritage Bureau
Good construction site Health and Safety in accordance with PRC requirements and <i>EHS Guidelines</i>	Occupational health and safety (OHS)	OHS Planning	<ul style="list-style-type: none"> - The contractor's Environment, Health and Safety Officer will undertake a risk assessment and develop and implement an Occupational Health and Safety Plan (OHSP) to address the risk, maintain records concerning health, safety and welfare and regularly report on accidents, incidents and near misses. The OHSP will be reviewed and approved by the LIEC and PMO. - The OHSP will provide adequate precautions to protect the health and safety of their workers. 	Contractor	PMO, LIEC, CSC
		Construction site sanitation	<ul style="list-style-type: none"> - Sites will be effectively cleaned. Wastes will be removed on a regular basis in accordance with waste management mitigation measures (above). - A clean and sufficient supply of fresh, potable water that has been certified as being in compliance with PRC drinking water standards will be supplied to all work sites. An adequate number of latrines workers (at minimum 1 per every 10 males, and 2 per every 10 females) and other sanitary arrangements will be provided at all work sites and cleaned and maintained in a hygienic state, in accordance with water quality mitigation measures (above). 	Contractor	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
		Occupational safety	<ul style="list-style-type: none"> - Workers will be provided with appropriate personal protective equipment (PPE) to workers to minimize risks, including: <ul style="list-style-type: none"> - Safety hats and safety shoes to all construction workers; - Safety goggles and respiratory masks to workers doing asphalt road paving; - Ear plugs to workers working near noisy PME. - Other PPE as required 	Contractor	PMO, LIEC, CSC
		Electrical safety	<ul style="list-style-type: none"> - Electrical safety risks will be assessed and safety protocols developed. 	Contractor	PMO, LIEC, CSC
		Traffic safety	<ul style="list-style-type: none"> - Provide appropriate safety barriers and warning signs to ensure safety of existing traffic and workers on roads. 	Contractor	PMO, LIEC, CSC
		Worker Accommodation	<ul style="list-style-type: none"> - No worker camps will be constructed. - Workers will be housed on existing off-site accommodations in accordance with in accordance with IFC/EBRD worker accommodation guidance 	Contractor	PMO, LIEC, CSC
		Medical emergency response	<ul style="list-style-type: none"> - Response procedures will be developed covering both workers and community members (when affected by project related activities), including: communication systems and protocols for interaction with local and regional emergency response providers, first aid equipment on site, contact information for the nearest ambulance and medical facilities, training for workers on initial on-site emerge response, protocols for informing and transferring injured workers to local or provincial health centers, and record keeping. - At least one trained first-aid worker will be available at each construction site. 	Contractor	PMO, LIEC, CSC
		Emergency response	<ul style="list-style-type: none"> - Emergency response procedures will be developed, including communication systems and protocols for interaction with local and regional emergency response providers, protocols for shutting down power, firefighting response procedures, provision of appropriate firefighting equipment, training for workers on fire response, and record keeping. 	Contractor	PMO, LIEC, CSC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
		Training	<ul style="list-style-type: none"> - An OHS manual will be prepared and disseminated to workers, and training will be provided to workers in all aspects of the OHS plan prior to the start of construction and on a regular basis (e.g. monthly). - No work will be allowed at dangerous heights or with electrical equipment until adequate training in that activity has been provided. 	Contractor, LIEC	PMO
	Community health and safety	Temporary traffic management	<ul style="list-style-type: none"> - A traffic control and operation plan will be prepared together with the local traffic management authority prior to any construction. The plan shall include provisions for diverting or scheduling construction traffic to avoid morning and afternoon peak traffic hours, regulating traffic at road crossings with an emphasis on ensuring public safety through clear signs, controls and planning in advance. 	Contractor, local traffic police, PMO	PMO, LIEC, CSC
		Information disclosure	<ul style="list-style-type: none"> - Residents and businesses will be informed in advance through publicity about the construction activities and provided with the dates and duration of expected disruption. 	Contractor	PMO, LIEC, CSC
		Prohibit access to construction sites	<ul style="list-style-type: none"> - Clear signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials, excavations etc., and raising awareness on safety issues. - All sites will be made secure, discouraging access by members of the public through fencing, barriers or security personnel, as appropriate. 	Contractor	PMO, LIEC, CSC
Operational Phase					
		Sensitive receptors	<ul style="list-style-type: none"> - Carry out annual assessment, verification, confirmation and record of any changes in sensitive receptors 	PMO, LIEC	EA
Storm water management in accordance with PRC requirements and <i>EHS Guidelines</i>	Roads, e-charging stations, multi-modal stations, buildings	Water and soil pollution Flooding, including from climate change	<ul style="list-style-type: none"> - Fuxing Middle Road will have innovative EbA measures to collect and treat storm water. A drainage system will collect all rainwater from roads, parking lots, sidewalks, etc. The drainage system will be sized to be able to collect even high intensity rainfall events induced by climate change. Runoff will be treated in bio-retention facilities, located in the green belts along both sides of the roads. These facilities are designed to remove contaminants and sediments from storm water runoff 	Facility operators	PMO, XEEB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<ul style="list-style-type: none"> utilizing grass buffer strips, sand beds, ponding areas, organic or mulch-layer, and soil and plants. - The hospital will be equipped with extensive EbA facilities to collect, treat and store all stormwater. - The potential effects of increased flooding due to climate change will be considered in siting the locations of important facilities and water-proofing program components including electrical equipment. - Existing buildings that are renovated and the multi-modal stations will be connected to the existing Xiangtan stormwater system. - E-charging stations will be equipped with drainage systems. Runoff will be directed to on-site oil-water separators, and then discharged to the municipal stormwater system. 		
Wastewater and sewage management in accordance with PRC requirements and <i>EHS Guidelines</i>	Multi-modal stations, buildings	Water and soil pollution	<ul style="list-style-type: none"> - All wastewater and sewage generated in program buildings or multi-modal stations will be discharged to the municipal sewage system and treated in one of two municipal Waste Water Treatment Plants (WWTPs). - The final discharge from municipal WWTPs will be required to meet <i>the Level III limit in Integrated Wastewater Discharge Standard (GB8979-1996)</i>. 	Bus station operator	PMO, XEEB
Air quality protection in accordance with PRC requirements including and <i>EHS Guidelines</i>	Program Roads and Bus Lines	Vehicle Emissions	<ul style="list-style-type: none"> - Operation of the priority bus system along with associated - Zero emission BEBs will replace exiting - Vehicles in the area will be required to comply with relevant PRC emission standards, including <i>Limits and Measurement Methods for Emissions from Light-duty Vehicles (China Stage III and IV) (GB18352.3-2005)</i>. - The ambient air quality at the roads will be required to meet <i>the Level II limit in Environmental Air Quality Standard (GB3095-2012)</i>. - Air quality monitoring will be undertaken at adjacent sensitive receptors, and if not in compliance with WHO AQGs additional measures will be investigated and implemented. 	Relevant authorities 3rd party qualified environmental monitoring company	PMO, XEEB
	Multi-modal Train Stations	Automotive Emissions	<ul style="list-style-type: none"> - No increase in emissions is anticipated as the vehicles using these facilities are existing loads for the stations. Instead, it is predicted that there will be a decrease in emissions as more passengers 	Station operator	PMO, XEEB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p>will be able to use public transport as opposed to taxis and private cars, and the more efficient layout and car and taxi loading / unloading processes will result in reduced waiting and idling times, therefore reducing associated emissions.</p> <ul style="list-style-type: none"> - Air quality monitoring will be undertaken at adjacent sensitive receptors, and if not in compliance with WHO AQGs additional measures will be investigated and implemented. 	3rd party qualified environmental monitoring company	PMO, XEEB
	CCHP Operation at Xiangtan First Traditional Chinese Medicine Hospital	CCHP Emissions	<p>Hospital will be EDGE certified, including:</p> <ul style="list-style-type: none"> - Low NOx natural gas boilers with less than 100 mg/m³ NOx emissions (exceeds PRC Emission Standards of Air Pollutants for Coal-burning, Oil-burning, Gas-fired Boilers GB 13217-2014), and the 2007 EHS Guidelines of 240 mg/m³ for boilers). - A DeNOx system (Selective Non-Catalytic Reduction or SNCR) will be installed on the gas engine to ensure NOx emissions are less than 30 mg/Nm³ - Considering the overall energy saving of 5771.65 MWh/year estimated in the EDGE certification, the overall emission from the hospital will be reduced versus the baseline situation. - Air quality monitoring will be undertaken at adjacent sensitive receptors, and if not in compliance with WHO AQGs additional measures will be investigated and implemented. 	Hospital operator	PMO, XEEB
Noise control in accordance with PRC requirements and <i>EHS Guidelines</i>	Program Roads and Bus Lines	Noise impacts	<ul style="list-style-type: none"> - It is predicted that there will be a decrease in noise compared to the base line as more passengers will be able to use low noise BEB public transport as opposed to noisier gas-fired buses, taxis and private cars. In addition, operation of the ITS system is expected to improve the overall efficiency of traffic system, and reduce low-speed traffic flows or traffic jams. - Noise monitoring will be undertaken at adjacent receptors, and if required sound barriers (or additional barriers) will be put in place to ensure actual noise level compliance with WHO guidelines 	Road operators	PMO, XEEB
				3rd party environmental monitoring agency	PMO, XEEB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
	E-charging Stations	Noise impacts	<ul style="list-style-type: none"> - Use of horns while in or entering or leaving the station will be prohibited, and idling of engines will not be allowed. - Low-noise equipment, will be selected where possible. - Noisy equipment will be installed in sound insulated equipment rooms, and building wall will also be sound insulated. - Evergreen vegetation will be planted around stations to act as noise barriers. - Noise at site boundary will be in compliance with GB12348-2008 Noise Standards for Industrial Enterprises at Site Boundary. - Sound barriers will be installed between charging stations and any adjacent sensitive receptors. - Noise monitoring will be undertaken at adjacent receptors, and if required sound barriers will be put in place to ensure actual noise level compliance with WHO guidelines 	Charging station operator	PMO, XEEB
Waste management in accordance with PRC requirements and <i>EHS Guidelines</i>	Program Roads, Bus Lines, E-charging Stations	Inappropriate domestic waste disposal	<ul style="list-style-type: none"> - Program roads and bus lines will be equipped with appropriate garbage and recycling containers installed every 80 to 100 m. - E-charging stations will be equipped with appropriate garbage and recycling containers. - Domestic garbage and recyclables will be collected on a regular basis. Recyclables will be collected by an appropriate recycling facility and garbage by the local sanitation department for disposal at a municipal solid waste landfill. 	Road operators, e-charging station operator, Xiangtan Sanitation Department, Recycling companies	PMO, XEEB
	Non-functional buses due to age or damage	Inappropriate scrapping and/or recycling	<ul style="list-style-type: none"> - Non-functional buses, either program buses or existing buses which program buses replace, will be recycled to the maximum extent possible. - The XMG, as the owner and operator of the BEBs, will be responsible for overseeing vehicle scrapping and recycling. They will entrust the procedure to a nationally certified vehicle write-off company who will be responsible for all aspects of vehicle scrapping and recycling including collection, remanufacturing of allowed components if suitable (engine assembly, steering assembly, transmission assembly, front and 	XMG	PMO, XEEB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			rear axles, and frame), and recycling of components that cannot be remanufactured, in accordance with relevant PRC regulations, including the <i>Regulations on Vehicle Recycling Management</i> .		
Hazardous waste management in accordance with PRC requirements and <i>EHS Guidelines</i>	Hazardous materials and waste at charging stations and other project facilities	<p>Fuels, oil, chemicals and other hazardous materials</p> <p>New and waste batteries</p> <p>Lubricating oil and grease (O&G)</p>	<ul style="list-style-type: none"> - Storage facilities for fuels, oil, chemicals and other hazardous materials will be stored within a secured weatherproof facility on impermeable surfaces provided (impervious concrete, a clay layer at least 1m in thickness (permeability coefficient $\leq 10^{-7}$cm/s), high density polyethylene 2mm in thickness, or other artificial materials at least 2mm in thickness (permeability coefficient $\leq 10^{-10}$cm/s), with a storage capacity of at least 110% of the capacity of the hazardous materials stored (10 m³), and at least 300 m from drainage structures, important water bodies and other sensitive receptors identified in the IEE. - Hazardous wastes shall be put in labeled containers and then placed in vented cabinets or containers. Incompatible hazardous wastes shall be stored separately or in areas separated by impermeable partitions. - A standalone site within each storage facility will be designated for hazardous wastes including scrap batteries - In addition, storage facilities will be required to be in compliance with <i>Standard for Pollution Control on Hazardous Waste Storage (GB18597-2001)</i> and the No. 36 Announcement of the Ministry of Environmental Protection in 2013 "Announcement on Issuing the Modification List of <i>Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes (GB18599-2001)</i> and Two Other National Pollutant Control Standards". - Signs will be placed at chemicals and hazardous materials storage sites to provide information on type and name of chemicals and hazardous materials. - Suppliers of chemicals and hazardous materials must hold proper licenses and follow all relevant protocols and PRC regulations and requirements. 	O&M units, battery providers, qualified waste battery and lubricating oil recycling companies	PMO, XEEB

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<ul style="list-style-type: none"> - A spill and environmental emergency response plan will be developed in accordance with <i>Management Method of Enterprises and institutions for Filing of Emergency Plans for Environmental Incidents (Trial)</i>, including: <ul style="list-style-type: none"> - Maintaining a stock of absorbent materials (e.g. sand, earth or commercial products) on site to deal with spillages and training staff in their use. - If there is a spill take immediate action to prevent entering drains, watercourses, unmade ground or porous surfaces. Do not hose the spillage down or use any detergents use oil absorbents and dispose of used absorbents at a waste management facility. - Record any spill events and actions taken in environmental monitoring logs and report to PMO and LIEC. - Licensed companies will be hired to collect, transport, and dispose hazardous materials in accordance with relevant PRC regulations and requirements. Hazardous wastes will only be disposed at nationally or provincially licensed hazardous waste facilities. <ul style="list-style-type: none"> - When a battery capacity is lower than 80%, it will no longer be used on buses. It will be moved to a battery cluster within the bus stations to provide electricity for slow chargers working in the night time. When capacity is too low to function in that manner, they will be recycled. - Battery providers will be responsible for collection, recycling (or reuse again if possible) of batteries on a regular basis in compliance with - In compliance relevant PRC regulations, including <i>Interim Measures for the Management of Recycling and Utilization of Power Batteries for New Energy Vehicles</i>, (2018, Ministry of Industry and Information Technology (MIIT) and six other authorities) and <i>Interim Provisions on the Management of Traceability of Recycling and Utilization of New Energy Vehicles</i>, (MIIT, 2018), battery providers will be responsible for collection, 		

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<p>recycling (or reuse again if possible) of batteries. Battery providers will also be required to have a "traceability" system that enables the identification of owners of discarded batteries, and easily dismantled product designs to help automate the recycling process.</p> <ul style="list-style-type: none"> - Qualified companies will collect and properly disposal waste O&G, and sludge from the oil-water separators on a regular basis in compliance with all relevant PRC regulations. 		
	Hospital	Medical wastes	<ul style="list-style-type: none"> - Medical wastes will be treated as hazardous waste as per HW01 in "<i>Directory of National Hazardous Wastes (2016 Revision)</i>", and will be collected and to transferred to Zhuzhou City for centralized incineration. The process will be managed by <i>Xiangtan Medical Waste Handling Center Co., Ltd.</i> - Collection and transport to Zhuzhou City will be managed by the <i>Zhuzhou Zhongcheng Medical Waste Transportation Co., Ltd.</i> - The waste incineration company is qualified and supervised by Zhuzhou Municipality. - The Xiangtan First Traditional Chinese Medicine Hospital will establish records for hazardous waste management to monitor generation and collection, and to ensure compliance with the hazardous waste handling management, and relevant PRC legislation. 	Xiangtan First Traditional Chinese Medicine Hospital, qualified medical waste management, transport and incineration companies	PMO, XEEB
Worker safety in accordance with PRC requirements and <i>EHS Guidelines</i>	Occupational health and safety (OHS)	OHS Planning	<ul style="list-style-type: none"> - EHSO will undertake a risk assessment and implement an Occupational Health and Safety Plan (OHSP) to address the risks, maintain records concerning health, safety and welfare and regularly report on accidents, incidents and near misses. - The OHSP will provide adequate precautions to protect the health and safety of their workers, including but not necessarily limited to sanitation, including waste removal and provision of potable water and sanitation facilities; occupational safety, including provision of appropriate personal protective equipment (PPE) such as safety hats, shoes, goggles, ear plugs and respiratory masks; electrical safety; traffic safety; emergency response, including procedures for medical, fire and other 	EHSO	PMO, LIEC

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			emergencies; and training in accordance with <i>EHS Guidelines</i> . The OHSP will be reviewed and approved by the LIEC and PMO.		
	Emergency Response	Medical emergency response	<ul style="list-style-type: none"> - Response procedures will be developed covering both workers and community members (when affected by project related activities), including: communication systems and protocols for interaction with local and regional emergency response providers, first aid equipment on site, contact information for the nearest ambulance and medical facilities, training for workers on initial on-site emergency response, protocols for informing and transferring injured workers to local or provincial health centers, and record keeping. - At least one trained first-aid worker will be available at each construction site. 	PMO, LIEC	EA
		Emergency response	<ul style="list-style-type: none"> - Emergency response procedures will be developed, including communication systems and protocols for interaction with local and regional emergency response providers, protocols for shutting down power, firefighting response procedures, provision of appropriate firefighting equipment, training for workers on fire response, and record keeping. 	PMO, LIEC	EA
		Training	<ul style="list-style-type: none"> - An OHS manual in accordance with <i>EHS Guidelines</i> will be prepared and disseminated to workers, and training will be provided to workers in all aspects of the OHS plan prior to the start of construction and on a regular basis (e.g. monthly). - No work will be allowed at dangerous heights or with electrical equipment until adequate training in that activity has been provided. 	PMO, LIEC	EA
Traffic safety in accordance with PRC requirements and <i>EHS Guidelines</i>	Bus, car and other vehicular traffic	Low noise BEBs pose a risk to pedestrian safety	<ul style="list-style-type: none"> - Buses will be equipped with Acoustic Vehicle Alerting Systems (AVAS), which will emit warning sounds at speeds less than 30 km/h. 	Manufacturers	PMO, Xiangtan Traffic Police
		Road condition	<ul style="list-style-type: none"> - Regularly inspect and maintaining corridor roads and drains. 	Road Operators	PMO, XMG Roads Department
		Road safety and traffic accidents	<ul style="list-style-type: none"> - Appropriate training and licensing of bus drivers and provision of PPE. 	Road Operators, Xiangtan	XMG

Item	Impact Factor	Potential Impact and/or Issues	Mitigation Measures	Implementing Entity	Supervising Entity
			<ul style="list-style-type: none"> - Strict enforcement of traffic laws and regulations, especially speed limits. - The provision of lanes for pedestrians and non-motorized vehicles. - Improved designs of road junctions and frequent pedestrian crossings 	Traffic Police	

Notes: ADB = Asian Development Bank; EA = Executing Agency; EHS = environment, health & safety; EIT = Environmental Impact Table; IA = Implementing Agency; XEEB = Xiangtan Ecology and Environment Bureau; O&M = operation & maintenance; PMO = Project Management Office.

D. Performance Indicators

20. Performance indicators (Table 3) have been developed to assess the implementation of the EMP. These indicators will be used to evaluate the effectiveness of environmental management.

Table 3: Performance indicators

No.	Description	Indicators
1	Staffing	(i) PMO established with appropriately qualified staff including PMO ESO. (ii) Qualified LIEC recruited. (iii) Qualified 3rd party environmental monitoring company engaged.
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 PMO ESO and LIEC. (ii) Ambient air quality and noise monitoring is conducted by 3 rd party environmental monitoring company.
4	Supervision	(i) ADB mission to review EMP implementation at least once a year during the construction phase. (ii) Local environmental authorities to supervise monitoring at their discretion.
5	Reporting	(i) Annual environmental monitoring reports prepared by PMO ESO with the support of LIEC, and submitted to ADB.
6	Capacity Building	(i) Construction Environmental Management Plans are developed and in place before substantive construction activities begin. (ii) Training on Construction Environmental Management Plans, ADB safeguard policy, EMP implementation, and GRM is provided prior to start of construction. (iii) Training on implementation of operation phase EMP and health and safety is provided prior to project operation.
7	Grievance Redress Mechanism	(i) GRM contact persons are designated at PMO, and GRM contact information disclosed to the public before construction. (ii) All complains are recorded and processed within the set time framework in the GRM.
8	Compliance with PRC standards	(i) Program complies with PRC environmental laws and regulations and meets all required standards.

E. Environmental monitoring plan

21. An environment monitoring plan (EMoP) will be implemented to monitor (i) the extent and severity of actual environmental impacts against the predicted impacts, (ii) the performance of the environmental protection measures and compliance with regulations, (iii) overall effectiveness of the project EMP; and (iv) need for adjustment of the project EMP. The project monitoring program focuses on the environment within the project's area of influence.

22. Two types of project monitoring will be conducted under the EMoP:

- a) **EMP Implementation Monitoring.** EMP compliance inspections to be conducted by the PMO ESO with support from the LIEC. Inspections will be undertaken on an ongoing basis and will involve monthly, weekly, or when necessary, daily inspections of active work sites to ensure compliance with relevant EMP requirements. Findings of compliance inspections will be reported to the contractor's Environment, Health and Safety Officer and the PMO, and measures to address any non-compliance will be implemented as soon as possible by the contractors.
- b) **Environmental Quality Monitoring.** Table 4 presents the project environmental quality monitoring program (air and noise), including, scope, location, parameters, duration and frequency of monitoring during the construction and operational stages. Environmental monitoring during construction and operation (first year) will be conducted by a qualified environmental monitoring company, contracted by the IA, supported through information available from XEEB monitoring stations. At the outset of project implementation the PMO ESO with support from the LIEC will update the environmental monitoring program if necessary. The monitoring program and budgets will be included in the project tendering documents and budgets, as well as the construction and operation contracts.

The environmental monitoring results will be compared with relevant PRC performance standards and relevant EHS and WHO guidelines, and any non-compliance will be reported in the EMP progress section under the semi-annual project progress reports. Detailed monitoring results will be reported in annual environmental monitoring reports by the PMO with the support of the LIEC (see reporting plan in Table A-5) as part of consolidated annual reports.

23. In addition, environmental monitoring may also be periodically conducted by the local environmental authorities. ADB will oversee EMP compliance on the basis of (i) the EMP implementation section of semi-annual project progress reports; (ii) annual environmental monitoring reports provided by PMO as part of consolidated annual reports; and, (iii) site visits during ADB review missions (generally once a year).

Table 4: Ambient environmental quality monitoring plan

Item	Monitoring Parameter	Monitoring Location	Monitoring Frequency	Implementing Entity	Supervising Entity
Pre-construction stage					
Update on sensitive receptors, sensitive locations for environmental monitoring				LIEC	PMO, XEEB
Construction Stage					
Air quality	PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ (24-hr). Standard: WHO AQGs	10 sensitive locations ⁽ⁱ⁾ (rotating) as selected by PMO ESO and LIEC from sites identified in IEE Table 32 or in an updated IEE; and at hospital boundary.	Monthly	3 rd party qualified environmental monitoring company	PMO, XEEB
Noise	Leq dB(A) (day time and night time). Standard: WHO noise guidelines	10 sensitive locations ⁽ⁱ⁾ (rotating) as selected by PMO ESO and LIEC from sites identified in IEE Table 32 or in an updated IEE; and at hospital boundary..	Monthly	3 rd party qualified environmental monitoring company	PMO, XEEB
Operational Stage (first two years)					
Air quality	PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ (24-hr)	10 sensitive locations ⁽ⁱ⁾ (rotating) as selected by PMO ESO and LIEC from sites identified in IEE Table 32 or in an	Monthly	3 rd party qualified environmental monitoring	PMO, XEEB

Item	Monitoring Parameter	Monitoring Location	Monitoring Frequency	Implementing Entity	Supervising Entity
	Standard: WHO AQGs	updated IEE.		company	
Noise	Leq dB(A) (day time and night time) Standard: WHO noise guidelines	10 sensitive locations ⁽ⁱ⁾ (rotating) as selected by PMO ESO and LIEC from sites identified in IEE Table 32 or in an updated IEE.	Monthly	3 rd party qualified environmental monitoring company	PMO, XEEB

Notes:

(i) "10 sensitive sites" for both construction and operational phase monitoring is indicative only, and the number may be increased or decreased with the agreement of the PMO ESO and the LIEC.

(ii) EMS = Environmental Monitoring Station; IA = Implementing Agency; XEEB = Xiangtan Ecology and Environment Bureau; PMO = Project Management Office.

F. Environmental standards

24. PRC environmental standards issued by the MEE generally consist of environmental quality (ambient) standards applicable to the receiving environment, and emission standards applicable to the pollution source. The former includes standards for ambient air quality, noise and vibration, surface water, groundwater, etc. The latter includes standards for integrated wastewater discharge, construction and community noise, odor and air pollutants, etc.

25. ADB's SPS requires borrowers to follow environmental standards consistent with good international practice, as reflected in internationally recognized standards such as the World Bank Group's EHS Guidelines. When host country regulations differ from these levels and measures, the borrower is to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower is required to provide justification for any proposed alternatives.

26. Table 5 presents the environmental standards and guidelines applicable to the Project, which reflects the PRC requirements and the ADB SPS (2009) guidance on the use of international standards.

Table 5: Environmental standards and guidelines applicable to the project

Parameter / Area of Concern	Applicable Standards and Guidelines	Remarks
Ambient air quality	<i>Ambient Air Quality Standard</i> (GB3095-2012), Class II	<u>Yearly average:</u>
		PM ₁₀ : 0.070 mg/m ³
		PM _{2.5} : 0.035 mg/m ³
		SO ₂ : 0.06 mg/m ³
		NO ₂ : 0.04 mg/m ³
		CO: 4.0 mg/m ³
		<u>Daily average:</u>
		TSP: 0.30 mg/m ³
		PM ₁₀ : 0.15 mg/m ³
		PM _{2.5} : 0.075 mg/m ³
		SO ₂ : 0.15 mg/m ³
		NO ₂ : 0.08 mg/m ³
		CO: 4.0 mg/m ³
		<u>Hourly average:</u>

Parameter / Area of Concern	Applicable Standards and Guidelines	Remarks
		SO ₂ : 0.50 mg/m ³ NO ₂ : 0.20 mg/m ³ CO: 10.0 mg/m ³
Construction air pollutant emission	<i>Air Pollutant Integrated Emission Standard (GB16297-1996)</i>	Maximum allowable emission concentration: Particulate matter (PM): 120 mg/m ³ Fumes from asphalt plant: 40 mg/m ³ during production and 75 mg/m ³ during mixing Limits for fugitive emission: PM: ≤1.0 mg/m ³ at construction site boundary Fumes from asphalt plant: no obvious emission at asphalt production plant
Environmental noise	<i>Environmental Quality Standard for Noise (GB3096-2008):</i> <ul style="list-style-type: none"> Class IVa for areas within 35 m from the boundary line of roads Class II for areas 35 to 200 m from the boundary line of roads <i>WHO Noise Level Guideline</i>	<u>Class IVa areas:</u> Day time: 70 dB(A) Night time: 55 dB(A) <u>Class II areas:</u> Day time: 60 dB(A) Night time: 50 dB(A) <u>Residential, institutional, and educational receptor</u> Day time: 55 dB(A) Night time: 45 dB(A) <u>Industrial and commercial receptor</u> Day time: 70 dB(A) Night time: 70 dB(A)
Construction noise	<i>Emission Standard of Environmental Noise for Boundary of Construction Site (GB12523-2011)</i>	<u>Noise level at construction site boundary:</u> Day time: 70 dB(A) Night time: 55 dB(A) <u>Noise level within construction site:</u> Day time: 60 dB(A) Night time: 50 dB(A)
Surface water quality	<i>Environmental Quality Standards for Surface Water (GB3838-2002), see IEE Table 9.</i>	<ul style="list-style-type: none"> Class II standard for Hongfeng Lake and Songbaishan Reservoir (drinking water source) Class III for rivers within the project area.
Wastewater discharge	<i>Integrated Wastewater Discharge Standard (GB8978-1996)</i>	<u>Discharge into Class III water body:</u> COD: ≤100 mg/l BOD ₅ : ≤20 mg/l SS: ≤70 mg/l TPH: ≤5 mg/l NH ₃ -N: ≤15 mg/l <u>Discharge into sewers:</u> COD: ≤500 mg/l BOD ₅ : ≤300 mg/l SS: ≤400 mg/l TPH: ≤30 mg/l
Environmental adverse impacts	<i>WB EHS Guidelines: Environment</i>	Approaches and measures appropriate to mitigate adverse impacts from the project activities
Occupational health and safety	<i>WB EHS Occupational Health and Safety Guidelines</i>	Approaches and measures appropriate to mitigate adverse impacts from the project activities
Community health and safety	<i>WB EHS Community Health and Safety Guidelines</i>	Approaches and measures appropriate to mitigate adverse impacts from the project activities
Construction and Decommissioning	<i>WB EHS Construction and Decommission Guidelines</i>	Approaches and measures appropriate to mitigate adverse impacts from the project activities

G. Reporting

27. **Internal Reporting.** During the construction period the subproject contractors and CSC will be responsible for conducting internal reporting on implementation and compliance with the EMP and CEMPs, including information on all spills, accidents, grievance received, and appropriate actions taken. Results will be reported through quarterly reports to the PMO.

28. The PMO will submit annual reports to the EA on EMP implementation based on subproject contractors and CSC internal reporting and the results of ambient and compliance inspection monitoring.

29. **Annual Environmental Reporting .** The PMO with support from the LIEC will submit environmental monitoring reports annually during construction and operation to the ADB. The annual environmental monitoring reports will include (i) progress made in EMP implementation; (ii) overall effectiveness of the EMP implementation (including public and occupational health and safety performance and incidents); (iii) compliance with loan covenants; (iv) copies of all permits and clearance obtained during the reporting period; (v) environmental monitoring and compliance; (vi) public consultation, information disclosure and details of all grievances and how they were responded to; (vii) any problems encountered during construction and operation, and the relevant corrective actions undertaken; and (ix) institutional strengthening and training. ADB will disclose the English version of the reports on its website. The ADB will reviewing the annual environment monitoring reports and ADB missions will inspect the project progress and implementation on site at least once a year.

30. **Environmental Acceptance Reporting.** Within three months after completion, or no later than one year with permission of the XEEB, an environmental acceptance report shall be prepared by a licensed institute in accordance with the PRC *Regulation on Project Completion Environmental Audit* (MEP, 2001), approved by the relevant environmental authority, and reported to ADB. The environmental acceptance report will indicate the timing, extent, effectiveness of completed mitigation and of maintenance, and the need for additional mitigation measures and monitoring (if any) during operation. Reporting requirements are summarized in Table 6.

31. **Internal Reporting.** During the construction period the subproject contractors and CSC will be responsible for conducting internal reporting on implementation and compliance with the EMP and CEMPs, including information on all spills, accidents, grievance received, and appropriate actions taken. Results will be reported through quarterly reports to the PMO.

32. The PMO will submit annual reports to the EA on EMP implementation based on subproject contractors and CSC internal reporting and the results of ambient and compliance inspection monitoring.

33. **Annual Environmental Reporting .** The PMO with support from the LIEC will submit environmental monitoring reports annually during construction and operation to the ADB. The annual environmental monitoring reports will include (i) progress made in EMP implementation; (ii) overall effectiveness of the EMP implementation (including public and occupational health and safety performance and incidents); (iii) compliance with loan covenants; (iv) copies of all permits and clearance obtained during the reporting period; (v) environmental monitoring and compliance; (vi) public consultation, information disclosure and details of all grievances and how they were responded to; (vii) any problems encountered during construction and operation, and the relevant corrective actions undertaken; and (ix) institutional strengthening and training. ADB will disclose the English version of the reports on its website. The ADB will reviewing the annual environment monitoring reports and ADB missions will inspect the project progress and implementation on site

at least once a year.

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H. EMP Institutional Capacity Building and Training

35. The capacity of the PMO (including representatives) and contractors will be enhanced through institutional strengthening and training. All parties involved in implementing and supervising the EMP must have a good understanding of the ADB SPS (2009), the project relevant environmental objectives, methods, and good practices of project environmental management.

36. **Institutional Strengthening.** The capacities of the PMO (including representatives) to coordinate environmental management will be strengthened through:

- (i) The appointment of qualified PMO ESO in charge of EMP coordination, including the GRM.
- (ii) The recruitment of a Loan Implementation Environmental Consultant (LIEC), a part-time national environmental, health and safety specialist who will support the PMO in mitigation implementation, environmental monitoring, reporting, and addressing any environment related issues that arise including grievances. The LIEC will also support contractors in developing Construction site-specific Environmental Management Plans (CEMPs) prior to construction and operation.
- (iii) The recruitment of a Construction Supervision Company (CSC) responsible for supervising and guiding construction contractors during project construction phase.
- (iv) The recruitment of a qualified Environmental Monitoring Company to collect and analyze air quality and noise data at designated monitoring locations to assess compliance with applicable environmental quality standards during construction.

Table 6: Environmental reporting plan

Phase/ Reports		From	To	Reporting Frequency
Construction Phase				
EMP and CEMP progress reports	EMP and CEMP progress reports	Contractors, CSC	PMO	Quarterly
Monitoring reports	EMP implementation section under the project environmental progress reports	PMO	EA, ADB	Annual
Environmental Acceptance report	Environmental acceptance monitoring and audit report	Licensed institute	XEEB, ADB	Within 3 months of completion of physical works
Operational Phase				
Environmental monitoring reports to ADB	EMP progress and monitoring report	PMO	IA, EA, ADB	Annually (until project completion)

Training	Contents	Attendees	Times	Period (days)	No. of persons	Cost (\$/person /day)	Total Cost
	and eligibility assessment						
Operation Phase							
Implementation of EMP and EMoP	– Impacts and mitigation measures						
	– Monitoring and auditing mechanism						
	– Reporting requirements						
	– Issue of non-compliance and corrective actions for EMP, EMoP and GRM.	IA	Once prior to project implementation	1	30	100	\$3,000
Implementation of operation EHS Plans	– Plan descriptions						
	– Roles and responsibilities						
	– Worker and community EHS concerns and actions						
Total estimated cost							\$15,000

Notes: PMO = Project Management Office; IA = Implementing Agency, XEEB = Xiangtan Ecology and Environment Bureau

I. Grievance Redress Mechanism

38. **Program Specific GRM.** A project grievance can be defined as an actual or perceived project related problem that gives ground for complaint by an affected person (AP). The PMO 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. The project has strong public support; nonetheless, grievances related to the environment, land acquisition and resettlement will need to be adequately handled. 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 any complaints, a project specific 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 AP's project-related grievances transparently and in a reasonable period of time.

39. The objective of the project GRM is to prevent and address community concerns, reduce risks, and assist the project to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM has been designed to (i) open channels for effective communication, including the identification of new environmental issues of concern arising from the project; (ii) demonstrate concern about community members and their environmental well-being; and (iii) prevent and mitigate any adverse environmental impacts on communities caused by project implementation and operations. The GRM will be accessible to all members of the community.

40. The overall approach of the GRM is to deal with grievances at a local level first in an efficient manner, and escalate to higher level of authority if the grievance cannot be resolved.

41. The PMO ESO will be responsible for implementation of the GRM, and will be the key contact point for residents, businesses, government departments and other stakeholders who may require information about the project or who have an issue they would like to discuss. Other GRM entry points will include: (i) the contractors; (ii) the IA; and (iii) the Xiangtan Ecology and Environment Bureau (XEEB) for environment issues. The PMO will issue public notices to inform the public within the project area of the GRM, and the PMO's and other entry points phone number, fax, address, email address will be disseminated at all construction and other sites.

42. The PMO will maintain a complaints database and communicate with contractors, CSCs, XEEB, and other relevant local government departments. The PMO ESO will be supported on an as need basis by the Loan Implementation Environmental Consultant (LIEC).

43. **Types of Environment Related Grievances and Eligibility.** Construction phase grievances might relate to issues such as traffic disruptions, access to businesses and residences, and construction dust or noise. Operation phase complaints may relate to service levels, delays or traffic disruptions. Once a complaint is received and filed, the PMO will identify if complaints are eligible. Eligible complaints include those where (i) the complaint pertains to the project; and (ii) the issues arising in the complaint fall within the scope of environmental safeguards. 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 allegations of fraud or corruption); and (iii) where other company or community procedures are more appropriate to address the issue. Complaints ineligible to the project or the GRM will be recorded and passed onto relevant authorities. If an ineligible complaint is rejected, the complainant will be informed of the decision and the reasons for rejection.

44. **Environment Related GRM Steps.** The GRM will be implemented through five escalating steps, advancing to the next level only if the grievance was unable to be redressed at the previous level. Note that: (i) at any stage in the GRM, an affected person (AP) may submit their grievance to any agency they feel most comfortable with. If such agency is not listed in the steps below, they will also need to inform at least one of the listed individuals or agencies, to enable the GRM procedures to be implemented; and (ii) the GRM does not replace the role of existing laws and legal procedures. In the event of any grievance, the PMO will immediately inform ADB, and then ensure that ADB is updated on the progress.

Step 1: If a concern arises, the AP should try to resolve the issue of concern directly with the contractor or via the GRM access points (community leaders, neighborhood organizations, XEEB) during the construction phase, and/or the operator during the operation phase. If the concern is resolved successfully no further follow-up is required. The contractor (during construction) and/or the operator (during operation) shall record any complaint and actions taken to resolve the issues and report the results to the PMO. If no solution is found within 7 working days or if the complainant is not satisfied with the suggested solution under Step 1, proceed to Step 2.

Step 2: The AP will submit the grievance to the PMO (if not done in Step 1). PMO will record the grievance, assess its eligibility and report back to the AP within 7 working days. If the grievance is eligible, proceed to step 3.

Step 3: The PMO will investigate the complaint, and consult with the EA, LIEC and other stakeholders as appropriate in an attempt to identify a solution. The PMO will give a clear reply to the AP within 5 working days with the suggested solution, and the IA will ensure that implementation of the agreed-upon redress solution begins within 7 working days. If

no solution is found or if the complainant is not satisfied with the suggested solution under Step 3, proceed to Step 4.

Step 4: The PMO will inform ADB as to the grievance, and will organize a multi-stakeholder meeting within 5 days, where all relevant stakeholders, including the complainant, the EA, IA, ADB and XEEB, can discuss the issue. The multi-stakeholder meeting will aim to find a solution acceptable to all, and identify responsibilities and an action plan. The PMO will ensure that the implementation of agreed-upon redress solution begins within 7 working days of the completion of the multi-stakeholder meeting.

Step 5: If the complainant is not satisfied with the suggested solution under Step 4, the grievance will be directed to the Xiangtan Municipal Government (XMG). The XMG will direct the EA to organize a hearing process and shall determine a solution acceptable to all. Based on the hearing results, an action plan shall be developed and the IA will ensure that the implementation of the agreed-upon redress solution begins within 7 working days of the completion of the hearing.

45. The five GRM steps are illustrated in Figure A-2. If the GRM steps are unsuccessful, persons who are, or may in the future, be adversely affected by the project may submit complaints to ADB's Accountability Mechanism through Office of the Special Project Facilitator (OSPF) or Office of Compliance Review Panel. 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, APs should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and they are still dissatisfied, should they approach the Accountability Mechanism

46. APs will not be charged any cost for submitting a grievance to the PMO. All costs for implementing an agreed solution will be paid by the party deemed responsible for causing the grievance. The grievance procedures will remain valid throughout the duration of the project construction and until project closure.

VIII. Cost Estimates

47. The estimated budgets for environmental monitoring, capacity building, training and public consultation are summarized in Table 8. Construction phase costs are estimated at \$319,000; operation phase mitigation and monitoring costs are estimated at \$143,500 (first two years).

48. Contractors will bear the costs for all mitigation measures during construction, including those specified in the tender and contract documents as well as those to mitigate unforeseen impacts due to their construction activities. The impact of climate change on extreme rainfall has been factored into the project design, and is included in the civil work contract costs.

IX. Mechanisms for Feedback and Adjustment

49. 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 ESO and LIEC will consult with the PMO and XEEB and propose appropriate changes to the EMP monitoring and mitigation plan.

50. 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 required by the SPS. The revised EMP will be passed on to the contractor(s) for implementation.

Figure 2: Five step project GRM

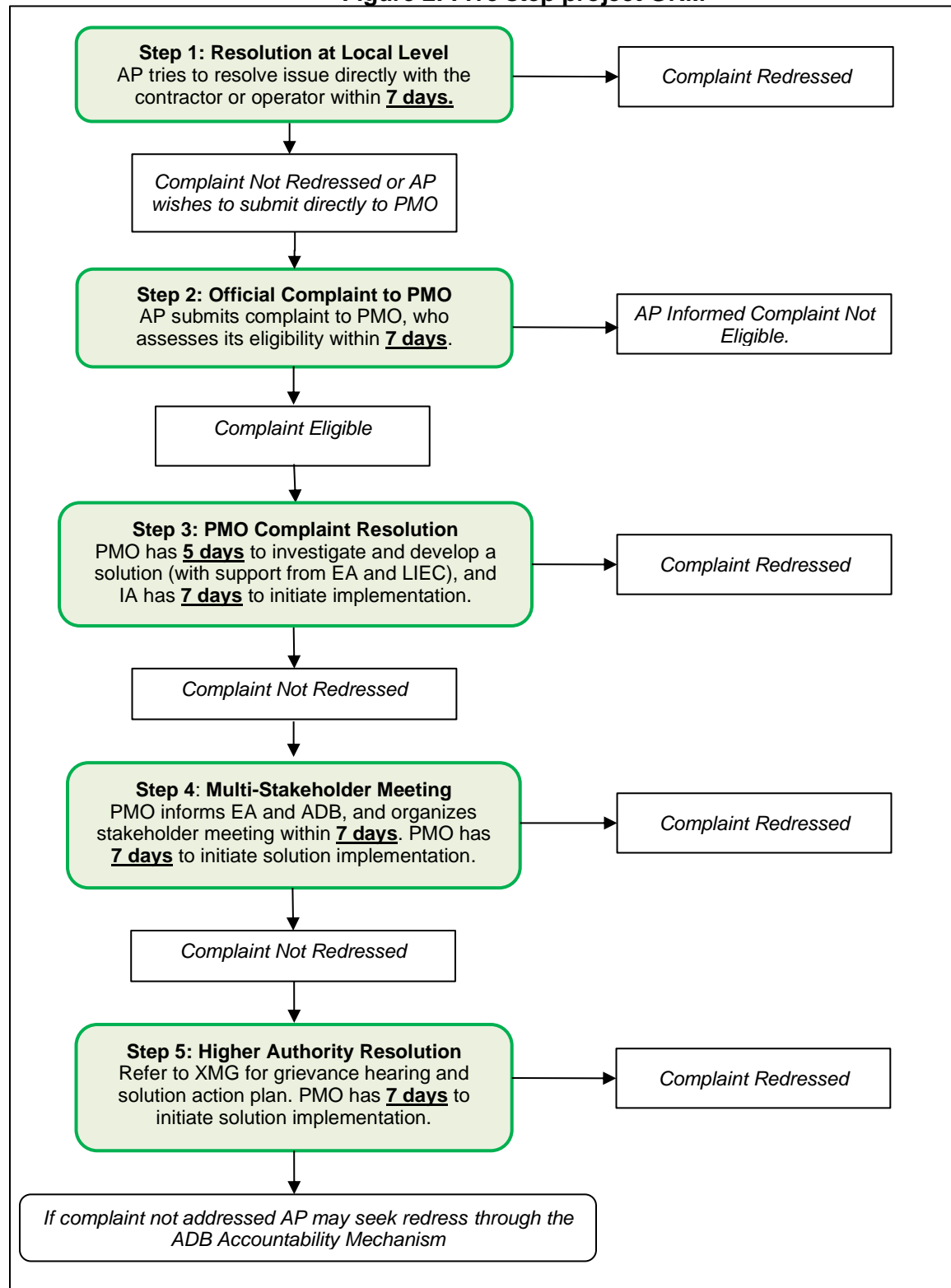


Table 8: EMP Budget (monitoring, capacity building and LIEC)

Construction Phase (4 years)					
1. 3rd Party Independent Ambient Monitoring	Item	Annual Cost	#	Cost USD	Cost RMB
Air (PM2.5, PM10, SO ₂ , NO ₂), Noise	Monthly at 10 sensitive locations (rotating)	\$ 60,000	4	\$ 240,000	¥1,674,480
Subtotal				\$ 240,000	¥1,674,480
2. Capacity Building	Unit	Course Cost	#	Cost USD	Cost RMB
Construction Phase EMP Training	Development and Delivery	\$ 7,500	2	\$ 15,000	¥104,655
Subtotal				\$ 15,000	¥104,655
3. Loan Implementation Env. Consultant	Unit	Unit Cost	#	Cost USD	Cost RMB
Construction Phase LIEC	Person Months	\$ 4,000	16	\$ 64,000	¥446,528
Subtotal				\$ 64,000	¥446,528
TOTAL Construction Phase				Cost USD	Cost RMB
				\$ 319,000	¥2,225,663
Operation Phase (first 2 years)					
1. Ambient Monitoring	Item	Unit Cost	#	Cost USD	Cost RMB
Air (PM2.5, PM10, SO ₂ , NO ₂), Noise	Monthly at 10 sensitive locations (rotating)	\$ 60,000	2	\$ 120,000	¥837,240
Subtotal				\$ 120,000	¥837,240
2. Capacity Building	Unit	Course Cost	#	Cost USD	Cost RMB
Operation Phase EMP Training	Development and Delivery	\$ 7,500	1	\$ 7,500	¥52,328
Subtotal				\$ 7,500	¥52,328
3. Loan Implementation Env. Consultant	Unit	Unit Cost	#	Cost USD	Cost RMB
Operation Phase LIEC	Person Months	\$ 4,000	8	\$ 32,000	¥223,264
Subtotal				\$ 32,000	¥223,264
TOTAL Operation Phase				Cost USD	Cost RMB
				\$ 159,500	¥1,112,832
GRAND TOTAL Construction + Operation				Cost USD	Cost RMB
				\$ 478,500	¥3,338,495

Construction Phase Notes:

Assumes 4 year construction period; Ambient monitoring based on monthly monitoring at ten sensitive sites (residential areas) to be selected by the PMO ESO and LIEC on a rotating basis depending on the progress of construction. Monitoring will be undertaken by a qualified 3rd party monitoring company; Construction phase LIEC part time – 16 months over construction phase. Assumes LIEC based in Xiangtan. Does not include costs for mitigations to be implemented by contractors.

Operation Phase Notes:

Operation phase LIEC part time – 4 months each for first two years of operation.

APPENDIX 5: STAKEHOLDER COMMUNICATION STRATEGY

A. Communication Analysis -Stakeholders

1. The stakeholder communication strategy is designed to involve a broad spectrum of stakeholders involved in low-carbon transformation in their choice of green transport modes and efficient energy use. The strategy also gives attention to the diverse needs of the many different groups affected by the program's components particularly ensuring inclusiveness of women and people with special needs. The communication strategy will also ensure that program components are developed in collaboration with and supported by key stakeholders.
2. This communication strategy is informed by the following: (i) consultations with key government, private sector and public/private partnerships stakeholders; (ii) a socio-economic survey (SES); (iii) semi-structured observation-based studies and open-ended interviews with stakeholders in program sites; and, (iv) focus group discussions (FGDs). These activities were undertaken by ADB and a combined team consisting of communication and social research consultants commissioned during the design and program processing phase.
3. The SES¹ gathered primary data on the Xiangtan population's demographics, mobility and consumption patterns, and other choices affecting their lifestyle-related carbon footprints (i.e., room cooling and heating, prevalence of energy efficient appliances and use of low-carbon transportation modes such as bicycles, buses, and walking). The survey also gathered data on the residents' knowledge of choosing and leading low-carbon lifestyles, and preferred information channels. All of these aspects were further examined in the FGDs.
4. The FGDs² centered on the following themes: different paths to achieve a low-carbon lifestyle; sustaining low-carbon lifestyles choices; and government support for low-carbon lifestyles.
5. Site visits and group interviews³ with key stakeholders from government, private sector and public/private partnerships were conducted to gain insights into how existing structures and systems such as buses and shared bikes work and shape behaviors and lifestyles. These also added insights into the priorities and worldviews of local institutional stakeholders that are key to the low-carbon transformation of Xiangtan.
6. Observations in program sites provided more in-depth insights into the daily mobility and energy use of key stakeholders. The analyses triangulated the results of the SES, FGDs and observations to determine whether stakeholders actually practice behaviors they said they did in focus groups discussions and interviews. Layering several types of analyses added to a fuller picture of the practices and priorities of the diverse range of stakeholders and allowed for a better targeted communication strategy. Using a behavior template and field notes, the communication and social research teams conducted observations as neutral observers and participant-observers.

¹ The SES was conducted on 26 August to 24 September 2019 as street interviews based on a multiple-choice questionnaire. Sample size is 406 respondents.

² 21 focus groups discussions were conducted with approximately 130 individuals. The participants comprised of current residents of the Yu Hu and Yue Tang areas in Xiangtan and undergraduate students from Hunan University of Science and Technology. Three groups were with low-income families and two were with disabled participants and one with students. Each group had between four and eight participants and were interviewed for one hour on average. All the resident participants were recruited by local sub district committees supported by Xiangtan DRC.

³ Conducted during the program inception mission in July 2019

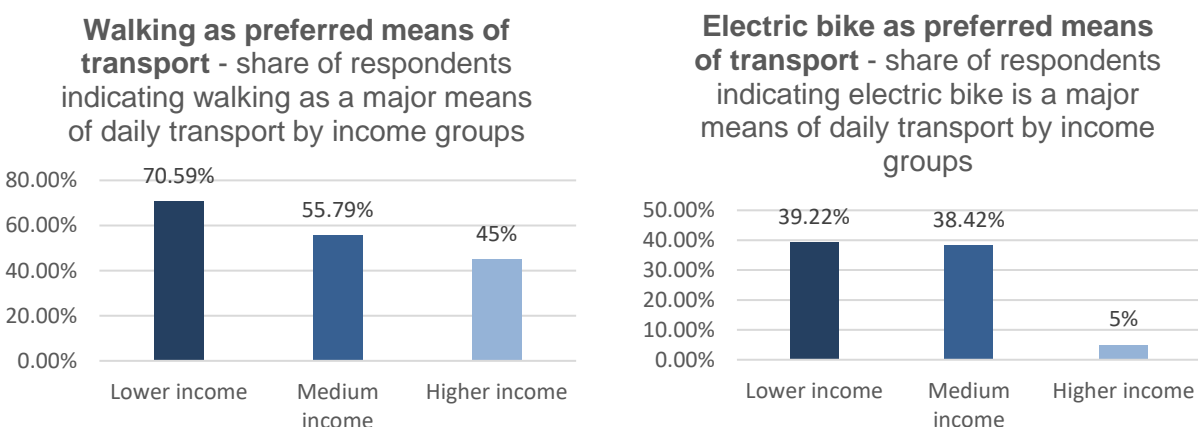
7. The stakeholder analysis is split in two. Part one corresponds to the mobility practices of stakeholders and preferences for social engagement. Part two of the stakeholder analysis focuses on the household energy use of stakeholders and possibilities for engaging with private sector.

B. Stakeholder Analysis- Part One

1. Public stakeholders

8. The primary stakeholders are Xiangtan residents specifically women, students, the elderly, disabled and shopkeepers in and around the key program sites. To reflect the strong elements of transportation and road designs in program Outputs 1 and 2, stakeholders are described mainly by their primary modes of transportation but acknowledging that residents often employ several modes of transportation in any given day.

9. **Transportation needs and means.** Based on the SES and the FGDs, the typical resident in Xiangtan takes two to four trips per day. Most trips are for commuting to and from work or for shopping/recreational activities. Most transport trips are short (below 5 kilometers) and takes up to 20 minutes. Most often, there is no or little costs (below CNY 5) involved. Around a third of all trips are on foot, but for other trips, buses (20%), cars (18%) and electric motorcycles (18%) stand out as the main means of transportation. When segmented for income, electric motorcycles are used mainly by lower and medium income groups while higher income groups favor personal cars for transport. Respondents point to convenience – the ability to use the chosen means of transportation when needed – as the main factor (53% of responses) influencing their choice of transportation, with speed (15%) and cost (13%) coming in next.



Source: 2019 Stakeholder Engagement Survey conducted for program.

10. Car ownership has almost doubled in China from 2013 to 2017⁴, and projections⁵ indicate a further tripling of the car fleet in Hunan province by 2030.

⁴ China Statistical Yearbook. 2018. Table 6-5: Main durable goods owned per 100 households nationwide. <http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm>.

⁵ Lim Ma et al. 2019. China's Provincial Vehicle Ownership Forecast and Analysis of the Causes Influencing the Trend. <https://www.mdpi.com/2071-1050/11/14/3928/pdf>

11. **Public and shared transport use.** SES results show that buses are most popular with lower income residents – 38% indicate buses as one of the three most used means of transport. Medium income groups also use buses (33%), while only 15% higher income residents commute by bus. Other forms of public or shared transportation within the city of Xiangtan (i.e., public bikes, sharing rides with friends/family, Didi or taxis) are used the least (between 0, 1 and 4% of trips). Public bikes and privately-owned bikes account for only 5% of trips.

12. **Factors influencing use of public transport.** The primary reasons given in the SES for not taking buses are that the trips are often too short, and for these, walking is preferred. For longer trips, buses lose out to other transport means in terms of convenience. The distance to bus stops as well as long waiting times are other prevalent reasons for not using buses. On the other hand, the speed of buses is not seen as a downside by many passengers. Only 7% reported that slow speed is their reason for not using buses. FGDs also report that bus stops are not well designed and provide too little shelter from rain or spray from puddles. Street observations reinforce these findings.

13. **Connectivity.** Results of observations point to lack of connectivity in public transport as a factor that works against its greater use. Often, bus stops and shared bike stations are placed too far apart to facilitate connectivity and ease of use. At the Xiangtan Intercity Railway Station, walking from the nearby bus stop closest to the station included crossing two major roads, with a long portion of the walking route spent on the road for lack of pedestrian walkways. At the Xiangtan Train Station, bus stops were closer, but bollards placed to keep motorcycle drivers off the main square in front of the station blocked access for people in wheelchairs or those with heavy and/or wheeled bags.

14. **Accessibility.** Observations show that pedestrian walkways are often uneven, in bad shape and needing repairs or poorly designed restricting access for elderly or disabled people. No section of Fuxing middle road allows people in wheelchairs to travel freely from one trunk road to the next. Most crossings also pose considerable challenges. For this reason, people in wheelchairs and people with wheeled bags often choose to walk on the street at considerable risk. Obstacles are both permanent (poor design or disrepair) and temporary (pedestrians walkways blocked by parked cars or motorcycles). Bus stops are often inaccessible for people in wheelchairs or with impaired walking because of very high curbs on all sides. The narrow platforms of bus stops provide waiting passengers with little space, increasing safety risks during peak hours. The stops also offer little shelter from rain or spray.

15. **Bus drivers.** Observations and FGDs show that bus drivers do not wait for elderly or disabled people to safely embark and disembark from buses. Bus drivers do not park close to the curb at bus stops, forcing passengers to step onto the road and up the high steps to the buses. In several FGDs, elderly and disabled stakeholders also say bus drivers are discourteous to them when they enter buses.

21. **Safety on buses.** Safety on bus rides is an important factor especially for women, but in Xiangtan, only one in 406 respondents of the SES point to safety or the lack of it as a factor for using buses. FGDs with students support this, although female students did report that they often ride buses in groups but did not directly cite safety from harassment or unwanted attention as a main reason for this behavior.

16. **Parking.** Parking in central Xiangtan causes major problems for pedestrians, local residents and shopkeepers as cars are parked in pedestrian walkways severely restricting pedestrian traffic. However, local residents and shop owners are protective of their own ability to

park as there are few or no alternative parking spaces. The owners of 53 cars and motorcycle repair shops and affiliated stores that line Baoto Middle road consider it important that customers can use the pedestrian walkway in front of their stores as parking or they will be out of business. Other store owners cite former restrictions in parking that led to dramatic loss of business for them.

17. Fuxing middle road also holds a large number of restaurants that often cater to a more local set of customers than the repair shops. The owners and employees of these establishments are more averse to cars using the pavement for parking. Though they also park in the pavements themselves, they are concerned with their restaurant's visibility from the street, and some also use the pedestrian walkways to serve customers. In the FGDs, residents say that illegally parked cars block ambulances and fire trucks, although they themselves admit to parking illegally for lack of other options. They also point to the need for facilities to charge their electric bikes at the street level. They often pull power lines down from their apartment along the halls and stairways causing inconvenience to all residents of the building.

18. **Risky behaviors.** Traffic in Xiangtan is growing but congestion in program areas is still relatively low. Even in peak hours, vehicles are still able to pass through most intersections without waiting for more than one traffic light cycle. However, risky behaviors in these intersections are high. Electric bikes and motorcycles particularly, encroach on pedestrian zones and drive against the flow. Pedestrians crossing trunk roads often find the time allotted by traffic lights as too short forcing them to run. On the other hand, pedestrians also start crossing on a red light or deviate from zebra crossings to cut corners. Pedestrians, electric bike users, and bicyclists have all been observed cutting corners if the opportunity is available.

19. **Road safety.** The Baseline and Design Road Assessments and School Zone Road Assessment, Xiangtan conducted for the program, evaluates road safety issues in Fuxing middle road and in 5 schools. The report concludes that the most problematic zones are around intersections, and that pedestrians suffer most from poor road design especially around pedestrian crossings and intersections with no signal lights. Most of the road sections with pedestrian crossings have poor signage visibility from the distance because of vehicles parking along the road blocking the signs. Around schools, the report points to a number of problem behaviors mainly from adults such as parking in pedestrian crossings, riding motorcycles on pedestrian sidewalks and congestion during school rush hours.

20. **Enforcement.** Larger road crossings have assigned police to facilitate traffic around peak hours (peak hours are from 7.30 to 8.30 and from 17:30 to 18.30) There are large differences in how these traffic police officer carry out their duties. Some are lenient, others are stricter. Observations show that the stricter police officers cause a significant reduction in risky behavior especially from electric motorcycle drivers. Police officers were not observed handing out any ticket or other sanctions. Local shop owners report that illegal parking is also most prevalent in areas not covered by public security cameras.

2. Institutional stakeholders

21. Road design and traffic management are managed by several institutions in Xiangtan. Stakeholders include the following: Transport Authority of Xiangtan (TAX); Natural Resource and Planning Bureau of Xiangtan City (NRPB); Housing Bureau; Xiangtan Public Security Bureau (XPSC). Authorities concerned with traffic, TAX and XPSC, place great emphasis on getting traffic to move faster although based on the SES, for residents, speed of traffic and congestion are not yet emerging issues.

22. Placing stronger restrictions on parking and enforcing existing regulations are not high on the local government's agenda, as these are considered to be very unpopular among residents. Parking enforcement is considered an "infringement on people's private property" (cars), as one official put it during the stakeholder consultations.

23. The Housing Bureau and NRPB share responsibility for the design of the areas in front of buildings including pedestrian walkways, parking spots, potential electric car charging stations etc. Pedestrian walkways and parking lots are administered and constructed by the Housing Bureau, but the planning is approved by NRPB. According to NRPB regulations, street building owners should make certain there is room for pedestrian traffic. In reality, due to the shortage of parking areas, parked cars always take up much of the space for pedestrians.

24. The areas around the buildings are part of the developers' design work, and designs have to get the approval of NRPB. Large developers have their own professional design teams for the roads, whereas, the small developers may subcontract external professional teams. Locally designed guidance and regulations are always stricter than the national ones.

C. Stakeholder analysis – Part Two

25. The second part of the analysis focuses on households' energy consumption for heating, cooling and use of appliances. Secondary research shows that: (i) Heating and cooling constitute the greatest cause of lifestyle-related GHG emissions from homes in the People's Republic of China^{6,7}. Results from the SES and FGDs confirm that: (ii) a sizeable part of households' income go to cooling and heating, but (iii) energy efficiency is not high priority for households when they buy appliances. The communication designed to support Outputs 1 and 2 to address the other prominent sources of carbon emissions – choice of and use of transport means – is covered in section III of this document.

26. **Characteristics of households.** Xiangtan is a tier 3 city, with income levels very close to the national average. Average disposable income in Xiangtan in 2018 was 29,872 CNY per capita compared to the national average of 28,228 CNY per capita in 2018. However, this is far from the income levels of the People's Republic of China's most affluent cities like Shanghai (64,183 CNY per capita in 2018) and Beijing (62,361 CNY)⁸. Housing is a mix of new apartment buildings (cost is up to the area of 8-9,000 CNY/m² for most expensive areas) and older houses. The latter range from apartment buildings which are mostly between 10 to 40 years old to shanty town buildings of varying age which are often self-constructed. Many will have the potential for improved energy efficiency through small scale interventions such as individual sun shading and caulking windows to the large-scale insulation of apartment buildings. Most new developments are not constructed with a central heating or cooling system but instead have shelves outside apartments for placing heat exchanger units.

⁶ Jin Guo et al. 2016. *Electricity Demand in Chinese Households: Findings from China Residential Energy Consumption Survey*. https://aceee.org/files/proceedings/2016/data/papers/9_76.pdf

⁷ Institute for Global Environmental Strategies, Aalto University, and D-mat Ltd. 2019. *1.5-Degree Lifestyles: Targets and Options for Reducing Lifestyle Carbon Footprints. Technical Report*. https://www.aalto.fi/sites/g/files/flghsv161/files/2019-02/15_degree_lifestyles_mainreport.pdf

⁸ Source: National Bureau of Statistics of the People's Republic of China: National Economy and Society Developed Statistical Bulletin 2018)/ Xiangtan City Bureau of Statistics: Xiangtan City National Economy and Society Developed Statistical Bulletin 2018).

27. **Cooling and heating.** Cooling and heating are considerable expenses for many Xiangtan households. From June to August, most households use air-conditioners to cool their homes. Even though temperatures can be high also outside this period, it is generally cooler in the mornings and evenings where families are in their homes and cooling is less needed. From November to January, residents use electric or gas heaters to keep homes warm. Global warming and the rising standards for comfort among the younger generation may extend the seasons, and thus, the need for cooling and heating. Lower income residents report heating costs of close to 400 CNY per month in the November-January and cooling costs of close to 800 CNY in June-August. Medium-income residents report slightly higher costs (around 500/850 CNY for heating/cooling) and higher-income residents report slightly higher than that (around 550/900 CNY). This indicates that heating and cooling costs hit the lower income household the hardest, as even though they live in smaller homes. Their heating/cooling bill is not much lower than households with a much higher income. This can also indicate that the lower income households live in lower quality housing with less efficient insulation and more leaks creating drafts.

28. FGDs and SES both show that residents are consciously trying to save energy by only using heating and cooling appliances in rooms that are actively in use and turning them off when not in use. Around 98.5% of SES respondents indicate that the energy bill is based on individual metering of energy consumption for each apartment/house.

29. **Energy saving LEDs and appliances.** The People's Republic of China has a mandatory energy efficiency label for appliances (China Energy Label or CEL), which identifies a product's efficiency on a scale of 1 to 5, with one being the most efficient and 5 the least. Labels must be present at the point of sale of any product covered by the mandate. China Energy Label was introduced in 2005, and as for then over than 25 product groups have become CEL-mandatory, while additional product groups are continually added.⁹

30. The SES indicates that most residents look for quality and brand first when buying appliances. Cost and efficiency have lower impact on their decision to purchase. The FGDs, however, show that although most of the residents know about the energy efficiency labels on electric appliances, only a minority choose to buy energy-efficient products. This is mainly because they do not trust that the appliances with 1st tier green label can really save as much energy (or money) as indicated, and energy-efficient appliances are often more expensive. Based on the FGDs, end users don't have enough information or visible evidence to prove how much electricity the energy efficient appliance can save, and if it is efficient, how many years it will take to balance that additional expense against savings.

31. Administrators and owners of appliance stores are stakeholders that could be key in designing and disseminating communication that could increase the uptake of energy-saving appliances. Xiangtan has a number of physical stores located at street-level and at malls, but residents also have a large selection to choose from online.

32. **Knowledge of low-carbon lifestyles.** Only 8% of SES respondents believe they "know quite well," how to live a low-carbon lifestyle. Almost half or 46% have a general idea what a "low-carbon lifestyle" is, whereas the rest of the SES respondents are unsure or know nothing about it. The SES results show that the main barrier for respondents to live low-carbon lifestyles is knowledge about what it constitutes and how to transition in making individual lifestyle choices. This indicates that there is a knowledge gap that behavior change communication can help fill.

⁹ China Compulsory Certification. <https://www.china-certification.com/en/what-is-ccc/>

The SES also indicates that the main sources of information for the respondents on low-carbon lifestyles are “TV or Broadcast” and “Public advertisement Internet.”

33. Insulation and energy efficiency. The SES indicates that costs for heating are approximately the same per square meter for all income groups, whereas energy use for heating in winter is significantly higher for the higher income residents (4.7 CNY/m²/month for higher income vs. 3.8 CNY/m²/month for lower income). This can indicate two things: either there is little difference in the insulation and energy efficiency status of homes among income groups or the higher income groups have better insulated homes but also have a higher comfort level and thus, use more energy. Either way, there are opportunities to influence behavior in homes through communication efforts that offer a menu of options for residents to reduce their energy consumption.

34. In many apartment buildings, owners elect “Owners Committees” who take care of the issues that are common for apartment owners in the same building, such as hiring property management companies or deciding on renovation of facade or other common areas. Both owners’ committees and property management companies can be key stakeholders to secure low-carbon lifestyles given that they can influence the overall performance of a whole building from initiatives such as outside insulation measures or better management of building systems such as lighting or water use. The People’s Republic of China is also the Global leader in ESCO (Energy Service Company) business models that allows private sector companies to renovate buildings with energy savings in mind without any cost to the owners. The ESCO market is growing fast (15% per year) and increasingly moving into the housing sector.¹⁰

D. Media Analysis

35. Country media environment. The People’s Republic of China has a very large and evolving media landscape. As of May 2019, there are 3,350 television channels, 1,900 newspapers, 2,900 radio stations, 5.23 million websites and 4.49 million apps¹¹ in the country. Total media spending in 2018 was up by 17.4% reaching a total of USD 100.13 billion (compared to approximately 45% of the total US media spending). The digital media market showed even stronger 30% growth, with digital media spending reaching USD 65.42 billion in 2018. Data from People’s Republic of China National Statistics Bureau shows that radio and television reached 54.63% of the population in 2017. The relatively limited range is mainly due to bad coverage in rural areas (33.49% of rural population reached)¹².

36. Internet Access: As of December 2018, more than half or 59.6% of the citizens of the People’s Republic of China had internet access. By location, 74.6% of urban dwellers and 38.4% of rural dwellers had internet access. Of the total percentage of internet users, 98.6% used their mobile phone for access¹³. Males constitute a higher percentage of internet users than females, and constitute 52.7% in comparison to 47.3%, respectively. Daily use of internet approached 4 hours for an average user.

37. Content trends: There is a strong trend towards the use of short videos for online media content especially for targeting younger audiences. The penetration of short videos (52%) is

¹⁰ International Energy Agency. <https://www.iea.org/topics/energyefficiency/escos/china/>

¹¹ PHD Media. 2019. *PHD Infographic: China Media Landscape*.
<https://www.phdmedia.com/china/phds-latest-china-media-landscape/>

¹² National Bureau of Statistics of China. 2016. *China Statistical Yearbook*. Beijing

¹³ China Internet Network Information Center, Statistical Report on Internet Development in China, #43.Feb 2019. Via China Internet Watch

catching up with online television penetration (73%), with consumers watching an average of 128 short videos per day.¹⁴ Douyin is the most dominant platform having more than 293 million monthly active users, but new players are still entering the market including WeChat's recently launched "Time Capsule" function. Online media segments are blurring as e-commerce, social media, video and other overlap. The ten most important digital media platforms in the People's Republic of China (as of January 2019) are¹⁵:

- WeChat: All round social media platform, sometimes called the "Chinese Facebook"
- Sina Weibo: Similar to Twitter
- Tencent QQ: Popular instant messaging app
- Tencent Video: Leading online video provider in People's Republic of China
- Baidu Tieba: A search engine forum
- Douban: Lifestyle discussion platform
- Zhihu: Similar to Quora
- Meituan – Dianping: Similar to Yelp
- Toutiao: News & information & entertainment platform
- DouYin (TikTok): Fast-growing short-video app

38. **Local media environment.** There are 14 radio stations and 15 television stations in Hunan Province. In 2018, the broadcast and television coverage of the population of Xiangtan City reached 100%. There were 924,000 registered broadband internet users showing an increase of 36.5% from 2017¹⁶. Fixed broadband penetration and mobile broadband penetration in Xiangtan city was 83% and 85% in 2018 respectively, finishing its internet penetration well-off goal two years in advance¹⁷.

39. To promote the internet development of rural areas, Xiangtan City implemented an internet and rural revitalization strategy. At the end of 2018, the fiber optic cable Internet connection has been fully accessible in many rural villages.

40. Rednet is the mainstream and comprehensive government news service of Hunan Province, which is also where citizens can raise their concerns and questions. The Xiangtan government media has expanded beyond operating traditional newspapers and television by including modern and diverse platforms such as DouYin, Weibo, Damei Xiangtan app and the Xiangtan Media Network. The Xiangtan City television station also manages the Xiangtan WeChat official account in addition to 18 accounts on specific topics such as transportation, environmental protection, building conduction, city planning, and others.

41. Residents use WeChat, Sina Weibo, Tencent QQ and Video, Baidu Tieba, Douban, Zhihu, Meituan–Dianping, Toutiao and DouYin to receive news from their communities, region and abroad, and content about a wide variety of topics from current politics to entertainment.

¹⁴ Marketing Interactive. 2019. *China's 2019 Media Landscape in 5 Points*.

<https://www.marketing-interactive.com/chinas-2019-media-landscape-in-5-points/>

¹⁵ Dragon Social. 2019. *10 Most Popular Social Media in China (2019)*.

<https://www.dragonsocial.net/blog/social-media-in-china/>

¹⁶ Xiangtan City National Economy and Society Developed Statistical Bulletin 2018

¹⁷ <http://news.sina.com.cn/o/2019-01-18/doc-ihrfqziz8737529.shtml>

E. Communication environment

42. The Xiangtan bus system already has an app for showing bus schedules, buying tickets, providing feedback etc. The platform can be potentially expanded to include functionalities where users can source program information and provide feedback. The smart transport systems operated by the traffic police and the transport authority also has data that can be potentially valuable to users if these can be accessed. The app for renting shared bikes can also be expanded and linked to the Xiangtan bus app to include not just bike-share information but also bus and bike connectivity and low-carbon lifestyle information for bike riders.

43. FGDs show that many residents do not use the bus app and instead pay with cards and use generic social media or map services to get data on bus schedules and traffic. With the high social media use in Xiangtan, the bus and bike share apps will be promoted through various digital channels as well as through KOLs (Key Opinion Leaders) in which are regarded in the People's Republic of China as more trustworthy than brands¹⁸.

44. This communication strategy will be implemented by the PMO, supported by communication consultants. These consultants will provide technical support to assess the communication capacity and needs of the XMG, and assist in implementing this communication strategy.

F. Primary communication objective

45. Communication is an important component to secure the success of the program's Output 1 (Low-Carbon and Resilient Infrastructure Transformation Demonstrated) and Output 2 (Information and Knowledge Platforms for Informed Decision-Making and Behavioral Changes Enabled). The communication strategy has two tracks – one, for the planning and second, for the implementation of the program -- to ensure that communication is incorporated in the program's systems thinking approach.

46. The communication strategy has four objectives:

- (i) Create platforms for meaningful stakeholder involvement in the planning and implementation of low-carbon and resilient infrastructure
- (ii) Promote the Xiangtan residents' continued use of public buses and increase use of low-carbon transport modes
- (iii) Promote more widespread adoption of low-carbon lifestyles in homes to reduce energy consumption for cooling, heating and lighting
- (iv) Promote walking as a low carbon mode of transportation and pedestrian road safety among school children

Objective 1: Create platforms for meaningful stakeholder involvement in the planning and implementation of low-carbon and resilient infrastructure

47. **Planning stage:** Understanding how the transport system and household energy use work from the users' perspective allows Xiangtan planners, designers and enforcement agents to work on integrated solutions that fit users' needs and contexts. Engaging with users and potential users will help planners understand the "pain points" of the current transport system and

¹⁸ China Briefs. 2019. *How Influencer Marketing Works in China*.
<https://www.chinabriefs.io/blog/2019/6/20/how-influencer-marketing-works-in-china>

household energy use. This needs to start early in the planning process for designers to incorporate the priorities of users and potential users in their planning.

48. Based on the SES, FGDs, key informant interviews and observations, the first section of this document summarizes the behaviors of key road users – bus riders and drivers, vehicle drivers, shop owners, e-motorcycle drivers, cyclists and pedestrians – and their motivations for use and non-use of public and low-carbon transport modes.

49. To contribute to program Output 1 (Low-Carbon and Resilient Infrastructure Transformation Demonstrated) communication will be used to ensure that stakeholders in and around the program sites are informed and engaged in the low-carbon transformation process. Understanding the priorities of present and potential bus passengers, bike riders and pedestrians as well as riders of electric motorcycles and car users is key to designing a system that effectively shift passengers from cars to more low-carbon modes of transportation. Understanding the current energy use and barriers to energy saving practices in households provides design directions in sustaining program interventions.

50. The following key agencies – Transport Authority of Xiangtan (TAX); Natural Resource and Planning Bureau of Xiangtan City (NRPB); Xiangtan Public Security Bureau (XPSC) and the PMO – will be capacitated to ensure that participatory processes are used to engage with the identified stakeholders. Part of the capacity building is providing technical assistance for the conduct of behavior trials (see appendix 3) to support the finalization of the detailed design, and develop the more detailed behavior communication strategy.

51. Communication plays a vital role for creating meaningful stakeholder involvement in two ways: (i) providing a platform for stakeholders to engage with the program designer to communicate their priorities; and (ii) keep users and potential users informed of progress and manage their expectations.

52. Meaningful stakeholder involvement includes setting up platforms for stakeholders to give feedback and have a tangible influence on the planning process for Outputs 1 and 2. The observations and interviews done suggest that there are multiple conflicting interests at stake when the road is to be reworked for ecosystem-based adaptation, such as residents wanting to keep – sometimes unsanctioned – parking opportunities in the pedestrian zones while shopkeepers want visibility and easy access for customers. Also, Fuxing middle road has a large number of auto repair garages and connected stores. In interviews, garage owners say the proposed new road design with a focus on separating different modes of traffic risk putting them out of business because customers will not be able to cross bicycle and pedestrian sections and drive their cars to the garages.

53. **Implementation stage:** Engagement with users remain important throughout the implementation phase. Communication has a pivotal role in: (i) generating feedback from users that allows transport authorities and bus operators to make ongoing adjustments to schedules and other services to keep satisfaction high; (ii) maintain a platform for user engagement on ongoing adjustments to infrastructure or systems.

54. The Xiangtan bus and bike-share apps will be enhanced to include feedback options, and provide regular program information to users. Promotion activities will generate more traffic and users to the apps. The Xiangtan Transport Authority can reinforce the apps through its social media accounts particularly WeChat and Sina Weibo. Ensuring that users get fast and meaningful responses on their feedback is one of the best ways to build user satisfaction and loyalty.

55. The PMO will provide regular updates to stakeholders through monthly or bimonthly bulletins. Regular meetings with road users such as town hall-style meetings or meetings with voluntary user representative groups offer city government a source of information to continuously improve services and understand users better. More detailed activities are on Appendix 1: Communication strategy matrix.

Objective 2: Promote the Xiangtan residents' use of public buses and increase use of low-carbon transport modes

56. **Planning stage:** Information to users and potential users is important throughout the program phases. Knowledge of upcoming investments in better bus and bicycle transport is important information for users who consider buying a car or moving to another part of the city. Communication will strengthen Xiangtan's brand as a city that is pursuing green growth and transforming citizens to adopt low-carbon lifestyles.

57. To ensure that the proposed program designs are centered on user needs and feedback is incorporated, the results of the observations, FGDs and SES were used to develop a behavior trials plan (see appendix 3) to guide the program team and program management office of the implementing agency prior to finalizing the detailed design. Depending on the key design aspects to test and the behaviors needed for trials, the methodologies are all participatory and include a mix of phased observations, actual trials and simulations and on-site interviews. The results of the trials will determine design adjustments, and the kind and extent of communication and enforcement needed to ensure behavior changes.

58. Detailed information on the new low-carbon transport system will also be valuable for private sector stakeholders such as developers, restaurants, shops etc. when they plan for where to place or expand their business. Communicating early with these groups can build support and create new opportunities for synergies created around the program outputs.

59. **Implementation stage:** Working on the supply side – offering better low-carbon transport modes – is most efficient when coupled with initiatives to increase demand. Under this stage, communication is focused on: (i) Managing stakeholder perceptions and expectations about the program prior to, during and after civil works; (ii) Dissuading citizens from investing in new cars in favor of better, low-carbon transport options; (iii) Increase public bus use; (iv) Increase proper use of pedestrian lanes; and, (v) Increase biking and proper use of bike lanes.

60. **Communication will be in tactical phases:** To manage stakeholder perceptions and expectations about the program, dissuade citizens from investing in new cars and encourage more residents to use low carbon transport modes, communication will be timed prior to, during and after civil works.

61. A more detailed behavior change communication (BCC) strategy targeting each stakeholder's transition to using low-carbon transport modes will be developed based on the results of the behavior trials. The exact timing, recurrence of messages, key messages and channel choices will be part of the BCC strategy. The stakeholders are current and potential users of buses and bicycles, pedestrians, private car owners, and motorcycle riders as well as residents with special transportation needs (i.e., elderly, disabled, pregnant women, parents with babies / small children).

62. Prior to civil works, the following approaches will be implemented: information will be provided about where and when construction will take place, and how civil works will affect the

road users and residents of affected areas. The feedback app (incorporated in the bus app and in the Xiangtan Transport Authority's social media accounts) will be promoted. During civil works: updates will be continuously provided to minimize inconvenience created, reminding road users about the end result. When infrastructure is finished: the convenience of new buses will be highlighted that will include regular updating about bus schedules and arrivals, and encouraging the use of bike shares located near bus stops. The new bus stops will be maximized to provide information about low-carbon lifestyles. A blended strategy will be used to synchronize messaging and timing of message release in digital, traditional media and physical (communication paraphernalia) channels.

63. To dissuade citizens in investing in new, private cars, infrastructure changes and enforcement are necessary. The behavior trials plan (appendix 3) will determine the parking areas, tariffs and other elements to shift parking patterns. Creating stronger enforcement of parking regulation and making it riskier to park illegally will reinforce the preference for public bus use. Communication will support this behavior by promoting the location, fees and enforcement conditions so private car owners and drivers will weigh the impact of investing in private vehicles.

64. To increase public bus use, communication approaches will focus on highlighting improved access and inclusivity of buses for residents with special needs and promoting the digital monitors to be installed at bus stops which will provide real-time information on coming bus arrivals, schedules and route information as well as service disruptions and crowding conditions. Customer service orientations will be provided to bus drivers and operators to ensure that they follow courtesy, safety and safe access protocols.

65. Better connectivity of buses with shared bikes, and the benefits of tri-modal green transport will be strategically promoted in bus stops, bike stands and through media and social media. The low-carbon lifestyles of KOLs (Key Opinion Leaders) providing testimonials about the benefits of walking, bus and bike travels (cheap, clean, healthy etc.) will be promoted. Enforcement is key to encourage the proper use of bike lanes where cyclists are made vulnerable and unsafe by the risky behavior of motorcycle / e-bike drivers.

66. Communication activities will promote safe cycling behavior in the 5 schools where the road safety campaign will be conducted (See communication objective 4). The student ambassadors program from these 5 schools will increase the visibility of children, who have undergone a gaming-based road safety curriculum in their schools, in helping direct pedestrian and bike traffic piloted within the 5 school zones. This will not only inspire a sense of responsibility in children but also make adult motorcycle / e-motorcycle drivers more conscious of the impact of their unsafe behavior. More detailed activities are on Appendix 1: communication strategy matrix.

Objective 3: Promote more widespread adoption of low-carbon lifestyles in homes to reduce energy consumption for cooling, heating and lighting

67. The communication strategy will focus on reducing energy use in buildings through insulation and use of energy-efficient lighting and appliances. Key messages will revolve around how current behaviors in heating and cooling can be shifted to using LEDs, energy-efficient appliances, and enumerating simple steps that can be easily made into habits.

68. Approaches will be tailored to these specific audiences: (i) middle- and higher-income households with a focus on women in the 20 old communities. FGDs indicate that women are mostly responsible for managing the household and have the greatest concern about household finances. Middle- and high-income households have the capacity and are more likely to have

funds to invest in energy-efficient lighting, appliances and systems in apartment buildings; (ii) schoolchildren of the same demographic as influencers to reinforce behavior changes of the women (above) and other members of the household. Done through schools, communication activities incorporated as part of the curricula or as additional learning activities have direct impact on children who will not just practice energy efficient habits in their houses but also inspire their parents to take action; (iii) owners committees in apartment buildings as they are the organized group that can initiate larger energy efficiency schemes either in collaboration with their property management company or on their own.

69. The communication strategy for households, children and owner committees of apartment buildings in 20 old communities will use four approaches: (i) Raising awareness of the availability and benefits of insulation and energy savings appliances/lighting. This will likely be executed mainly on social media targeted to Xiangtan residents; (ii) education materials for primary schools on energy efficiency and insulation; (iii) targeted information to home owners in medium- or high-income neighborhoods on how they can improve energy efficiency in their homes and buildings. Options for action could include but are not limited to: caulking of windows, changing to high efficiency LEDs for lighting, changing to high efficiency appliances, installing shades/foils to block heat from sunlight; (iv) targeted information to owners committees or other instances serving the same role on their options to create energy savings via insulation and introducing funding opportunities like ESCO contracts.

70. The following set of audiences will be targeted to ensure that technical support and actual energy-efficient options are available for households and owners committees in apartment buildings who are ready to make behavior changes. Targeting these stakeholders ensure that intent to be energy-efficient or demand for energy efficiency is translated into concrete practice by providing supply-side support: (i) property management companies, as they have the option of including advisory services for insulation, and efficient lighting/appliances to residents in a building/complex they serve. Also, they can potentially realize energy savings as a service-business models in the buildings they serve; (ii) local and online appliance stores; (iii) ESCOs as partners in larger insulations projects.

71. Messaging will be focused on detailing the specific opportunities to save on energy costs. For homeowners, examples of actual household savings will be provided, and how interventions such as caulking, for example, also creates greater comfort and can have additional positive health effects. Messaging for schoolchildren is more focused on how saving energy contributes to a greener and more resilient future, but also with the same elements of home improvement as mentioned for homeowners. Messaging for owners' committees will focus on the benefits of larger interventions like insulation of a building or better energy management, the ESCO-model, lifetime costing and finance models that can create savings for residents from the first year of a renovation project.

72. The communication strategy for property management companies, appliance stores and ESCOs will follow a two-pronged approach: (i) securing commitments to supply capacity building for property management companies on energy saving as a service business models; (ii) coordinating price rebates or other sales strategies to social media strategies focusing on LEDs or energy efficient appliances.

73. Messaging towards supply side audiences will center on the market opportunity in creating energy efficient lifestyles that the Xiangtan LCCD program will open. For property management companies, focus is on how better energy management can be turned into savings for their clients and thus a competitive advantage. Xiangtan can be presented to ESCO companies as a new

market, and platform to expand the market to upcoming provincial cities in China. More detailed activities are on Appendix 1: communication strategy matrix.

Objective 4: Promote walking as a low carbon mode of transportation and pedestrian road safety among school children

74. Encouraging more walking supports the transition to low-carbon lifestyles but this can leave pedestrians, and especially vulnerable groups such as children, at risk of accidents. Over 20,000 children are killed or injured each year in road-related accidents in the People's Republic of China, with an estimated 43% of students having been involved in a traffic accident at some point in their lifetimes. Children are particularly vulnerable to accidents because they are more difficult to see due to their small size and therefore can be hidden from view due to obstacles such as parked cars. They are also less able to make decisions about safe behavior, and are more likely to behave in unpredictable ways such as running across the street.¹⁹

75. This communication objective is focused on the five (5) Xiangtan schools identified in the Baseline and Design Road Assessments and School Zone Road Assessment, Xiangtan. These are the Jinting Primary School, Heping Primary School, Huoju Primary School, No. 3 Primary School and Xiangji Primary School. Traffic volume near the schools increase at the same rate as the school's peak hours. The Road Safety Report recommends that the program adopt a raised pedestrian crossing that is the same levels as the sidewalk to provide a safe, continuous route for the school kids, their parents and caregivers, teachers and administrators. Raising the pedestrian crossing will make the road users more visible to motorists at the same time, make motorists yield to walkers. The Road Safety Report also recommends extending the curb for the pedestrian crossings in front of school gates to block illegal roadside parking, shorten crossing distances, provide more waiting space for pedestrians and make them more visible to motorists.

76. To support these recommended changes in the pedestrian infrastructure, communication efforts will be focused primarily on children who are the main users of the improved pedestrian crossings, and parents / caregivers who drive vehicles or motorcycles / e-motorcycles. Using participatory co-designing methodology, teachers will develop with the school children a gaming-based curriculum that will: (i) introduce the improved raised pedestrian walkway and extended curb; (ii) simulate safe behaviors in responding to traffic signals, crossing and boarding vehicles / motorcycles / e-bikes; (iii) increase walking; (iv) increase cycling. Gaming-based, all safe pedestrian crossing and riding behavior will earn the school children points that will allow them to proceed to the next level of safe road user behaviors. The game also rewards students who walk and bike more.

77. To reach the secondary audiences, communication efforts will be focused on orienting the parents and caregivers who pick up the children to: (i) follow traffic signals and yield to pedestrians crossing the elevated crossing; (ii) follow new unloading and loading schemes to ensure smooth and safe getting on / getting off behavior of students; (iii) refrain from illegal roadside parking. Risky behaviors and road safety violations will cause children to have demerit points or extra redemption challenges in the gaming-based curriculum. The PMO's communication consultants will provide technical support to teachers to develop the participatory methodology and gaming-based curriculum. The consultants will also provide support in the parents and caregivers' orientation and behavior enforcement.

¹⁹ Chevron China. 2013. *Chevron Supports "Walk Wise" in China*.
http://www.chevronchina.com/en/news/archived/May31_2013.aspx

A student ambassador program will also be created that will increase broader awareness of children and traffic safety concerns in Xiangtan while building a sense of leadership among students. Select groups of student ambassadors will accompany local police to direct pedestrian and bike traffic, increasing the children's visibility in the neighborhood and inspiring a sense of improved road safety behavior among children. More detailed activities are on Appendix 1: communication strategy matrix.

Table 1: Communication Strategy Matrix

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
Objective 1: Create platforms for meaningful and stakeholder involvement in the planning and implementation of low-carbon and resilient infrastructure						
Low use of new sustainable transport modes (output 1) due to lack of alignment with stakeholders needs and preferences	Agencies with mandates related to Outputs 1 and 2. (Transport Authority of Xiangtan (TAX); Natural Resource and Planning Bureau of Xiangtan City (NRPB); Xiangtan Public Security Bureau (XPSC) and the PMO), program designers and planners.	Centralized planning with little dialogue with users/residents - > Participatory processes engaging users and potential users as well as other key stakeholders in planning and implementation of program.	Developing the program in dialogue with users and stakeholders will enhance the desired outcomes and create greater acceptance of program.	Capacity building on conduct of behavior trials using a mix of participatory methodologies Expert support in incorporating results of behavior trials in the detailed design process. Bimonthly/Quarterly meetings with agencies to track progress and define needs for research and participation initiatives.	Timeline: Planning stage before finalization of detailed design Responsibility: PMO with communication consultants. Resources: 1 person month, international participatory process consultant. 2 person month, national participatory process consultant.	Stakeholders engaged in design and planning process Results of behavior trials incorporated in detailed design Output indicators: 100% of relevant agencies participate in capacity building # of stakeholders/users taking part in "town hall" meetings where: <ul style="list-style-type: none"> At least 40 % of participants are women At least 10% of participants are elderly or disabled
	Bus passengers (present and potential) and pedestrians with a focus on residents in areas in proximity of trunk roads reworked	From low satisfaction or acceptance of service gaps -> active engagement in defining needs and priorities with regards to transportation.	The new low-carbon, smart urban mobility system can have a large influence on your transportation, but you have the opportunity to help shape it by contributing to the planning process.	Creating attention and knowledge with stakeholders of the planned work by: <ul style="list-style-type: none"> Stakeholder/community information and dialogue meetings (town hall style) Social media forums for dialogue on street 	Timeline: Planning and implementation stage Responsibility: PMO with communication consultants Resources: ½ person month, international participatory process consultant	# of stakeholders/users taking part in co-design workshops where:

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
	<p>Cyclists (present and potential) with a focus on residents in areas in proximity of trunk roads reworked</p> <p>Electric motorcycle and car drivers in program affected areas</p> <p>Committees representing residents with special needs, such as disabled, elderly or women</p>			<p>design and program development</p> <p>Providing a platform for stakeholders to engage with the program designer:</p> <ul style="list-style-type: none"> - Behavior trials - Co-design workshops providing a platform for stakeholders to engage with the program designer to communicate their priorities <p>Creating platform for user engagement on ongoing adjustments:</p> <ul style="list-style-type: none"> - Enhancing the Xiangtan bus and bike-share apps to include feedback options, and provide regular program information to users. <p>Keep users and potential users informed:</p> <ul style="list-style-type: none"> - Monthly/Bimonthly bulletins from 	<p>2 person month, national participatory process consultant</p> <p>1 person month national social media consultant</p>	<ul style="list-style-type: none"> • At least 40 % of participants are women • At least 10% of participants are elderly or disabled <p># of bulletins issued</p> <p># of active users on chosen social media forums</p> <p># of active users of the enhanced feedback options of the Xiangtan bus and bike-share apps</p>

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
				PMO on progress; - Social media forums for dialogue on street design and program development particularly WeChat and Sina Weibo		
Public resistance to redesign for Fuxing middle road (output 2) due to lack of alignment with stakeholders needs and preferences.	Residents, shopkeepers, regular users of Fuxing middle road such as shop employees and customers, employees of business in or around Fuxing middle road and other stakeholders	Protecting status quo of the street design to preserve their business and parking opportunities -> Acknowledging that the street reworked for greater resilience can bring benefits for them if they engage in a participatory design process.	Fuxing middle road can be better for all users – if all take part in the planning process.	<p>Creating attention and knowledge with stakeholders of the planned work early in the process by:</p> <ul style="list-style-type: none"> - Stakeholder/community information and dialogue meetings (town hall style) - Social media forums for dialogue on street design and program development. <p>Providing a platform for stakeholders to engage with the program designer to communicate their priorities, by:</p> <ul style="list-style-type: none"> - Behavior trials, stakeholder 	<p>Timeline: planning and implementation phase</p> <p>Responsibility: PMO with communication consultants.</p> <p>Resources: ½ person month, international participatory process consultant. 2 person month, national participatory process consultant. 1 person month national social media consultant.</p>	

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
				<p>surveys/interviews/FGDs</p> <ul style="list-style-type: none"> - Co-design workshops providing a platform for stakeholders to engage with the program designer to communicate their priorities. <p>Keep users and potential users informed of progress and manage their expectations by:</p> <ul style="list-style-type: none"> - Monthly/Bimonthly bulletins from PMO on progress; - Social media forums for dialogue on street design and program development particularly WeChat and Sina Weibo. 		
Objective 2: Promote the Xiangtan residents' use of public buses and increase use of low-carbon transport modes						
Program design not reflecting users' needs resulting in low number	Program designers and planners. Agencies with mandates related to	Centralized planning with little dialogue with users/residents - > Participatory processes	The suggested behavior trials plan will enhance the desired outcomes and create greater	Organizing and executing behavior trials plan (see appendix 3)	Timeline: Planning stage before finalization of detailed design	Stakeholders engaged in design and planning process

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
of residents will use bus or bicycle	Output 1 and 2. (Transport Authority of Xiangtan (TAX); Natural Resource and Planning Bureau of Xiangtan City (NRPB); Xiangtan Public Security Bureau (XPSC) and the PMO)	engaging users and potential users as well as other key stakeholders in planning and implementation of program.	acceptance of program.		Responsibility: PMO with communication consultants Resources: Covered in related activities under Objective 1 (capacity building and expert assistance in behavior trials)	Results of behavior trials incorporated in detailed design Output indicators: Results of behavior trials plan referenced and integrated into planning documents Final planning documents must clearly indicate how the design has been inspired by behavior trials plan
Low number of residents will use public buses Low number of residents will use public bikes	Bus passengers (current and prospective) with a focus on residents in areas in proximity of trunk roads reworked Cyclists (current and prospective) with a focus on residents in areas in proximity of	Uses the bus occasionally -> uses the bus frequently Occasionally combines bus rides with bicycle rides in their daily transport -> Frequently combines bus rides with bicycle	The new low-carbon, smart urban mobility system is the convenient, affordable and green way to get around Xiangtan Support Xiangtan's transformation to a high growth low-carbon, inclusive city	Prior to civil works: - Providing information of when specific areas will be affected by construction and highlighting benefits of coming transport system (synergizes with activities described in Objective 1) - Promoting feedback options in Xiangtan Bus and Bike share	Timeline: implementation phase Tactical phasing in overall strategy taking place over 1-2 years. Responsibility: PMO with communication consultants Resources: 2 person month, international communication consultant 3 person month, national	Increased use of bus and bicycle by Xiangtan residents. Output indicators: Bus lines affected by program must show faster growth passenger numbers than non-affected lines. Survey in relevant city parts to establish baseline and measure outcomes in:

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
Residents with special needs will not achieve greater mobility	trunk roads reworked	rides in their daily transport	New buses offer improved access and inclusivity for residents with special needs	apps and social media feedback platforms (see Objective 1)	communication consultant. 2 person month national social media consultant	- Bicycle ownership (must grow by % determined by PMO)
Resistance from private sector stakeholders will put a break on planned activities	Committees and other groups representing residents with special needs, such as disabled, elderly or women	Dissatisfied with lacking or non-inclusive bus services -> promoting new inclusive bus services	The planned enhancement to Xiangtan's transport system and urban design will support the economic development of the city.	During civil works: - Keeping residents updated to minimize inconvenience (synergizes with activities described in Objective 1)		- Share of residents that have bus and as preferred means of transportation (must grow by % determined by PMO)
	Private sector stakeholders with an interest in affected city areas such as developers, restaurants, shops	Promoting status quo of traffic system to avoid perceived business risks -> realizing and supporting the business potential of Output 1 and 2		When infrastructure is finished: Highlighting convenience of new buses and traffic information system with blended social media and physical communications campaign using: - Short video format and testimonials from Key Opinion Leaders - Engagement enhancing formats such as games, competitions etc.		

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
				<ul style="list-style-type: none"> - Posters etc. in relevant community centers, business zones, shopping areas, businesses, schools etc. - Info-screens at bus stops 		
Bus drivers dissuading residents with special needs from using the bus by not taking their needs into consideration	Bus drivers in Xiangtan	From being focused on speed and not being considerate to residents with special needs -> being courteous, placing the bus close to the curb at stops	Customer service is especially important to passengers with special needs	<p>Training program for Xiangtan bus drivers teaching them to meet the needs of passengers with special needs</p> <p>Follow up on effect with customer surveys</p> <p>Use customers surveys as part of bus drivers' employee evaluations.</p>	<p>Timeline: planning and implementation phase – repeat if needed</p> <p>Responsibility: PMO in collaboration with bus operating companies and Transport Authority of Xiangtan (TAX)</p> <p>Resources: ½ month national communications consultant.</p>	<p>Bus drivers showing increased customer service towards passengers with special needs</p> <p>Outcome indicators:</p> <ul style="list-style-type: none"> - Customer satisfaction surveys must show increased satisfaction from passengers with special needs over the program period
Residents invest in new cars before program implementation, making it harder to convince them to use the bus as they would	Residents in Xiangtan with plans to buy a new car	Buying a new car -> waiting to evaluate the effect of smart urban mobility system before choosing transport mode.	Parking can become more expensive, and buses will become more convenient.	<p>Monthly/Bimonthly bulletins from PMO on progress</p> <p>Social media forums for dialogue on street design and program development (using WeChat, Sina Weibo)</p>	<p>Timeline: planning and implementation phase</p> <p>Responsibility: PMO with communication consultants</p> <p>Resources: Covered in suggested initiatives above</p>	<p>Slowing growth in car purchase with Xiangtan residents</p> <p>Output indicators:</p> <ul style="list-style-type: none"> - Growth in car sales in Xiangtan must be lower than in comparable

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
want to utilize the investment in a car						cities over program period
Objective 3: Promote more widespread adoption of low-carbon lifestyles in homes to reduce energy consumption for cooling, heating and lighting						
The considerable source of carbon emissions from households will increase	Female Xiangtan Residents in middle- or higher income brackets mainly responsible for household management.	Not insulating their homes-> insulating their homes Refrain from buying LED lighting and other energy efficient appliances -> buying LEDs and other energy efficient appliances	Insulation saves money and creates greater comfort for you and your family. A lot can be done in your home with little effort Energy efficient lighting and appliances saves money in the long run	Blended strategies with social media and physical presence (e.g. on posters and info-screens at bus stops) Short video format and testimonials from Key Opinion Leaders Social media/ website for information on detailed information, supplier lists, tips and tricks, etc. Detailed choice of platform and formats will be discussed between PMO and program specialists Posters and other communication materials in relevant community centers, business zones, shopping areas, businesses, schools, etc	Timeline: can start as soon as program funding is available. Phased behavior change communication activities around the start of heating and cooling seasons Resources: 2 person month, international communication consultant. 3 person month, national communication consultant. 2 person month national social media consultant.	Residents increasing their use of individually applicable insulation technologies such as caulking and shutters/foils to keep out heat from the sun Increased use of energy efficient LED lighting Increased use of energy efficient appliances Output indicators: Survey of households establishes baseline and measures outcomes for: - Average energy use in surveyed households - % of light bulbs that are LED

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
						<ul style="list-style-type: none"> - % of appliances in that are labelled best in the CEL national energy efficiency label - % of households that have taken steps to insulate their dwelling
New generations will grow up with lifestyles that increase carbon emissions	School children of middle- and higher income brackets	Being uninformed on and uninterested in saving energy -> inspiring their parents to save energy	Saving energy saves money and creates a safer future.	Information/education materials offered to teachers on how to create energy savings in homes. (suggested age groups 8-12 years)	<p>Timeline: can start as soon as program funding is available</p> <p>Phased behavior change communication activities around the start of heating and cooling seasons</p> <p>Responsibility: PMO with communication consultants.</p> <p>Resources: 1/2 person month, international sustainability training specialist. 1 person month, national sustainability training specialist. 2 person month national primary education specialist.</p>	<p>Schoolchildren acting as inspiration for their families in saving energy and carbon emissions</p> <p>Spillover effects on strategy for insulation/energy efficiency in households (see above)</p> <p>Output indicators: #of school classes that have received training</p>

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
					Costs: School campaign: USD 97,000	
Potential for savings on energy bills and carbon emissions are not realized	Owners' committees or similar groups representing apartment owners in apartment complex	<p>Not insulating the apartment complex-> insulating the apartment complex</p> <p>Not having energy efficiency as a parameter for evaluating the service of property management companies -> having energy efficiency as a key parameter for evaluating the service of property management companies</p>	<p>Create energy savings and greater comfort by insulating the building – this can raise the value of apartments</p> <p>ESCO or other financial instruments can finance insulation without owners having to pay more.</p> <p>Good property management companies can help the apartment owners to create energy savings and save money.</p>	<p>Targeted information materials to owners' committees.</p> <p>Information meetings for owners' committees.</p> <p>Energy consultants/ESCOs meeting owners' committees to provide information.</p> <p>Website for reference materials, suppliers lists, etc.</p>	<p>Timeline: can start as soon as program funding is available</p> <p>Phased behavior change communication activities around the start of heating and cooling seasons</p> <p>Responsibility: PMO with communication consultants</p> <p>Resources: 1/2 person month, international energy efficiency consultant. 3 person month, national energy efficiency/ESCO consultant. 1 person month national communication consultant.</p>	<p>Owners' committees adopting use of full-building insulation techniques in Xiangtan</p> <p>Output indicators: # of Owners' committees:</p> <ul style="list-style-type: none"> - Request information package. - Attend information meeting - Request visit from energy consultants <p># of visitors on webpage, downloads and time spent</p> <p>#of buildings insulated</p>
	ESCOs: as partners in larger	Not targeting Xiangtan as a market for low-carbon services	The low-carbon transformation program offers new markets for	Targeted information materials to businesses in the relevant sectors	Timeline: can start as soon as program funding is available.	Private sector stakeholders in Xiangtan adding energy saving in

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
	insulation projects Property Management Companies Appliance stores, local and online	and goods -> seeing that the Xiangtan Low-carbon Transformation program opens a new market for low-carbon services and goods in Xiangtan	insulation and efficient lighting and appliances in Xiangtan.	Training material offered for capacity building with property management companies. Building a trusted suppliers list where applicants can promote their services after being vetted by PMO	Responsibility: PMO with communication consultants Resources: 1/2 person month, international energy efficiency consultant. 1/2 person month, international communication consultant 1 person month, national energy efficiency consultant. 1 person month national communication consultant.	buildings to their value propositions, products and services Output indicators: # of business engaging in program # of property management companies requesting capacity building/training
Objective 4: Promote walking as a low carbon mode of transportation and pedestrian road safety among school children						
Children are a particularly vulnerable population group when it comes to accidents with vehicles. A low carbon lifestyle includes the ability to safely get around while walking, therefore both children	School children	Risk of unsafe road crossing-> always crosses the road with caution and in designated areas.	(i) Properly use the improved, raised pedestrian walkway and extended curb; (ii) simulate safe behaviors in responding to traffic signals, crossing and boarding vehicles / motorcycles / e-bikes; (iii) increase walking	Gaming-based curriculum co-created with children that is piloted in the 5 key schools Children act as leaders to educate their families and act as role models in their behavior Community event where children present road-safety to local stakeholders	Timeline: Creation of gaming-based curriculum 3-5 months. Integrated with regular activities Responsibility: PMO with communication consultants Resources: 2 person month, international communication/education consultant	Schoolchildren showing fewer risk behavior in traffic Drivers showing fewer risk behavior around school generally in Xiangtan Output indicators: # of accident/serious accidents/deaths from traffic close to 5 Xiangtan schools

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
and drivers must adopt road-safe behaviors.			Children are encouraged to act responsibly leaders and “teach” their families about road safety as well as act as role models to other children	Student ambassador program where children are selected to accompany police officers in directing pedestrian traffic and orienting pedestrians Social media outreach that supports children in educating their families and includes educational short videos Signages or banners posted in school zones	3 person month, national communication/education consultant. Optional: 2 person month national social media consultant	decreased from baseline year # of of accident/serious accidents/deaths from traffic in Xiangtan decreased
Risk behavior in traffic – and near schools – increases with more injuries and casualties as a result.	Drivers, including the family and parents of the school children. Drivers of cars, bikes, and motorcycles.	Unsafe behavior near schools such as fast speeds, distracted driving, parking near crosswalks and on sidewalks -> cautious driving with particular care in school zones and in the rush hour of school drop offs.	(i) Follow traffic signals and yield to pedestrians crossing the elevated crossing; (ii) Follow new unloading and loading schemes to ensure smooth and safe getting on / getting off behavior of students; (iii) Refrain from illegal roadside parking.	Parents/drivers information meetings on safe behaviors in traffic conducted at schools Participation in the gaming-based curriculum Social media outreach		
Risk behavior in	Drivers, including the	Unsafe behavior near schools	(i) Follow traffic signals and yield	Parents/drivers information meetings		

Risks	Audiences/ Stakeholders	Current/ Desired Attitude Behaviors	Messages	Activity/Channels	Timeline, Responsibility, Resources	Expected Outcomes
traffic – and near schools – increases with more injuries and casualties as a result.	family and parents of the school children. Drivers of cars, bikes, and motorcycles.	such as fast speeds, distracted driving, parking near crosswalks and on sidewalks -> cautious driving with particular care in school zones and in the rush hour of school drop offs.	to pedestrians crossing the elevated crossing; (ii) Follow new unloading and loading schemes to ensure smooth and safe getting on / getting off behavior of students; (iii) Refrain from illegal roadside parking.	on safe behaviors in traffic conducted at schools Participation in the gaming-based curriculum Social media outreach		

ESCO = energy service companies, LED = light emitting diode, PMO = program management office.

G. Stakeholder analysis

78. This Stakeholders Analysis is split in two parts. Part one corresponds to the mobility practices of stakeholders and preferences for social engagement. Part two of the stakeholder analysis focuses on the household energy use of stakeholders and possibilities for engaging with private sector.

Table 2: Stakeholder analysis on traffic and mobility

STAKEHOLDER GROUP	INTEREST/STAKE	ISSUES OF CONCERN	INFLUENCE
Xiangtan Residents			
Cyclists Small group as only 2.7% of responses in SES reports bikes being a major transport mode for daily trips; 21% of households own at least one bike according to SES Young people/students	Needs safe and fast transport Needs good integration with buses and trains for longer trips Used for shorter trips Very few households own a bike. Shared bicycle system has issues with availability of bikes at key points, and the usability since the bikes are heavy and with no gears	Shared bike system is relatively successful, but connectivity can be improved to encourage tri-modal use ((bike-ride bus or train-walk) Cyclists don't wear helmets. Shared bikes are cheap and easy to access from bike docks, but are relatively heavy limiting the usability on longer trips There are no bicycle racks with buildings or in designated bicycle parking spaces, so private bike owners cannot lock their bike to avoid theft Vulnerable group in traffic – bike lanes used by electric-motorcycles; often pressed into car lanes by confusing road layout; missing bicycle lanes	Influence is low – cyclists are a small group and their needs have not been high on the agenda of the relevant city authorities. Students are the more frequent users of the shared bike system Most own a smartphone and are digitally savvy, but street interviews and FGDs indicate that lower income residents don't use ICT on for traffic information because they want to save data use. If they use shared bikes they do so via card payment
Bus passengers Bus use is relatively high with 39 % of lower income residents and 33% of medium income residents based on SES	Need reliable, affordable, convenient and safe bus service Lower income residents are dependent on bus services to get to work	Distance to bus stops from work or from home is too far Bus stops do not provide adequate shelter from rain, sun, and spray from puddles. Lower income passengers save smartphone data and do not use apps to see when bus arrives. This leads to risky behavior as they walk into the street to look for approaching buses Bus drivers often don't drive close to the bus stop platform, forcing passengers to step into street to enter the bus	Bus passenger app has function to give feedback or report complaints Users that pay with other apps, such as Alipay, do not have that option Most own a smartphone, but lower income residents don't use it to get information on bus departure time and other info because they want to save on data use

		<p>Bus stops are narrow and hard to navigate safely without getting into the street.</p> <p>Bus stops have different height of curbs, but buses do not have adjustable floor height, impairing accessibility</p>	
<p>Car users</p> <p>Higher and medium-income residents</p>	<p>Want fast and hassle-free traffic</p> <p>Want parking spaces</p> <p>Cars are convenient and carry status</p> <p>75% of higher income respondents point to cars as the main means of transportation for trips above walking distance. The same is true for 47% of medium-income respondents</p>	<p>Car ownership has almost doubled in China from 2013 to 17²⁰, and projections²¹ indicate a further tripling of the car fleet in Hunan province by 2030. In Xiangtan this has created a lack of parking spaces, resulting in parking on pedestrians walkways and other irregular spaces</p> <p>Still seen as more convenient and faster than buses</p> <p>Traffic is growing, but congestion in Xiangtan is still relatively low</p> <p>Existing bus or bike priority lanes are not prohibited for cars, but car owners are automatically carry responsible for any accidents in these lanes</p>	<p>Enforcement of parking laws is seen as sensitive and hard to tighten</p> <p>Car users park randomly with little fear of parking rules being enforced</p> <p>Influence is high – local authorities generally focus on the needs of car users</p> <p>Most own a smartphone and are digitally savvy</p>
<p>Commuters with no cars</p>	<p>Needs fast, reliable convenient modes of commuting to work</p> <p>Flexibility is needed for those with changing work hours</p>	<p>Connectivity in transport system needs improvement, especially around train stations.</p> <p>Bus stops don't provide adequate shelter from rain, sun, and spray from puddles</p> <p>Lower income passengers save smartphone data and do not use app to see when bus arrives. This leads to risky behavior as they walk into the street to look for approaching buses.</p>	<p>Most own a smartphone and are digitally savvy, but lower income residents don't use it for bus information because they want to save on data use</p>
<p>Disabled and seniors</p> <p>Hindered in their mobility and choice of transportation</p>	<p>Are often dependent on public transport or family members for transport</p>	<p>Bus drivers are reluctant to wait for disabled or elderly people even when they are called out</p> <p>Street observations show that:</p> <ul style="list-style-type: none"> - Bus stops are often designed with very high 	<p>Have less access or capabilities to use smartphones for information gathering or expressing their views.</p>

²⁰ <http://www.stats.gov.cn/tjsj/ndsj/2018/indexeh.htm> , table 6-5.

²¹ <https://www.mdpi.com/2071-1050/11/14/3928/pdf>

	<p>Need transportation to avoid isolation in homes</p> <p>FGDs and street observations indicate that seniors often take care of children and need to travel to take them to leisure activities, school or other activities</p>	<p>curbs making it difficult or even impossible for disabled or seniors to use them safely</p> <ul style="list-style-type: none"> - Most buses have high steps and no access for wheelchairs - Pedestrians walkways are often poorly designed for disabled and elderly with uneven paving and high curbs. Slopes are often too steep - Most pedestrian walkways have lines to guide visually impaired residents, but they are not consistent and sometimes disconnected - Parked cars and bollards to keep motorcycles out block their way <p>For above reasons many choose to walk in the street even in newly developed areas</p>	<p>Can express views / feedback via family members or friends</p>
<p>Electric motorcycle drivers</p> <p>Electric motorcycles are popular with medium and lower income residents. (SES shows 39% of lower income respondents and 38% of middle income respondents indicate that electric motorcycles are a major means of transportation. Same only true for 5% of higher income respondents)</p>	<p>Needs safe and fast transport.</p> <p>Are exposed to weather during travels.</p> <p>Shop owners indicate that some smaller shops also need electric motorcycles or tricycles for delivery.</p> <p>SES shows electric motorcycles are preferred means of transport except walking for lower income residents. Also popular with medium income residents.</p>	<p>Plastic covers to shield drivers from sun/rain are popular but pose a hazard in windy conditions</p> <p>Confusing road design forces drivers into bike priority lanes at crossings, causing hazardous situations</p> <p>Reckless behaviors are common, such as: counterflow driving in slip lanes, using pedestrian islands and zebra crossings to wait for traffic lights or to cross the street, driving on the pedestrian walkways.</p> <p>Only professional drivers wear helmets.</p> <p>Parked cars block access ways, thereby causing drivers to drive on the pedestrian walkways for extended distances</p>	<p>Influence on actual traffic flow and safety is high through their force of numbers and frequency of reckless driving behavior</p> <p>Many pedestrian walkways have bollards to keep drivers from entering public squares or pedestrian walkways. This unfortunately hinders pedestrians especially disabled and elderly who are dependent on the walkways</p> <p>Police officers in the street often reprimand electric motorcycle riders for breaking traffic regulation but no sanctions are given.</p>
<p>Local residents in project areas</p>	<p>Shop owners indicate that residents are worried about parking spaces for their cars</p>	<p>Residents report that there are too many cars parked in the street/on pedestrians walkways, but they don't want to give up their own chance to park</p>	<p>Most own a smartphone and are digitally savvy with access to social media to express opinions</p>

	<p>Reduced traffic can lead to less air pollution and health risks</p> <p>“Tidiness” of the street is reported as a quality they would like see more of</p> <p>Want to keep parking fees from increasing</p>	<p>Crossing trunk roads is difficult on foot as there is little time and most often no pedestrian islands midway</p> <p>Shop owners agree a nearby parking spaces would help keep streets clear of parked cars</p>	<p>Government puts planning online to seek the public's feedback, but they do it at a relatively late phase of the project</p> <p>Hearings will be held for stakeholders if deemed necessary</p>
Local shop owners in project areas	<p>Want to allow customers easy access to shop</p> <p>Want to have their shop visible from the street</p> <p>Want to keep rent from increasing</p>	<p>Fuxing middle road houses a large number of car/motorcycle repair shops and associated stores with spare parts and related products. These stores depend on their clients being able to drive their vehicle across the pedestrian walkway to access the shop</p> <p>Restaurant owners are depend on local customers. They want to use pedestrian walkways to seat more customers.</p> <p>Parked cars block line of sight so stores are not visible to potential customers in the street</p> <p>One shop owner report a 50% drop in revenue the last time parking was made more difficult in front of their shop</p>	
Lower Income Residents Residents with an income in the lower third of the income distribution used in the SES (below 3000 CNY/month)	<p>SES shows this group:</p> <ul style="list-style-type: none"> - Depends on bus service or electric motorcycles for longer transport trips. Walk for shorter trips - Have diverse transport aims, taking several trips per day 	<p>Connectivity in the Xiangtan public transport system could be improved</p> <p>Reckless driving/walking, not using helmets or riding with plastic covering making visibility difficult and hazardous when blown away by to wind.</p> <p>Traffic Police indicates that the ITS (Intelligent Transport Signaling) system in Xiangtan facilitates car traffic at the expense of other traffic modes</p>	<p>Low influence - can give user feedback and complaints via bus app</p>
Medium Income Residents Residents with an in the middle third of the income	<p>SES shows that:</p> <ul style="list-style-type: none"> - Car is preferred mode of transport for longer trips for 	<p>Rapid growth in car ownership (see reference above) has created a lack of parking spaces, resulting in parking on pedestrian walkways</p>	<p>Target audience most likely to transition from car to bus, as still have access to car use</p>

distribution used in the SES (between 3,000 and 10,000 CNY/month)	<p>this group (46% indicate car as a major transport means). Electric motorcycles also popular (38%). Bus in third place (33%).</p> <ul style="list-style-type: none"> - This group has diverse transport aims, taking several trips per day. 	<p>Other modes of transportation are seen as more convenient than buses</p> <p>Connectivity in the Xiangtan public transport system can be improved</p>	
High Income Residents Residents with an in the top third of the income distribution used in the SES (above 10,000 CNY/month)	<p>Car transport is the most preferred transport mode. (75% indicate car as a major transport means). Very few use electric motorcycles</p> <p>Have diverse transport aims, taking several trips per day</p>	<p>Rapid growth in car ownership (see reference above) has created a lack of parking spaces, resulting in parking on pedestrians walkways and other irregular spaces.</p> <p>Could buy electric cars but FGDs indicate that they do not trust the quality or the accessibility of charging stations.</p>	Lifestyles of the wealthy inspire aspirations of lower income families
Pedestrians People travelling on foot. Low income residents travel by foot more often than medium and higher income	<p>Needs safe transportation especially in crossings</p> <p>Need access to well-designed and maintained pedestrian walkways</p>	<p>Electric bicycles, motorcycles – and sometimes cars – drive on pedestrian walkways and in zebra crossings. Sometimes this is encouraged by police</p> <p>Parked cars take up a lot of the available space on pedestrian walkways – sometimes forcing pedestrians into the street</p> <p>Pedestrian walkways are generally uneven and badly kept, with high curbs. Pedestrians with wheeled bags often walk in the street</p> <p>Roads are broad and often have no safe islands in mid-crossing causing people to walk before light turns green</p> <p>Traffic Police indicates that intelligent traffic control system prioritizes cars</p>	<p>More accessible orum – real or virtual – needed for pedestrians to share experiences, form interest groups to influence traffic planning or rule enforcement</p> <p>Most own a smartphone and are digitally savvy, but lower income residents don't use ICT for information because they want to save on data use.</p>
Students Female and male students in	Students aspire to lead a low-carbon lifestyle, but also	Need accessible and affordable transport from dorm/university areas to city or leisure activities	Medium influence, but can potentially be mobilized as “ambassadors” in

Xiangtan's universities	<p>seek the status of e.g. car ownership.</p> <p>Most live in dorms</p>	<p>Travels to other cities to visit family – need well connected trains/long distance travel modes</p> <p>Female students report little unwanted attention in public transport, but often go in groups</p>	<p>communication strategy. Can influence families</p>
Xiangtan authorities with related mandates			
Housing Bureau	<p>Pedestrian areas and parking lots are regulated by the Housing Bureau. Planning is approved by NRPB</p>	<p>According to NRPB regulation, street building owners should make certain there is room for pedestrian traffic. In reality, due to the shortage of parking areas, parked cars always take up much of the space for pedestrians</p> <p>Parking regulation is not enforced</p> <p>There is strong resistance to any initiative making it harder to use cars such as tighter regulation of parking</p>	<p>High – planning authority for much of the civil works in program.</p>
<p>Natural Resource and Planning Bureau of Xiangtan City</p> <p>Approves city planning done by other departments and bureaus, such as plans for new developments, for pedestrian and parking areas etc.</p>	<p>Supervises the land use according to national law</p> <p>Organizes the overall city land use planning and implement</p>	<p>The new city government is devoted to link Xiangtan to Changsha and integrate Xiangtan in Changsha-Zhuzhou-Xiangtan area, so the focus for the city's development strategy changed to outwards from previous years' inwards.</p> <p>During the last 5 to 6 years, the strategy was focusing on development in Xiangtan City.</p> <p>Due to lack of government supervision and financial investment many plans cannot be implemented</p> <p>Complaints are being raised by the citizens about city planning and public facilities</p> <p>People's Republic of China's city planners have the knowledge about advanced international ideas and tendencies. However, due to the rapid development in the country, they have much less time and resources in the planning phase</p>	<p>High influence - gives approval to the city land use plans</p> <p>Administration only reaches to the city level and county level. For more detailed issues such as how many arteries and highways should be planned, this is the responsibility of the relevant functional departments and this is finally approved by NRPB.</p> <p>NRPB is not in charge of the implementation</p>

		Planning works which in western countries may take several years, they have to complete the within half year or less	
Transport Authority of Xiangtan Plans and regulates bus services in and around Xiangtan; Manages contract with bus operating companies	Focus is on making buses go faster to compete with car transportation Ambitions is to get more low-income users to use buses. No expectations that they can draw in people from high or higher middle income to use buses more All new buses are reported to be electric and low-floor for accessibility, though few low-floor buses are seen in the street	High-income residents will not use buses Expect that cheaper tickets will increase passenger numbers Expects newer buses will result in more positive/high-end image of bus traffic Expects car use to increase	High Influence -- crucial agency for planning connectivity and accessibility of public transport modes Can influence the bus companies that have the buses by setting standards and key performance indicators for them
Xiangtan Public Security Bureau Traffic police. Regulates traffic and operates the Smart City ITS. Enforces traffic and parking regulation	Needs to keep traffic flowing Objectives of the ITS system: <ul style="list-style-type: none"> - Increase average speed in peak hours by 5-8 km/h - Decrease number of accidents by 30% - Decrease time lost in traffic jams by 20% 	Plans are to develop ITS system to catch traffic violations and provide data for cars to avoid congestion No plans for adding functionalities that can facilitate pedestrian or bike traffic. Consider developing bus priority signaling Traffic police in street enforce regulation irregularly	High – controls development and implementation of ITS including bus priority signaling Controls traffic police enforcement in streets for street safety
Private Sector Stakeholders (Analysis based on generic profile)			
Real estate developers and investors Develops and invests in buildings and developments in the affected areas	Interested in raising housing prices in the areas where they have invested.	Parking is added to all observed new residential areas, giving residents an incentive to own a car Can potentially become a supporter of program, if they believe their investments will grow as a result of program outcomes	High – shapes the residential areas and can influence choice of transport

Taxi and Didi drivers Provides transport services	Interested in keeping or growing their business	Can potentially become a supporter of program, if they believe the program outputs will decrease congestion or otherwise help them in their business Important supplementary services for some residents such as disabled or elderly – if they can afford it	Low influence
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FGD = focus group discussion, ITS = intelligent transport system, NRPB = Natural Resource and Planning Bureau of Xiangtan City, SES = socioeconomic survey

Table 3: Stakeholder analysis on energy use in buildings

STAKEHOLDER GROUP	INTEREST/STAKE	ISSUES OF CONCERN	INFLUENCE
Xiangtan Residents			
Lower Income Residents Residents with an income in the lower third of the income distribution used in the SES (below 3000 CNY/month)	FGDs indicate that this group show low-carbon behavior (e.g. using cooling/heating sparingly), waste little food) because they aim to save on cost of living Cooling and heating is a high cost compared to their income.	Has few extra funds to invest in energy/carbon savings. Low-energy appliances are seen as too expensive and lifetime cost calculations (paying more in short term for expensive equipment but saving more in medium/long term on energy savings) are not well understood	Can improve energy efficiency and comfort in their home at a relatively low cost Can influence via owners' committees Can buy more energy labelled goods
Medium Income Residents Residents with an in the middle third of the income distribution used in the SES (between 3,000 and 10,000 CNY/month)	Show low-carbon behavior (e.g. using cooling/heating sparingly) to reduce energy costs Cooling and heating is a considerable cost compared to their income (see section 29)	Low-energy appliances are seen as too expensive and lifetime cost calculations (paying more in short term for expense equipment but saving more in medium/long term on energy savings) are not well understood Have more funds to invest in energy savings/insulation. Show interest in insulation.	
High Income Residents Residents with an in the top third of the income distribution used in the SES (above 10,000 CNY/month)	Cooling and heating is a smaller cost compared to their income	Have funds to invest in energy savings e.g.in heating and cooling Low-energy appliances are seen as too expensive and lifetime costing is not well understood	Lifestyles of the wealthy inspire aspirations of lower income families Can improve energy efficiency and comfort in their home at a relatively low cost

			Can influence via owners' committees Can buy more energy labelled goods
Owners Committees Organize owners of apartments within the same building/block (no access could be established to this stakeholder group. Analysis based in generic profile)	Want well-functioning and affordable housing Interested in saving costs where possible	Can influence choice of property management companies As an elected body, it has to balance the interests of the owners Can initiate renovation projects such as external insulation	High – can influence or take decisions on larger projects such as full building insulation
Property Management Companies Manage maintenance of residential buildings. Has insights into the technical systems or the buildings (no access could be established to this stakeholder group. Analysis based in generic profile)	Must keep balance between their service and their price competitive. Seeks to expand business	Can invest in new services such as energy saving as a service but run the risk of customers not wanting it Xiangtan Low-carbon Transformation program can be the catalyst for new business and service models with a focus on energy savings in buildings Needs to build capacity with employees and possibly also management	Medium – can potentially be an active partner driving energy savings in buildings if they see a market for it
ESCOs ESCOs finance large scale energy savings such as full building insulation at no cost to owners. Company is paid by difference in energy costs and apartment owners' fixed energy payment for set period of time. After this period, savings are harvested by apartment owners. (no access could be established to this stakeholder group. Analysis based in generic profile)	ESCOs are well-established business model in People's Republic of China Other finance models (loans for example) can be competitive	Needs scale for their projects to be financially viable, at least a full apartment building, often more, is needed Complicated financial model can be hard to communicate ESCOs or other large-scale energy savings in private homes need mechanism to handle that residents might raise expectations for comfort after project implementation causing parts of the energy savings to be cancelled	
Appliance stores Sell appliances	Want to sell more goods and services	Physical stores are under pressure from online shopping	

		A communication strategy to shift to more energy-efficient appliances can cause a raise demand	
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ESCO = energy service company, FGD = focus group discussion, SES = socioeconomic survey.

Table 4: Behavior trials plan- “show, do not just tell”

Behavior change to test	Key project design aspects to test prior to finalization of detailed design	Respondent selection	Suggested methodologies
A. From irregular parking -> Parking only where allowed	<p>Stronger enforcement of parking regulation:</p> <ol style="list-style-type: none"> 1. Park only where allowed 2. Increase parking fee to amount agreed after consulting with key stakeholders <p>How will car users react to increased enforcement of parking regulation (more frequent fines, larger fines)?</p> <p>Background (SES / FGDs): Car owners do not obey parking regulation along Fuxing middle road, blocking pedestrian walkways and access points to shops, roads and houses. There is demand for parking spaces, and they agree to parking fees.</p>	<p>3 respondents who drive private cars everyday to Fuxing middle road or in a selected low-carbon community</p> <p>For in-depth observation and interviews</p> <ol style="list-style-type: none"> 1. Private car users who have heavy packages and/or family members 2. Those who live far away (determine distance) <p>On-site interviews for those who: Insist on parking illegally obstructing pedestrian walkways, right-of-way – and fined for doing so</p> <p>Requirements: 2 researchers</p>	<ol style="list-style-type: none"> 1. Designate an area of project relevance and work with local traffic police to regulate parking diligently for a period. At least two weeks is recommended to allow for regular users to accommodate their use patterns. 2. Two weeks before testing, work with traffic police to <u>disseminate information</u> on the test parking sites (i.e, WeChat groups, flyers for shops along Fuxing middle road r, etc.) -- *this is the comms aspect which will also be tested 3. <u>Day 1</u>: Ride with 2 respondents to determine where they will park and how they park; conduct interviews <u>Day 2</u>: Ride with 2 respondents and point them to the parking sites; conduct interviews (core questions to be finalized) <u>Day 3</u>: Ride with 2 respondents to determine where they will park, point to parking sites; conduct interviews <u>Day 4</u>: Interview same 2 respondents to determine where they parked (without the researchers), and insights 4. On-site interviews with those who insist on parking illegally and are fined and/or towed
B. From using cars -> choose to use bus	Better, more accurate real-time information on bus ETA and routes.	<p>Random</p> <p>Requirements: 3 researchers</p>	<ol style="list-style-type: none"> 1. Work with traffic police to choose a bus stop in project area – preferably near a bike-share stand (also to test connectivity modes) 2. Prototype and test a bus stop information system in

	<p>How will bus users react to better information at bus stops?</p> <p>Background (SES / FGDs): Waiting time too long, passengers shift to other modes of transportation. They risk walking on street to observe if bus is coming.</p>		<p>coordination with bus authority for real-time data. Use visible temporary screens containing bus ETA and route. 4 days total testing in same spot.</p> <ol style="list-style-type: none"> 3. Use quick feedback mechanisms (emoticons such as 😊 😞) to determine user reactions to the information 4. Create billboard with multiple answers to determine how else to reach bus users 5. Interview users onsite to deepen feedback (core questions to be finalized)
C. From using cars -> Choose bi-modal transport (use buses then bikes or vice-versa)	<p>Bike share stands located strategically nearer bus stops</p> <p>Can bikes at strategically positioned areas make more people use public bike system?</p> <p>Background (SES / FGDs): Cyclists do not use shared bikes for too long because they are heavy and single-gear</p>	<p>3 respondents who bike everyday to Fuxing middle road</p> <p>For in-depth interviews</p> <ol style="list-style-type: none"> 1. Bus user who wants to try a bike 2. Bike user who wants to ride bus 3. Dedicated bike user <p>Random interviews</p> <p>Requirements: 3 researchers (will also conduct trials for behavior trials E)</p>	<ol style="list-style-type: none"> 1. Bike-share stands should be strategically near a bus stop 2. Install a sign at nearby bus stop to point to bike-stand and benefits of cycling 3. For in-depth interviews – appointments need to be set: Day 1 “before / what used to be” journey map (can be drawn or videoed) and interview (core questions to be finalized) Day 2 (after trying bike / bus) continuation of journey map and interview – same respondents on changes Day 3 continuation of journey map and interview – same respondents on recommendations 4. Random interviews with users of shared bikes
D. From using cars -> choose to use bus	<p>Commuter-friendly bus drivers can increase number of bus users and commuter satisfaction</p> <p>How does bus users react to more user-friendly bus drivers?</p> <p>Background (SES / FGDs): Behavior of bus drivers make it difficult for passengers (particularly elderly, disabled, people with heavy bags and/or kids) to enter or exit buses</p>	<p>3 bus drivers</p> <p>In-depth interview with drivers at the end of shift – for 4 days</p> <p>Random interviews with passengers while riding buses -- Special focus should be given to disabled, elderly, people travelling with small children, people travelling with heavy bags as these groups are especially</p>	<ol style="list-style-type: none"> 1. Work with bus supervisors to test a “friendly driver initiative” where a few bus drivers are instructed to: <ul style="list-style-type: none"> ○ Wait for and show cordiality to the elderly/ the disabled/ passenger travelling with children or heavy bags. ○ Pull all the way up to the curve at bus stops. ○ Show good humor in dealing with passengers ○ Are allowed to be less accurate on their time plan to accommodate for the above 2. Design quick satisfaction feedback for passengers as

		<p>impacted by bus driver behavior.</p> <p>Requirements: 3 researchers</p>	<p>they get off the bus -- for 4 days.</p> <ol style="list-style-type: none"> 3. Conduct actual interviews with bus passengers (current and prospective) on the importance of bus driver behavior on their choice of transportation mode. (core questions to be finalized 4. Conduct in-depth interview with drivers at the end of shift – everyday for 4 days
E. From using cars -> Choose to use private bikes	<p>Can access to private bikes make more people give up car travel?</p> <p>Background (SES / FGDs): Cyclists do not use shared bikes for too long because they are heavy and single-gear</p>	<p>5 respondents who drive private cars everyday to Fuxing middle road and willing to use their personal bikes for 2 weeks</p> <p>Requirements: 3 Researchers (same researchers who will conduct methodology among bike users / bus users in Fuxing middle road -- see behavior trials C)</p>	<ol style="list-style-type: none"> 1. Get 5 employees at a public office to use their personal bikes for 2 weeks. Incentive from company would be good. 2. Orient employees on use of journey maps (video) to record their experiences with commentaries (prior to mission) 3. Conduct in-depth interviews to understand the experience

FGD = focus group discussion, SES = socioeconomic survey

APPENDIX 6: STRATEGIC PROCUREMENT PLAN

A. Section 1. Project concept

Project Title	Xiangtan Low-Carbon Transformation Sector Development Program
Country	PRC
Executing agency	Xiangtan Municipal Government
Implementing agency	Xiangtan Municipal Government
Program development objectives	The program development objective is to support the Xiangtan municipal government's (XMG) efforts to transform Xiangtan from a carbon-intensive, heavily polluting city to a low-carbon, climate resilient, and livable one.
Project description	<p>The Xiangtan Low-Carbon Transformation (LCT) Sector Development Program (SDP, the program) comprises (i) a policy-based loan supporting reforms that will update existing policies and introduce innovative measures to unlock potentials for carbon reduction; and (ii) a project loan that demonstrate how low-carbon and resilient infrastructure transformation, coupled with information and knowledge systems using information and communications technology (ICT) could foster continuous LCT.</p> <p>Program Scope. The expected impact of the program will be carbon emissions peak achieved in Xiangtan by 2028. The expected outcome will be the use of low-carbon enabling systems in Xiangtan increased. The program will have four outputs of which outputs 1, 2, and 4 will be under the project loan while output 3 will be supported by the policy-based loan.</p> <p>Output 1: Low-Carbon and Resilient Infrastructure Transformation Demonstrated. Physical infrastructure transformation with integrated design of cross-sectoral interventions will be demonstrated. Road infrastructure will be transformed to ensure seamless access to public mobility systems that are safe and inclusive to all, including children, elderly people, and persons with disability. Incorporating safety would support the shift to low-carbon modes of transport. Mobility system transformation includes: (i) installation of comprehensive bus priority lanes (63 kilometers), integrated with improved bicycle network and pedestrian facilities; (ii) school zone transformation for children's road safety at five primary schools; and (iii) street transformation for climate resilient and multi-purposed street for people. Deployment of 100 electric buses and the installation of 790 e-charging units at 31 locations will also lessen GHG emissions and contribute to air quality improvement.</p> <p>The construction of the first "EDGE-certified" hospital building in the PRC will demonstrate the integration of passive building design, clean energy technologies, and ecosystem-based adaptation (EbA) measures. Other infrastructure transformation includes: (i) retrofit of a run-down public building to be equipped with high energy and water saving features and appliances; and (ii) improvement of public facilities and other urban infrastructure at 20 urban communities showing practical ways to build a low-carbon, resilient, and livable Xiangtan.</p> <p>Output 2: Information and Knowledge Platforms Established for Informed Decision Making and Behavior Changes. Physical transformation complemented by ICT and knowledge platforms will complete and sustain LCT. Under this output, a number of sectoral ICT platforms will be installed or</p>

	<p>upgraded, and then, consolidated into a city-wide ICT platform. These are the: (i) intelligent transport system (ITS) that will be reprogrammed to prioritize people and public mobility systems; (ii) building energy management system to monitor and improve energy efficiency of 200 public buildings; (iii) community-scale energy and utility management system to optimize operational efficiency of over 1,300 companies; (iv) early flood warning system to monitor and analyze potential risks caused by fluvial and pluvial floods; and (v) environmental monitoring and assessment system. These platforms will enable better decision making and foster behavior changes towards LCT.</p> <p>Output 3: Capacity Building and Program Management Enhanced. To ensure successful program implementation, a consulting firm will be engaged to assist XMG's project management office comprising of multi-agency representatives. The consultant will also provide trainings and workshops in operating the systems as well as identifying comprehensive plans and programs for sustaining low-carbon transformation.</p> <p>Output 4: Low-carbon transformation policy reforms adopted. The abovementioned infrastructures and system transformations will be sustained and scaled up by policy, institutional, and operational reforms, and outreach activities. Reform areas include: (i) introduction of parking policy and institution setup; (ii) market and demand-driven operation of public buses; (iii) people-oriented ITS operation; (iv) school-zone reform for road safety; (v) clean district energy system and waste heat recovery; (vi) industrial energy and utility management and operation; (vi) low-carbon building sector reforms through green building certification, energy performance contract, and green financing, building energy management system, and energy statistics; (vii) capacity building on EbA and climate adaptation planning tool; and (viii) data security and standardization. Reform measures will be carried out in two equal tranches of \$25 million each. Pursuing the XMG's clear and long-term commitment to carbon peaking target, the LCT policy reforms will create norms of a low-carbon, resilient, and livable city by regulating, incentivizing, guiding, and supporting all relevant actors of the society.</p>
<p>Description of indicative contract packages</p>	<p>The indicative packages under output 1 includes:</p> <ul style="list-style-type: none"> (1) Works (bill of quantities based, for road retrofit or upgrade, safety features, ecological based adaptation features, etc.; for building structure, building internal decoration; and for community upgrade). (2) Consulting Service (for engineering design and construction supervision, and guideline development); (3) Non-Consulting Service (EDGE) (4) Goods (for e-buses) (5) Goods (for charging piles) (6) Goods (for tri-gen equipment, and PV panels) (7) Goods (for building and utility energy management system [BEMS]) <p>The indicative packages under output 2 includes:</p> <ul style="list-style-type: none"> (1) IT product and service (for ICT platform, ITS, energy saving, etc software development and maintenance service) (2) Open competitive bidding (OCB) for Goods (for sensors and field equipment) <p>The indicative packages under output 3 includes:</p> <ul style="list-style-type: none"> (1) Consulting service (for project management, loan implementation support, and capacity building)

	There are 31 packages in total. Within these packages 25 will be financed or partially financed by ADB, including 6 consulting service packages, 7 works packages, and 12 goods packages (including 6 general goods packages and 6 information technology product and service packages). The other 6 packages will be financed by counterpart funding.			
	Type of contract	No. of contract	Procurement method	Estimated value (mil \$)
	Civil works	7	OCB	184.22
	Goods (General)	6	OCB	48.16
	Consulting services	6	QCBS (90:10)	32.04
	Goods (Information Technology Product and Service)	6	OCB	29.37
	Others	6	GP	9.39
	Total	31		303.19
GP = government procurement, OCB = open competitive bidding, QCBS = quality- and cost-based selection.				
Summary of the financing agreement	Total cost for the Program will be \$395.88 million. The Government of PRC has requested a regular loan of \$200.0 million from ADB's ordinary capital resources comprising of \$50.0 million policy-based loan and \$150.0 million project loan. The balance of \$195.88 million will be PRC's counterpart financing.			

B. Section 2: Operating Environment

1. Capacity and Capability Assessment of the Borrower

Strength	Weaknesses
<ul style="list-style-type: none"> The leading agency during implementation has retained an experience external agency, a consulting institute with focus on low carbon development, to provide assistance in project implementation. The leading agency during implementation has a strong position in the domestic chain of responsibility. The program has strong support from relevant bureaus with agreed professional staff secondment during implementation The program has strong support from local residents due to increased safety, resilience and livability. The leading agency has a procurement unit with extensive experience in domestic procurement of government funded project. The strengthened project management office (PMO) has good English language capacity. The Project is supported by ADB. The project is in line with Xiangtan Municipality's low carbon development and transformation scheme. The project can contribute to carbon footprint reduction 	<ul style="list-style-type: none"> The PMO during project preparation is established under the Municipal Development and Reform Commission (DRC), however the office is severely understaffed and has to outsource some key positions to external sources. There is a lack/shortage of ADB project implementation experience across the bureaus involved. There is shortage of knowledge and experience of ADB procurement policy and procedure in the leading agency. There is a large amount of stakeholders involved. Some projects (Outputs 1 and 2) are delivered in congested area of the city downtown. Limited awareness among stakeholders. Trivial administrative requirements. Some sub-projects have low return. Some agencies do not have full understanding of low carbon solutions.

Opportunity	Threat
<ul style="list-style-type: none"> Increased road safety. Increased climate resilience. Increased energy efficiency. Increased cross-sectoral data integration and sharing. Improved public transportation service. An opportunity to apply and promote green procurement. Developed national level low carbon practical training and demonstration base. To attract low carbon practitioner and promote business opportunity in the region. To create Asian-Pacific Region knowledge sharing platform by integrating with ADB knowledge sharing mechanism. Personnel in relevant agencies in Xiangtan Municipality receiving training and capacity development. 	<ul style="list-style-type: none"> Existing high levels of government debt and debt ceilings may limit ability to raise domestic counterpart funds. Potential delays in project implementation due to slow disbursement from counterpart funding. Competition between procurement agencies has led to low fees and scope focused on processing rather than quality consulting. Disturbance from policy departments and personnel in the government during project life cycle. Robust operations and maintenance (O&M) might not be sustainable during operation stage. Inundation of project sites, i.e. Yangmeizhou.

2. Supporting requirements

Procurement capability and capacity	<p>The capacity is assessed to be medium to low. Xiangtan DRC (XDRC) will lead the day-to-day project implementation of the project management office. Some staff from XDRC has capability of working with English. However, the instability in staffing can affect the continuity of project management. This organization lack relevant experience and capacity in procurement. During project implementation the Xiangtan municipal Financial Bureau (XFB) might join the DRC and become member organization. XFB's procurement experience is mainly focused on procurement of domestic funded projects and the agency lacks understanding on ADB policy and requirement on procurement. In addition, there is a lack of comprehensive training on procurement.</p> <p>Currently, the PMO retained the Hunan Province Lianchuang Low-Carbon Economy Development Center as its consultant and seconded some of its staff to the PMO. This action to some extent alleviated the pressure from under-staffing, and also brought in some procurement experience this institute had from previous World Bank/ADB projects. The staff seconded from this institute can use English proficiently. However, this institute has little knowledge about the new procurement framework.</p> <p>Other government agencies in the government departments and public institutes will support the procurement activities led by the XFB during project implementation. These organizations all have shortage in English capacities and lack previous experience with ADB financed projects. Therefore, their support to XFB will focus on technical issues.</p>
Experience in implementing similar projects	<p>XFB is the leading agency for government procurement activity for Xiangtan Municipal Government (XMG). Therefore, it has some similar project experience.</p> <p>Hunan Province Lianchuang Low-Carbon Economy Development Center, the external consultant retained by the PMO, has participated</p>

	<p>in other ADB financed projects in the past. Therefore, this institute has some basic understanding and experience on ADB procurement policy.</p> <p>The other government agencies and public institutes have little ADB project experience. Some agencies such as the Bid Data Center (BDC) has also retained external profession project company as partner. However, such parties have no ADB loan project experience either.</p>
Contract management capability and experience	<p>The PMO has some management experience on consulting service providers, including the Hunan Province Lianchuang Low-Carbon Economy Development Center which is currently providing service. Other project related agencies also have certain contract management experience. However, their experience is limited to management of contracts financed by domestic funding with domestic suppliers or service provider.</p> <p>The partner of BDC has some knowledge regarding contracts related to information technology and service. However, it has no experience with ADB financed contract management.</p>
Level of reliance on external consultants	<p>Both PMO and project related government agencies and public institutes has strong reliance on external consultants, especially on procurement and contract management. In addition, the PMO will need technical support from external source especially on matters related to specific low-carbon concepts or related to big data system.</p>
Existence and description of complaints management system	<p>Currently, the government has its internal complaint management system. In addition, the public resource trading center has its online complaint redress mechanism.</p> <p>There is no project-level complaint management system established yet. During program implementation, such mechanism will be established too.</p>

3. Key procurement conclusions

<p>The PMO, including the XDRC now and the XFB to join during implementation, is currently understaffed and lack staff stability.</p> <p>The PMO has strong reliance on external sources for procurement, contract management and on specific technical areas.</p> <p>The project related government agencies and public institutes have limited English language capacity.</p> <p>During implementation:</p> <p>(1) It is needed to provide professional consulting service and technical support to quickly fill the gap in PMO's project management capacity and project experience in the form of external consultants.</p> <p>(2) Due to the lack of low-carbon concept, it is needed to have professional consulting service involved the project designs to ensure the realization of project objectives.</p> <p>Due to the lack of understanding on ADB policy and relevant project experience, it is recommended to conduct prior review for key transactions.</p>

4. External influence analysis

Governance	<p>There is a stable government environment for program implementation.</p> <p>The administrative functions of the government are also supportive of the project.</p> <p>Currently, two laws govern public procurement: The Law of Tendering and Bidding (2000) and the Government Procurement Law (2012).</p> <p>Issues: (i) Consulting services are not clearly addressed in the two national procurement laws; and (ii) national procurement laws are not clear on participation of state-owned enterprises.</p>
Economic	<p>The economic environment presents as predictably and relatively stable for the life of the Program.</p> <p>Central government efforts to control local government debt risk suspension of projects, or hinder efforts to raise counterpart funds; and</p> <p>Labor supply: the market has sufficient supply of medium to low skilled labors. There might be shortage of highly skilled technicians, especially for the maintenance and regular upgrade of information technology product.</p>
Sustainability	<p>Climate change and adaptation. The impact of climate change on the project is limited. The project design has embedded climate resilience element to improve the climate change adaptation capability.</p> <p>Waste treatment and disposal. Xiangtan Municipality has the wastewater, garbage management system in place.</p> <p>Environmental impact and mitigation measures: most of the civil works will be conducted in the built area with limited environmental impacts. Due to the improved public transportation service, the pollution from other transportation mode might be reduced, leading to some positive environmental benefits. Strict standards and monitoring system are in place however will need to make program-based plans to be implemented.</p>
Technology	<p>Some program components are highly specialized, such as the ICT platform and related information technology activities, and the green products, etc.</p> <p>Xiangtan Municipality has a Public Resource Trading Center (PRTC) established. The center hosts an e-procurement platform which can be used to process transactions online. The e-procurement platform has brought tremendous convenience to the procurement activities. The evaluation panel is usually randomly selected from the expert bank.</p>

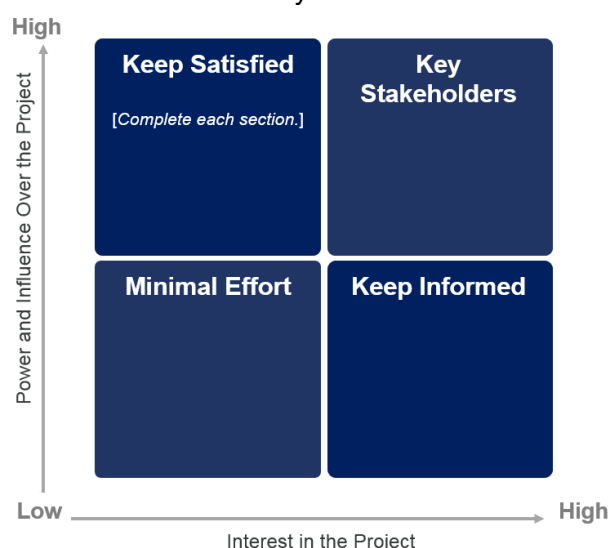
5. Key procurement conclusions

<p>There are certain differences between the procurement procedure required by domestic procurement laws and ADB. In this Project, the activities financed by ADB loan will adopt the ADB procurement procedure.</p> <p>Due to the lack of ADB procurement experience in the executing/implementing agency, it is recommended that for all transactions in the first year of project implementation, prior review will apply.</p>

In the second year, the ADB review mission will re-assess the capacity developed and experience gained in the executing/implementing agency and make due adjustment in the arrangement based on the outcome of the assessment.

The e-procurement platform has a good system in place to ensure fairness, transparency and confidentiality of the procurement transaction received by the PRTC. However, the process and module upon which the workflow of the electronic public procurement platform was designed is mainly catered for the domestic procurement practice and targets audience who has a legal entity that is registered in PRC. The platform can be considered as one of the advertising channels of the package procurement of this project, however at this stage its suitability and feasibility to handle bid submission, evaluation and award cannot be confirmed.

6. Stakeholder analysis and communication plan



The following stakeholders have been identified:

Stakeholder Type	Stakeholder	Power	Interest	Strategy Quadrant
Public Sector				
	Ministry of Finance	High	High	Key Stakeholder
	Hunan Provincial Government	High	High	Key Stakeholder
	Xiangtan Municipal Government	High	High	Key Stakeholder
	Xiangtan Ecology and Environment Bureau	High	High	Key Stakeholder
	Xiangtan Resettlement Office	High	High	Key Stakeholder
	Xiangtan Development and Reform Commission	High	High	Key Stakeholder
	Xiangtan Financial Bureau	High	High	Key Stakeholder
	Xiangtan Housing and Urban Rural Development Bureau	High	High	Key Stakeholder
	State Grid	High	Medium	Keep Satisfied
	Xiangtan Urban Administration Bureau	High	Medium	Keep Satisfied
	Xiangtan Water Resource Bureau	High	Medium	Keep Satisfied
	Xiangtan Natural Resource Planning Bureau	High	Medium	Keep Satisfied

	Xiangtan Transportation Bureau	High	Medium	Keep Satisfied
	Xiangtan Fire Fighting Department	High	Medium	Keep Satisfied
	Xiangtan Quality and Technical Supervision Bureau	High	Medium	Keep Satisfied
	Xiangtan Meteorology Bureau	High	High	Key Stakeholder
	Traffic Police Department	High	High	Key Stakeholder
	Xiangtan Big Data Center	High	High	Key Stakeholder
	Women's Association	High	Medium	Keep Satisfied
	Xiangtan Ethnic Affairs Bureau	High	Medium	Keep Satisfied
	Public Utilities	High	Medium	Keep Satisfied
	Jiaofa Group Company	High	High	Key Stakeholder
	Chengfa Group Company	High	High	Key Stakeholder
	Chinese Medicine Hospital	High	High	Key Stakeholder
Community Groups				
	Affected Community	Low	High	Keep Informed
	Affected primary schools	Low	High	Keep Informed
	Affected hospitals	Low	High	Keep Informed
	Resettled people	Low	High	Keep Informed
	Bus commuters	Low	High	Keep Informed
Suppliers				
	Supply market	Medium	High	Keep Informed
	Bidder	Medium	High	Keep Informed
	Supply chain	Medium-High	High	Keep Informed
	Consultant Groups	High	V. High	Key Stakeholder
Internal				
	Internal Executive	High	V. High	Key Stakeholder
	Internal Management	High	High	Key Stakeholder
	Internal Staff	Low	High	Keep Informed
Other				
	Asian Development Bank	High	V. High	Key Stakeholder
Keep Satisfied		Key Stakeholders		
Affected public utilities		Ministry of Finance		
Women's Association		Hunan Provincial Government		
Xiangtan Ethnic Affairs Bureau		Xiangtan Municipal Government		
State Grid		Asian Development Bank		
Xiangtan Water Resource Bureau		Xiangtan Ecology and Environment Bureau		
Xiangtan Natural Resource Planning Bureau		Xiangtan Resettlement Office		
Traffic Police Department		Xiangtan Development and Reform Commission		
Xiangtan Transportation Bureau		Xiangtan Financial Bureau		
Xiangtan Quality and Technical Supervision Bureau		Jiaofa Group		
Xiangtan Meteorology Bureau		Chengfa Group		
		Chinese Medicine Hospital		
		Consultants		
		Managers		

	Management
Minimal Effort	Keep Informed
	Affected communities Affected schools Affected hospitals Bus commuters Resettled people Supply market Bidders Supply chain Internal staff Other road users Hospital users

7. Stakeholder communication plan

Stakeholder name and role	Key Stakeholder Group ➤ Ministry of Finance ➤ Hunan Provincial Government ➤ Xiangtan Municipal Government ➤ Asian Development Bank ➤ Xiangtan Ecology and Environment Bureau ➤ Xiangtan Resettlement Office ➤ Xiangtan Development and Reform Commission ➤ Xiangtan Financial Bureau ➤ Jiaofa Group ➤ Chengfa Group ➤ Chinese Medicine Hospital ➤ Consultants ➤ Managers ➤ Management
Interest in the project?	High Interest
Support and influence level	High Power and Influence
Objections, drivers, needs, and levers	The objectives of this group are linked into knowledge on: ➤ Fulfilment of requirements ➤ Time Schedule ➤ Quality ➤ Compliance The drivers for this group are quite varied, and include: ➤ Seeking benefits ➤ Approvals and Land Usage
Action	Generally, the stakeholders in this group have a positive approach and outlook in the project. Actions required will support the continuation of this positive outlook
Responsible, accountable, consulted, or informed?	This stakeholders in this group are seen as being Responsible, Accountable or Consulted – dependent on their drivers and involvement in the management of the project.

Communicate what, when, and how?	<p>Most communication will be led by face-to-face communications for this stakeholder group, however face to face opportunities will also be supported by:</p> <ul style="list-style-type: none"> ➤ Reporting ➤ Online content ➤ Presentations ➤ Meetings ➤ Paper-based documentation (as required) <p>PMO will have responsibility for communicating to this stakeholder group.</p> <p>Communication will be scheduled and regular, as well as ad-hoc as required.</p>
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8. Key procurement conclusions

There are a number of local government agencies that has high power and interest in the project. Among them the Xiangtan Development and Reform Commission and Xiangtan Financial Bureau are the gatekeeper agencies as they will have the leading roles in project preparation and project implementation, respectively. Open dialogue regarding debt carrying capacity, availability of counterpart funds, and procurement plan is required, for which this participatory workshop for Strategic Procurement Planning is also an effective method.

The program will have a lot of affected people during implementation and a lot of end users during operation that, not only have a lot of interest in the project, but their behavior would play an important role in the long term successful and sustainable low-carbon transformation. Prompt information dissemination and public consultation or campaigns can be used to keep them informed or have them involved in a participatory way.

Most of proposed packages involves goods or works with steady supply of potential bidders, i.e. the roads, buildings, landscaping, e-bus and charging piles, green products, etc. Special attention should be given to those contacts for which the domestic market hasn't been fully developed and the availability of potential bidders are in question. This include the ICT platform, the energy-saving monitoring system, the low-carbon and climate resilience designer, etc. These should be the focus of the market research to identify the market conditions and potential bidders, and corresponding strategy to address the conditions.

C. Section 3: Market Analysis

1. Porter's five forces

Porters 5 Forces Assessment by Packages of Works

This project will have several categories of contracts as mentioned in Section 1, including :

- (1) OCB for works (BOQ-based, including road upgrade, building structure, building internal, green building upgrade, ecology-based landscaping). These contracts are involved in Output 1.
- (2) OCB for general goods (e-bus, charging piles, digitized bus information board, green building equipment/products, PV, Tri-gen, BEMS sensors etc.)
- (3) OCB for high technology goods - Information Technology and Service (Smart city dispatch center, flood warning, environmental monitoring sub-system, building energy efficiency sub-system, community energy efficiency sub-system, environmental monitoring equipment etc.). These contracts are involved in Output 2.

(4) Consulting service (engineering designs and construction supervision of roads and buildings with ecology-based and low-carbon elements). These contracts are involved in Output1.

(5) Consulting service (integrated urban catchment management plan and development design; and project management and capacity building;). These contracts are involved in Output 2 and 3.

(6) Non-consulting service (EDGE certification fees). These contracts are involved in Output 1.

BEMS = building and utility energy management system, BOQ = bill of quantities, OCB = open competitive bidding, O&M = operations and maintenance, PV = photovoltaic.

Works (BOQ based)

Competitive Rivalry	High	The nature of the works are very common in China. The market is well developed with sufficient qualified domestic suppliers (thousands) ⁴⁴ for works in different sectors. The competition is fierce.
Risk of Substitution	Low	Not much new technology. Some minor improvement might exists here and there but not much change available.
Bargaining Power of Supplier	Low	Due to the fierce competition, the supplier always use lower price to gain advantage in competition.
Bargaining Power of Buyer	High	The buyers can always raise their requirements for higher standards.
Risk of New Entrants	Low	Risk of new entrant would be unlikely to impact the market significantly (but it is relatively easy to enter the market)

BOQ = bill of quantities.

OCB Goods (E-bus, charging piles, digitized bus information board, green building equipment/products, PV, Tri-gen, BEMS sensors, environmental monitoring equipment, etc.)

Competitive Rivalry	Medium to low	Most of the goods are specialized in nature (e-bus, charging piles, energy sensors, transmitter, processor, low-carbon equipment and green products etc.), However there is not much need of customization. Most of them are standard products available in stock. (Medium) The tri-generation equipment for HVAC in the hospital building will need some customization to fit in the hospital building. (Low) The BEMS sensors are also very specialized (Low) Some specific environmental equipment is unique with only few supplier in the market. (Low)
Risk of Substitution	Medium to Low	Substitution of the Service/Technology is not difficult. (Medium) Some equipment, such as sensors, in order to catch up with the pace of advancing of software technology, has also been advancing very fast. (Low)
Bargaining Power of Supplier	Medium	Equipment is very specialized. However most of the equipment are standard with not much need of customization.

⁴⁴ According to the Ministry of Housing and Urban Rural Development, by end of 2018, there were 627 domestic mega-enterprises owning 788 Special licenses (higher than the Category A), including 450 in building, 110 in highway, and 108 in municipal engineering. There were even more Category A, B and C licenses for domestic enterprises in these sectors, and thousands of general contractor licenses for domestic enterprises.

Bargaining Power of Buyer	Low to Medium	Energy saving equipment (sensors) buyer has not much knowledge of the product. (Low) User (EEB) have strong knowledge of product of environment monitoring equipment, though the equipment is very specialized. (Medium). Other products are mostly standard products.
Risk of New Entrants	Low-Medium	Specialized field, the entry cost can be high.

BEMS = building and utility energy management system, e-bus = electric bus, OCB = open competitive bidding, O&M = operations and maintenance, PV = photovoltaic.

OCB (Dispatching Center, etc.)

Competitive Rivalry	Medium to low	The market has been developed with certain degree of competition as a few major domestic supplier ⁴⁵ .
Risk of Substitution	Medium	The equipment are mostly standard product. The integration is customized.
Bargaining Power of Supplier	Medium	The equipment are mostly standard product with some customization in integration.
Bargaining Power of Buyer	Medium	With support from its partnership with developers, the buyer have good knowledge of product.
Risk of New Entrants	High	IT technology advances very fast and new technology comes out every several years.

OCB = open competitive bidding.

IT Product and Service (City-wide ICT Platform)

Competitive Rivalry	Medium	There are around a few major domestic supplier (software developer and service provider) and many smaller suppliers too. International wide there some more well-developed major suppliers available too ⁴⁶ . High degree of customization.
Risk of Substitution	High	IT technology advances very fast and new technology comes out every several years.
Bargaining Power of Supplier	Medium	There has been some mature technology available in the market for ICT. However, when some new technology comes out and during the transition it can be high.
Bargaining Power of Buyer	Medium	With support from its partnership with developers, the buyer have strong knowledge of product.
Risk of New Entrants	Medium to low	Risk of new entrant would not be likely as it is not very easy to enter the market due to technical complex.

ICT = information and communications technology, IT = information technology.

⁴⁵ The well-known suppliers include Zhongxing Dianzi, Beijing Haotai, Zhongguo Dianzi, Yihualu and Zhongtongfu, etc, according to information provided by experts from Xiangtan Big Data Center.

⁴⁶ The well-known domestic and international suppliers include ABB, Alibaba, Ernst&Young, Huawei, Johnson Control, and IBM, according to the TRTA consultants.

OCB-IT Product and Service
(SUB-systems for early flood warning, CMEUMS, BEMS, ITS, EMAS)

Competitive Rivalry	Medium to low	For environmental monitoring, flood early warning, intelligent transportation system, the domestic market has been developed with certain degree of competition as a few major domestic supplier (software developer and service provider) available ⁴⁷ . For energy saving the domestic market hasn't been well developed and most well-known suppliers are from the international market. The domestic market is not very competitive. Especially for energy saving subsystem, the competition is relying on international suppliers. High degree of customization.
Risk of Substitution	High	IT technology advances very fast and new technology comes out every several years.
Bargaining Power of Supplier	Medium to high	There has been some mature technology available in the market for ITS, Flood early warning, and Environmental monitoring. However when some new technology comes out and during the transition it can be high.
Bargaining Power of Buyer	Low	The product is customized and specialized. The buyers do not have strong knowledge of product.
Risk of New Entrants	Medium to low	Risk of new entrant would not be likely as it is not very easy to enter the market due to technical complex.
BEMS=building energy management system, CMEUMS=community-scale multi-energy and utility management system, ITS = intelligent transport system, EMAS = environmental monitoring and assessment system, OCB = open competitive bidding.		

Consulting Service
Project management; Engineering design and construction supervision; Integrated urban catchment management plan and development design

Competitive Rivalry	Medium to low	Domestic consulting market for project management has been developing very fast with thousands consulting firms available. However not many of them (less than twenty ⁴⁸) have extensive ADB project experience. (Medium) The general design market is well developed with fierce competition ⁴⁹ . However, for the specific feature of low-carbon and climate resilience concept in this project, not many design firms have proven experience in this specific area. (Low)
Risk of Substitution	Medium to Low	Substitution of the Service/Technology is not difficult. (low) For low-carbon and climate resilience design, the market is still under-developed. The risk of substitution is medium.

⁴⁷ For Environmental monitoring system, well known suppliers include Shenzhen Zhongxing, Wuxi Zhongke, Hebei Xianhe, Zhongke Sanqing, Zhongke Yutu, Juguang Keji according to information provided by expert from the Ecology and Environment Bureau; for energy efficiency monitoring system, the well-know suppliers are mostly from the international market including Johnson Control, Siemens, Honeywell, and Schneider, according to the TRTA consultants.

⁴⁸ Currently domestic firms actively involved in ADB financed projects include (i) China branch of several major international consulting firms; (ii) consulting divisions of several major design firms; and (iii) several small firms established by individual consultants.

⁴⁹ According to the Ministry of Housing, Urban and Rural Development, currently there are more than 20,000 design firms (including design institutes) with various licenses in different sectors of engineering, i.e. building, municipal, roads/transportation, hydraulic, etc. Among them the top 5 municipal engineering design institute, North-China, Northwest, Northeast, South-west, Central-South design institutes, also the Shanghai Municipal Engineering Design Institutes, almost have all the licenses needed for this project. There are many more smaller but also very experienced design firms that also have necessary licenses.

Bargaining Power of Supplier	Medium	The service provided is usually technical capability that the buyer do not possess, which put the supplier in advantage. However, the market size has grown to a certain stage with a certain amount of suppliers available. Thus, the supplier's overall bargaining power is medium.
Bargaining Power of Buyer	Low	In this project the buyer is heavily relying on external consultant which put them in advantage in price negotiation. The bargaining power is low.
Risk of New Entrants	Low-Medium	Specialized field, the entry cost can be high.

O&M = operations and management.

Non-Consulting Service - EDGE certification

Competitive Rivalry	Low	Current there is very limited suppliers to provide such certification service. The competition is very limited.
Risk of Substitution	High	Substitution of the Service/Technology is difficult.
Bargaining Power of Supplier	High	The service provided is very specialized.
Bargaining Power of Buyer	Low	The buyer is heavily relying on external consultant which put them in advantage in price negotiation. The bargaining power is low.
Risk of New Entrants	Low-Medium	Specialized field, the entry cost can be high.

2. Key procurement conclusions

Civil works (roads, buildings, landscaping)

The market for civil works (BOQ based) have been well developed with fierce competition and sufficient suppliers. This puts the buyer in advantage in bargaining and provide an opportunity for cost saving. Therefore, the strategy is to increase the size of contracts to attract better quality suppliers and save cost.

Goods (e-bus, charging piles, digitized bus information board, flood warning equipment, green products etc)

The market is fairly competitive. Most of the goods in the field are specialized technology product. However, they are mostly standard products with little or no customization needs (except for some highly specialized instruments for environmental monitoring). This provides an opportunity of saving cost by making the contracts attractive through larger contract size and better commercial terms, i.e. payment terms and schedules.

Goods (environmental monitoring equipment)

The market conditions for environmental monitoring equipment varies. For some regular equipment the market is well developed and competitive. For some very specialized equipment, the market competition is less competitive with only few suppliers available. For the general equipment the buyer can attract suppliers with larger size and better commercial terms. While for the very specialized equipment the buyer can reduce the contract size and prepare better technical specifications to reduce procurement risk.

Goods (ICT dispatch center)

The market is fairly competitive. There have been a number of experienced integrator of the provision and installation equipment and associate works in the market. The uniqueness of such integration also provides an opportunity to combine conformity and performance in contract management.

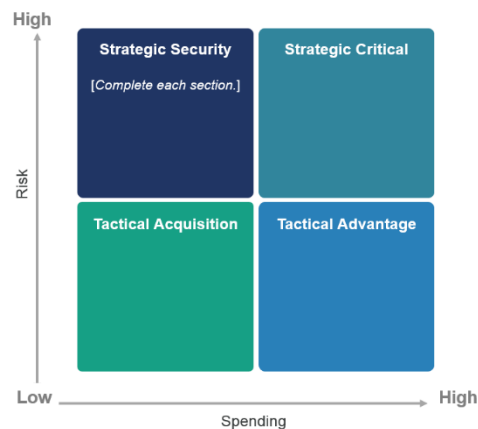
Information Technology and Service (ICT, environmental monitoring sub-system, building energy efficiency sub-system, community energy efficiency sub-system, etc.)

The domestic ICT and software subsystem market has been developed with several major suppliers already available. However, the nature of high specialization gives the buyer disadvantage in price negotiation. In order to offset this disadvantage, the buyer should gain strong knowledge about the product/system by developing good quality specifications.

The domestic market for energy efficiency subsystem is underdeveloped without many qualified suppliers available. The buyer needs to bring international supplier in the competition to reduce procurement risk.

In addition, the fast pace of advancing technology induced risk of substitution for these information technology and services. This risk needs to be mitigated by certain contractual clauses to ensure promptly upgrade and service.

3. Supply positioning



Strategic Security	Strategic Critical
Consulting Service (Project Management) Consulting Service (Design) Goods-Information Technology and Service (Energy saving systems, environmental monitoring subsystems, ITS subsystem, Flood Early Warning subsystem) Goods (Sensors, small monitoring equipment)	Goods (Dispatching Center) Works (Government building upgrade)
Tactical Acquisition	Tactical Advantage
Works (Landscaping) Works (Train Station road upgrade) Goods (Bus information board) Goods (Green products) NCS (EDGE certification)	Works (Roads) Works (Hospital building) Works (Community upgrade) Goods (E-bus) Goods (Charging pile)

4. Key procurement conclusions

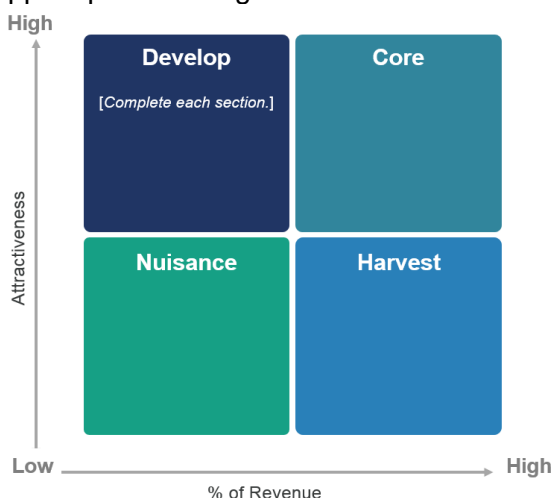
The Works for roads, hospital building, and Goods for e-bus and charging piles have large contract size and low risk and are in the Tactical Advantage category. For these contracts, the target is to encourage competition to save cost.

The Works for landscaping, train station road upgrade, community upgrade, Goods for bus information board and non-consulting service for EDGE certifications has low contract size and low risk. They are in the Tactical Acquisition category. For these contracts, the buyer should use simpler method to complete procurement to save resource, and shift resource (manpower and management efforts) to other important packages.

The consulting services for project management, capacity development and designs, Goods for sensors and other equipment, and Information Technology and Service for various monitoring subsystems under the smart-city program has small size but high risk due to high specialization. They are in the Strategic Security category. For these contracts, buyers should spend efforts in contract management to make sure these packages are delivered with desired quality. Performance measurement might be considered.

The Goods for dispatch center and the Works for Government Building upgrade have high contract size and high risk due to complexity. They are in the Strategic Critical category. The Buyers should spend the most efforts in these contracts in both procurement and management and develop efficient cooperation relationship or partnership with the bidders (contractors).

5. Supplier preferencing



Develop	Core
Consulting services (project management, design, integrated urban catchment management and development design)	Works (Roads, Hospital building, Government building, Community upgrade) Goods (Dispatch center) Information Technology and Service (various subsystems) Goods (e-bus, charging piles)
Nuisance	Harvest
NCS	Goods (Green products) Goods (Sensors and other equipment) Goods (Bus information board) Works (Landscaping)

6. Key procurement conclusions

The works for roads, hospital building, government building, and community upgrade, Goods for e-bus and charging piles, and dispatch center, and Information Technology and Service for various systems all have considerable size and will be attractive to bidders. However, for the works, and goods contracts, they might not be very attractive to international bidders as the competition in the domestic market is

already fierce. The IT service packages might attract some international bidders because these packages are very specialized, and the international bidders might have some technology advantage over domestic suppliers. For the key suppliers, the buyers can attract the bidders to develop long-term relationship to ensure satisfactory delivery.

The goods for green products, bus information board and sensors are mostly standardized product. The works for landscaping has smaller size and might not be as attractive as the large sized works. Bidders/suppliers will tend to harvest and take profit from these packages. The buyers need to make the commercial terms more attractive to have more potential bidders.

Consulting service packages (project management, design, integrated urban catchment management and development design) are highly attractive though their size might not be large, due to potential of downstream work. Suppliers for these services tend to develop relationship and partnership with buyers. The buyers can consider use performance measurement to delivery evaluation.

The Non consulting service (EDGE certification) are nuisance to bidders. The buyer should consider reduce their level of efforts in these contracts, and use simpler and faster procurement methods, i.e. use domestic funding to direct contract such service suppliers.

D. Section 4: Risk Management

1. Project procurement risk assessment

No.	Risk description	Likelihood ("L") (1-5)	Impact ("I") (1-5)	Risk Score (L x I)	Proposed Mitigation	Risk Owner
1	EA/IA does not have sufficient resource to manage this project	5	5	25	Mitigate	EA/IA
2	EA/IA has no prior ADB project experience	5	3	15	Mitigate	EA/IA
3	EA/IA's procurement officers are not proficient with English which limits their communication capacity with ADB and leads to project delay	4	3	12	Mitigate	EA/IA
4	Procurement officers from EA/IA do not have access to systematic procurement training	4	3	12	Mitigate	EA/IA
5	The experts selected for Bid Evaluation Committee do not have much experience	3	3	9	Mitigate	EA/IA
6	Bidding might be manipulated.	3	3	9	Mitigate	EA/IA

7	Lack of anti-corruption mechanism in EA/IA.	2	3	6	Mitigate	EA/IA
8	Lack of technical capacity	5	3	15	Mitigate	EA/IA
9	Lack of O&M capacity for ICTs	5	3	15	Mitigate	EA/IA
10	Lack of O&M capacity for other facilities	4	3	12	Mitigate	EA/IA

EA = executing agency IA = implementing agency, ICT = information and communication technology, O&M = operations and maintenance.

2. Risk management plan

No	Risk Description	Consequence	Risk Owner	Proposed Mitigation
1	EA/IA does not have sufficient resource to manage this project	Project delay	EA/IA	EA/IA to provide sufficient human resource (qualified personnel) to PMO; EA/IA to provide secondment of qualified technical personnel to PMO. EA/IA to hire consultants including management consultant and procurement agency to assist in procurement-related activities.
2	EA/IA has no prior ADB project experience	Project delay	EA/IA	
3	EA/IA's procurement officers are not proficient with English which limits their communication capacity with ADB and leads to project delay	Project delay	EA/IA	
4	Procurement officers from EA/IA do not have access to systematic procurement training	Project delay	EA/IA	ADB to provide training; PMC to provide training;
5	The experts selected for Bid Evaluation Committee do not have much experience	Non-compliance in procurement	EA/IA	PMC and procurement agency to provide guidance.
6	Bidding might be manipulated.	Non-compliance in procurement	EA/IA	PMC to provide supervision; ADB to provide regular review and monitoring; PMO to establish a complaint address system.
7	Lack of anti-corruption mechanism in EA/IA.	Non-compliance in procurement	EA/IA	PMO to adopt ADB anti-corruption policies in all procurement-related activities
8	Lack of technical capacity	Project delay and budget overrun	EA/IA	PMO to hire specialized consulting service; ADB to provide guidance.

9	Lack of O&M capacity for ICTs	ICT not sustainable	EA/IA	PMO to hire specialized consulting service; ADB to provide guidance.
10	Lack of O&M capacity for other facilities	Facilities not sustainable		PMO to hire specialized consulting service; ADB to provide guidance.

ADB = Asian Development Bank, EA = executing agency IA = implementing agency, ICT = information and communication technology, O&M = operations and maintenance, PMC = program management consultant, PMO = program management office.

E. Options Analysis

Strategic Options Description	Feasibility (1–10)	Suitability (1–10)	Acceptability (1–10)	Overall (3–30)
1.1 a) Works for road retrofit as one contract	10	8	8	26
1.1 b) Works for road retrofit as separate contract	10	6	8	24
1.2 a) Bus information board as separate goods package	10	6	8	24
1.2 b) Bus information board integrated in Works package.	10	8	8	26
1.3 a) E-bus as one contract	10	8	8	26
1.3 b) E-bus as several separate contract	10	6	6	22
1.3 a) Charging piles as one contract	10	8	8	26
1.3 b) Charging piles as several separate contract	10	6	6	22
1.4 a) Bus information boards as separate contract	10	6	6	22
1.4 b) Bus information boards integrated in works for bus stations.	10	8	8	26
1.5 a) Community upgrade as a single contract	8	8	8	24
1.5 b) Community upgrade as separate contracts by districts;	10	9	9	28
1.5 c) Community upgrade as separate contracts by districts with various lots based on proximity of communities.	10	10	10	30
1.6 a) Works for hospital building as one contract	10	6	6	22
1.6 b) Works for hospital building as several separate contracts	10	8	8	26
1.7 a) rain garden design and works in one contract	10	8	8	26
1.7 a) rain garden design and works in separate contracts	10	8	8	26
1.8 a) Government building works and equipment in one contract	10	8	8	26
1.8 a) Government building works and equipment in separate contracts	10	8	8	26
1.9 a) Integrate all design works in one consulting service contract	6	6	6	18
1.9 b) Separate design works into various contracts based on sub-project	10	9	6	25
1.9 c) Integrate design works in several consulting service contracts while integrate assignments in similar nature.	10	10	8	28

2.1 a) Early warning sensors as separate contracts	10	6	8	24
2.1 b) Early warning sensors integrated in early warning platform.	10	8	8	26
2.2 a) Dispatch center works and equipment in one contract	10	10	8	28
2.2 b) Dispatch center works and equipment in separate contracts	6	6	6	18
2.3 a) CMEUMS, BEMS in one contract	8	6	6	20
2.3 b) CMEUMS, BEMS in separate contracts	8	8	8	24
3.1 a) project management and integrated urban catchment management and development design in one contract	8	8	8	24
3.2 b) project management and integrated urban catchment management and development design in separate contracts	8	8	8	24

BEMS = building and utility energy management system, CMEUMS = community-scale multi-energy and utility management system.

F. Section 6: Procurement Strategy Summary

- The indicative procurement plan has been prepared with the following assumptions :
 - The packages distribution provided is tentative and may vary as per the requirement of carrying out the program.
 - The Estimated value mentioned in the plan are tentative and may vary.
 - The Estimated values mentioned in the plan are confidential and are for internal consumption only as values to be put in the tenders is not yet finalized and hence the same should not be uploaded on the website for any reference by the prospective bidders.
 - The Estimated values will also be impacted with the variation in the Exchange rate. For the subject estimation we have considered the exchange rate as \$1.00 = CNY6.977.
 - The Advertisement Date mentioned for the packages are tentative and may be preponed or postponed as per the requirement of carrying out the program.
 - The loan effectiveness is presumed to be 1 January 2021.
- The following table lists goods, works, non-consulting, and consulting services contracts for which the procurement activity is either ongoing or expected to commence within the procurement plan's duration.

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
CW101	Civil works (median and peak-hour curbside bus priority lanes, bus stops, cycling lanes, walkways, safe islands, and safety features at two elementary school zones) in Yuhu District	16.75	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020)

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
							Advance contracting: No
CW102	Civil works (median and peak-hour curbside bus priority lanes, bus stops, cycling lanes, walkways, safe islands, and safety features at three elementary school zones) in Yuetang District	36.82	OCB	Prior	1S1E	Q3/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW103	Civil works for building (Xiangtan First Traditional Chinese Medicine Hospital building structure)	47.63	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW104	Civil works for hospital building internal structure and for resilient rain garden/EbA facilities	32.53	OCB	Prior	1S1E	Q2/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW105	Civil works for government building retrofit ('Asia Pacific Low-Carbon Development Training Center')	8.98	OCB	Prior	1S1E	Q2/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW106	Civil works for the Yuhu District low-carbon communities	21.33	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
CW107	Civil works for the Yuetang District low-carbon communities	20.19	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
							Bidding Documents: Works (PRC specific SBD updated 2020) Advance contracting: No
G101	Provision of e-Buses (urban city buses:100 e-bus)	11.18	OCB	Prior	1S1E	Q3/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G102	Provision and installation of e-charging stations (778 charging piles at 30 locations)	10.86	OCB	Prior	1S1E	Q4/2021	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G103	Provision and installation of pedestrian crossing sound/countdown, digitalized bus information system; and monitors and computers for smart bus control room.	5.74	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G104	Provision and installation of low-carbon equipment (Trigen, PV) for Xiangtan First Traditional Chinese Medicine Hospital	3.19	OCB	Prior	1S1E	Q3/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G105-ICT	Provision and installation of building energy management system (BEMS) at Xiangtan First Traditional Chinese Medicine Hospital	0.72	OCB	Prior	1S1E	Q3/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G201-ICT	Development, provision and installation and commissioning of the	10.22	OCB	Prior	1S1E	Q2/2021	Advertisement: International Prequalification of Bidders: No

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
	smart city-wide ICT platform operation system						Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G202	Provision and installation of monitors and computers for city dispatch room	5.73	OCB	Prior	1S1E	Q1/2022	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G203-ICT	Provision and installation of BEMS for 200 public buildings and sensors	5.73	OCB	Prior	1S1E	Q2/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G204-ICT	Development, provision and installation and commissioning of early flood warning system (including Model-building, flood assessment) and relevant sensors	4.55	OCB	Prior	1S1E	Q3/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G205	Provision and installation of power transmission system expansion at Jiu Hua industrial zone	11.47	OCB	Prior	1S1E	Q2/2023	Advertisement: National Prequalification of Bidders: No Domestic Preference Applicable: No Documents: Goods (PRC specific SBD updated 2020) Advance contracting: No
G206-ICT	Provision and installation community-scale multi-energy and utility management system+sensors at Jiu Hua industrial zone	4.54	OCB	Prior	1S1E	Q3/2022	Advertisement: International Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
G207-ICT	Development, provision and installation	3.61	OCB	Prior	1S1E	Q4/2022	Advertisement: International

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
	commissioning of environmental monitoring and assessment system						Prequalification of Bidders: No Domestic Preference Applicable: No Bidding Documents: ADB (IT Product and Service) SBD Advance contracting: No
Consulting Services							
Package No.	General Description	Estimated value (mil \$)	Selection method	Review	Type of Proposal	Advertisement Date (quarter, year)	Comments
CS101	Engineering design and construction supervision (bus priority, bus stops, cycling and walkways; road safety; multi-modal station; and Fuxing Middle Road)	6.74	QCBS	Prior	FTP	Q4/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS102	Engineering design and construction supervision for Xiangtan First Traditional Chinese Medicine Hospital	14.12	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS103	Engineering design and construction supervision for government building retrofit ('Asia Pacific Low-Carbon Development Training Center')	1.35	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS104	Engineering design and construction supervision for Yuhu and Yuetang low-carbon communities	6.23	QCBS	Prior	FTP	Q3/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes
CS201	Integrated Urban Catchment Management Plan and Design Development for Railway block, Yangmaizhou island and Yaowang-shazilin parks (flood hazards assessment and modelling, conception design,	2.10	QCBS	Prior	FTP	Q3/2023	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB)

Goods, Works, and Non-consulting Services							
Package No.	General Description	Estimated value (mil \$)	Procurement method	Review	Bidding procedure	Advertisement Date (quarter, year)	Comments
	development guideline, and Capacity building)						Advance contracting: No
CS401	Program Management Consulting for capacity building and loan implementation	1.50	QCBS	Prior	FTP	Q2/2020	Advertisement: International Prequalification of Bidders: EOI Domestic Preference Applicable: No Bidding Documents: SBD (ADB) Advance contracting: Yes

CS = consulting service, CQS = Consultant Qualification Selection, CW = civil works, EbA = ecosystem-based adaptation, EOI = expression of interest, FTP = full technical proposal, OCB = open competitive bidding, Q = quarter, QCBS = quality- and cost-based selection, SBD = standard bidding document.

Procurement packaging and scheduling

3. There are 31 packages in total. Within these packages 25 will be financed or partially financed by ADB, including 6 consulting service packages, 7 works packages, and 12 goods packages (including 6 general goods packages and 6 information technology product and service packages). The other 6 packages will be financed by counterpart funding.

Type of contracts	No. of contract	Procurement method	Estimated value (\$ million)
Civil works	7	OCB	184.22
Goods (General)	6	OCB	48.14
Consulting services	6	QCBS (90:10)	32.04
Goods (Information Technology Product and Service)	6	OCB	29.37
Others	6	GP	9.39
Total	31		303.19

GP = government procurement, OCB=open competitive bidding, QCBS = quality- and cost-based selection,

4. The consulting service for capacity building and program management is crucial for the smooth implementation. This package will be advertised in 2020 through advance contracting, and possibly retroactive financing. All the engineering design and construction supervision consulting service packages will be advertised in 2020 through advance contracting, and possibly retroactive financing.

Procurement method

5. OCB will be used for ADB financed contracts for works and goods, and IT products and services. Advertising will be national advertising for all contracts with the exception of five specialized IT products and services for the city-wide ICT platform system, the community-scale multi-energy and utility management system (CMEUMS), and building energy and utility system (BEMS) covering 200 public buildings, the early flood warning system, and environmental monitoring and assessment platform, which will be advertised internationally. Bid preparation time for OCB national advertising and international advertising will be a minimum of 28 and 42 days

respectively. Offline bid submission shall be applied, and the government's e-procurement system will not be used except for being used as an advertisement and information disclosure purpose, as its procedures and its scoring systems in bid evaluation are incompatible with ADB guidelines.

6. All the consulting services for engineering designs and construction supervision, project management and capacity building, and integrated urban catchment management plan and design development will be engaged using the quality- and cost-based selection (QCBS) method with a quality–cost ratio of 90:10 method.

Pre-qualification

7. The arrangement is set as follows:
- (i) Consulting Services: Express of Interest (EOI) submission and shortlisting steps are required for all consulting service packages.
 - (ii) Works: No pre-qualifying is required.
 - (iii) Goods: No pre-qualifying is required.
 - (iv) IT product and service: No pre-qualifying is needed.

Bidding Procedures

8. Unless otherwise agreed between XMG and ADB and set forth in the procurement plan, procurement under OCB will use the single-stage one-envelope procedure.

9. However, for consulting services contracts, EOI and shortlisting will be applied.

Specifications

10. Specifications arrangement are as follows:
- **Consulting services:** TORs developed by PMO with ADB's assistance, and reviewed and approved by ADB. Performance-based TORs will be applied.
 - **Works:** Conformance type specifications will be used for all works including for buildings, roads, and landscaping.
 - **Goods:** Conformance type specification will be used for goods relating to E-buses, charging piles, sensors, green products. Combined conformance and performance-based specification will be used for goods relating to dispatch center, and low-carbon equipment.
 - **IT product and service:** Combined conformance and performance-based specification will be used for IT product and service.

Review Requirements

11. ADB will provide prior review for all packages advertised in the first year of implementation. The review requirement may be adjusted based on the outcome of the re-assessment on IA's capacity which will be conducted during the ADB review mission in the second year of implementation.

Standstill Period

12. The standstill period will follow requirements of the China's country system, which is normally 3 days.

Standard Bidding Documents and Contract Forms

13. Standard bidding documents and contract forms that will be applied are listed as follows:
- (i) Works packages with OCB advertised nationally: Standard Bidding Documents for Procurement of Civil Works Financed by International Financial Institutions updated in 2020.
 - (ii) Goods packages with OCB advertised nationally: Standard Bidding Documents for Procurement of Goods Financed by International Financial Institutions (the SBDs) updated in 2020.
 - (iii) Information Technology Product and Service: ADB's standard bidding document template for information technology product and service.
 - (iv) Consulting and non-consulting services packages: ADB's Standard Request for Proposal Template.

Pricing and Costing Method

14. Contracts will be unit price or lump sum for all contracts. Costing will be based on cost norms.

Key Performance Indicators

15. Key performance indicators in the Design and Monitoring Framework (DMF) as per output will be used.

Evaluation Method

16. The evaluation method includes:
- Lowest evaluated substantially responsive bid price for all works, goods and information technology product and service contracts.
 - Rated criteria would be used for consulting services contracts.

Contract Management Approach

17. Collaborative approach is used for the management of key packages of complexity, including the government building upgrade and the dispatch center, and also with all the key packages of Information technology product and service and consulting services. For other works contracts, transactional approach will be used. Minimal efforts will be used for the non-consulting service packages.

18. Payment procedure is a key to be focused on during contract management as late payment is a frequent cause of disputes and of other issues induced, especially given the current debt situation of the EA/IA. A detailed contract management plan with appropriate funding arrangement should be in place prior to the project implementation to ensure the EA/IA's obligations can be fulfilled properly in contract execution and management.

Value for Money

19. A variety of different factors relating to procurement have been considered in the SPP to achieve value for money. They include market conditions, operational context, client capability, contract duration and timing, previous experience, risks present, and all appropriate procurement modalities and bidding arrangements.

20. The works involved under the program include roads (retrofit or expansion), building (new hospital building and government building upgrade), community upgrade (buildings and landscaping) and landscaping (rain garden). These works are common in PRC and the market is highly competitive with sufficient providers. In order to achieve value for money for these activities, the works of similar natures are combined to form large sized works to attract better qualified contractors and to encourage competition to reduce overall cost. In addition, national advertisement will be used to save resource and cost on procurement management. One stage and one envelope procurement method will be adopted. All procurement packages for works will be evaluated based on the lowest evaluated price, where cost is the main contributor to value for money, and contracts will be awarded to the lowest evaluated substantially responsive bidder.

21. The Goods-general involved under the program include bus information boards, sensors for various smart subsystems (ITS, flood early warning, heat sensors), various environmental equipment, green product, low carbon equipment (tri-generation and PV panels), e-bus and charging piles. Strategy used for these goods vary. For e-bus and charging piles, because the market is already very competitive with sufficient suppliers, larger sized packages are used to attract better qualified contractors and to encourage competition to reduce overall cost, and national advertisement is used to save resource on procurement management. For the bus information board, sensors, and green products that are mostly standard product with transparent market price, they are integrated into other packages, i.e. the green products are integrated in the building upgrade works contract, the sensors are integrated into relevant sub-system contracts, to minimize the resource and cost for procurement management. For low-carbon equipment, which is specialized, they are packaged into individual contract packages to reduce the contract complexity. One stage and one envelope procurement method will be adopted. All procurement packages for works will be evaluated based on the lowest evaluated price, where cost is the main contributor to value for money, and contracts will be awarded to the lowest evaluated substantially responsive bidder. However, for the equipment especially for the Tri-generation and PV panels, life-cycle cost will be considered in the determination of lowest evaluated price.

22. The Goods-Information technology product and service involved under this program include the subsystem for building energy management, for environmental monitoring, for ITS, for flood early warning, for smart city platform, etc. The strategies for these sub-systems vary. To reduce risks for all these subsystems that are highly specialized, they are packaged into individual packages. Because the market has been fairly developed with sufficient suppliers available, customization is required for local conditions. Thus, international advertisement will be used, except for a building energy management system for the hospital. In addition, combination of conformity and performance based technical specification will be used to encourage better quality, which will also ensure value for money. For the subsystem for the community-based energy management, the domestic market hasn't been well developed. Thus, international advertisement will be used to attract international bidders to participate in the competition. These contracts will be encouraged to use attractive commercial terms to attract good and qualified bidders, which can bring in higher quality product.

23. The consulting services involved under this program include various design services, the project management and capacity building, and integrated urban catchment management plan and design development. Due to the nature of such services and the extreme reliance of PMO on the external consulting services, quality instead of price will be the focus in evaluation. Thus, QCBS procedure with a quality and cost ratio of 90:10 will be adopted. In addition, international advertisement and full technical proposal will be used to attract highly experience firms in the competition to improve the quality of the service and deliverables. Weighted and scored non-cost

(quality) criteria will be used in the evaluation. The contract will be awarded to the first-ranked consultant with the highest combined score.

24. For the non-consulting services, especially the EDGE certification for which the competition is very limited, and pricing is transparent, domestic procedure will be used to minimize the need of resource in the procurement. Counterpart funding will be used to financing such contracts.

25. Advance contracting will be used for five consulting service packages- all the design services and the project management and capacity building package. Retroactive financing will apply up to 20% of the loan amount for expenditures incurred prior to loan effectiveness, but not earlier than 12 months prior to the signing of the loan agreement. By advancing some of these contracts, the EA/IA can minimize their implementation schedule and reduce their up-front cost in the project preparation.

26. Though the e-procurement platform in the Xiangtan Public Resource Trading Center can bring convenience, which can save the resource in procurement management, however it also brings in undesired limitation on competition, which can jeopardize the overall value for money. Therefore, while the facility might be used to facilitate advertising for national advertised OCB packages, its bidding procedure will not be adopted under this Program.

27. At the very beginning of each contract execution, an effective contract management plan will be developed to ensure that the contracts are successfully implemented and that the deliverables are met as agreed in the contract.