

## OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

### A. Consultants to be Engaged Through Firms, Using Quality Cost-Based Selection

1. **Urban and climate change specialist and team leader** (international, 3 person-months, intermittent). The expert should have (i) a postgraduate degree in environmental management, policy and governance, climate change policy, environmental engineering, environmental science, environmental economics, or another relevant field; (ii) at least 10 years' experience working with low carbon development plans, climate change policy, public policy and policy evaluation, climate change mitigation and adaptation planning at a city level; and (iii) a good command of English. The expert will (i) provide team leadership for the project team, including technical and strategic oversight on all the required tasks and activities; (ii) take responsibility for the technical feasibility assessments, procurement plans, financial and economic due diligence, safeguards due diligence, and sector and social assessments; and (iii) ensure the quality of works performed by all other consultants.
2. **Urban transport planner** (international, 2 person-months, intermittent; national, 3 person-months, intermittent). The consultants should each have (i) a postgraduate degree in transport and urban planning, transport economics, transport engineering, civil engineering, or other relevant field; (ii) at least 10 years' working experience in sustainable urban transport, travel demand analysis, bus rapid transit feasibility analysis, non-motorized transport system, traffic signal management, congestion management, new energy vehicles, multimodal transport hubs, parking policy, and public transport systems; and (iii) a good command of English. The experts will lead the team of transport sector specialists and be responsible for coordinating and consolidating various aspects of urban transport system design for Xiangtan low-carbon urban transport development.
3. **Bus priority system designer** (international, 1.5 person-months, intermittent; national, 3 person-months, intermittent). The consultants should each 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 of working experience in sustainable urban transport, travel demand analysis, bus rapid transit feasibility analysis, and public transport systems; and (iii) a good command of English. The consultants will carry out a traffic survey, an urban transport system assessment, a non-motorized transport mode integration assessment, and a parking and congestion assessment.
4. **Travel demand modeler** (international, 1 person-month, intermittent; national, 2 person-months, intermittent). The experts should each have (i) a bachelor's degree in transport and urban planning, transport economics, transport engineering, civil engineering, or other relevant field; (ii) at least 7 years of working experience in sustainable urban transport, travel demand survey, travel demand modeling and analysis; and (iii) a good command of English. The experts will carry out an urban mobility survey, urban travel demand modeling, and mode-shift impact analysis.
5. **Clean fleet and e-charging station specialist** (international, 1 person-month, intermittent; national, 2 person-months, intermittent). The experts should each have (i) a bachelor's degree in engineering, mechanical engineering, electrical engineering, or other relevant field; (ii) at least 5 years of working experience in clean vehicle and e-charging stations or substation design and/or management; and (iii) a good command of English. The consultant will carry out due diligence of clean fleet, battery disposal, and e-charging stations or substations proposed under the project. The due diligence shall include power outbreak risks associated with e-charging stations.

6. **Urban adaptation expert** (international, 3 person-months, intermittent). The expert should have (i) a postgraduate degree in hydrologic-engineering or other relevant field, (ii) at least 10 years' working experience in urban adaptation assessment and adaptation tool design, and (iii) a good command of English. The expert will lead urban adaptation assessment and tool design for Xiangtan. The expert shall build a software tool to identify flood prone zones and critical infrastructure at city level; assess flood risks and economic impacts; propose urban adaptation measures on identified critical impacts areas; and design measures with cost implications. The expert will undertake a short summary assessment report on urban adaptation for Xiangtan.

7. **Urban resilience planning expert** (international, 3 person-months, intermittent). The expert should have (i) a postgraduate degree in urban planning, hydrologic engineering, or other relevant field; (ii) at least 10 years of working experience of climate risk and impacts assessment in urban setting, urban heat stress and cooling effects planning, and ecosystem-based adaptation tool design; and (iii) a good command of English. The expert will provide climate risks and impacts assessment, including economic loss assessment. The expert, in close coordination with the urban adaptation expert, will prepare pre-feasibility studies on the proposed adaptation measures including technical and financial feasibility and calculate impacts on resilience improvement.

8. **Hydraulic modeler** (international, 1.5 person-months, intermittent). The expert should have (i) a postgraduate degree in hydro-engineering or other relevant field; (ii) at least 10 years of working experience in hydraulic modeling in urban setting, including drainage hydraulic modeling and analysis; and (iii) a good command of English. The expert, in close collaboration with the urban adaptation expert, shall conduct necessary hydraulic modeling to assess flood risks and impact scale at city and neighborhood levels.

9. **Urban adaptation map designer** (international, 1.5 person-months, intermittent). The expert should have (i) a postgraduate degree in computer science, computer programming, digital mapping or other relevant field; (ii) at least 10 years' working experience in digital mapping and map programming, and other relevant fields in urban adaptation map and program design; and (iii) a good command of English. The expert, in close collaboration with the urban adaptation expert, shall design a computer program for Xiangtan urban adaptation map and tool.

10. **Ecosystem-based adaptation engineer** (international, 1.5 person-months, intermittent; national, 3 person-months, intermittent). The consultants should each have (i) a bachelor's degree in civil engineering or similar engineering or other related field; (ii) at least 5 years' working experience in preparing engineering plans for ecosystem-based adaptation measures including project design, appraisal, and management; and (iii) a good command of English. The expert will work closely with the urban adaptation expert and will carry out engineering plans for urban resilience infrastructure including green-blue infrastructure for Xiangtan.

11. **Intelligent transport system designer** (international, 3 person-months, intermittent; national, 2 person-months, intermittent). The experts should each have (i) a bachelor's degree in transport and urban planning, transport economics, transport engineering, civil engineering, computer science, computer engineering, information and communication technology (ICT) or other relevant field; (ii) at least 7 years' working experience in intelligent transport system design both for supply- and demand-side information technology for sustainable urban transport; and (iii) a good command of English. The experts will carry out planning and design of intelligent transport systems, and explore the possibility of and/or design the integration and use of big data for Xiangtan urban transport system.

12. **Smart energy city architect** (international, 3 person-months, intermittent; national, 2 person-months, intermittent). The experts shall each have (i) a bachelor degree in computer science, computer programming, computer science, computer engineering, ICT, or other relevant field; (ii) at least 7 years' working experience in designing smart energy solutions in energy demand management systems, designing systems, models using artificial intelligence algorithms, big data, and internet of things solutions; and (iii) a good command of English. The experts shall develop a master plan for smart energy city, including high-level functional and technical requirement documents and detailed city-wide digital components such as but not limited to smart building (energy efficient information technology systems), energy optimization system, energy management system for the city, smart systems to manage electric vehicle charging points, integrated platforms for demand and distribution management for the city, cyber security aspects, information communications network architecture, and an emission monitoring system.<sup>2</sup>

13. **Digital Technology Expert** (international, 3.5 person-months, intermittent; national 3 person-months, intermittent). The experts shall each have (i) a bachelor degree in computer science, computer programming, computer science, computer engineering, ICT, or other relevant field; (ii) at least 7 years' working experience in designing systems, models using artificial intelligence algorithms, big data, internet of things solutions, cybersecurity, and data sciences activities; and (iii) a good command of English. The experts will develop an action plan for implementing digital components, including identifying details of the platform, process, and skills required to implement smart energy city and intelligent transport systems. The expert will work closely with the smart energy city consultant and intelligent city transport consultant to develop collaborated, harmonized and efficient solutions.

14. **Innovation policy and governance expert** (international, 3 person-months, intermittent). The expert should have a postgraduate degree in environmental management, policy, laws, and/or governance; climate change policy; environmental engineering; social science; environmental law; economics; business administration; engineering; or other relevant field. The expert should have at least 10 years' experience working with innovation, sustainable development, and climate change in infrastructure and/or urban settings, innovation policy, climate change policy, and public policy and policy evaluation; and a good command of English. Working experience in the People's Republic of China (PRC) will be an advantage. The expert will conduct research on various policy schemes to trigger innovation, including green procurement policy, and other incentive mechanisms to promote low carbon infrastructure development and low carbon technologies in the PRC and other countries. The expert will also design policy and governance mechanisms to promote innovation, including green procurement policy and governance suitable to the proposed Xiangtan low-carbon city development program.

15. **Policy researcher on building and energy system innovation** (national, 3 person-months, intermittent). The expert should have a postgraduate degree in environmental management, policy, laws, and/or governance; climate change policy; environmental engineering; social science; environmental law; economics; business administration; engineering; or another relevant field. The expert should also have at least 10 years' policy research experience in building and energy systems and system innovation in urban setting, and a good command of English. With close collaboration with the innovation and policy expert, the researcher will carry out

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<sup>2</sup> The energy optimization system refers to computer models and system that consider dynamic effects of fluctuating energy sources, as well as linking sectors through heat pumps, and electric vehicles. Demand and distribution management refers to concepts such as district heating and cooling, home energy management system, public building energy management system, heat pumps, smart meters, and energy efficient appliances for demand management. For distribution and effective greenhouse gas reduction, systems may include weather forecasting and integrating in energy administration, energy storage systems, and simulators.

research on various policy schemes, green procurement policy, and other incentive schemes to promote low carbon buildings and communities, and energy systems and relevant low carbon technologies in the PRC and other countries. The expert shall provide inputs in designing green procurement policy for Xiangtan and/or Hunan province suitable to the proposed Xiangtan low-carbon city development program.

16. **Policy researcher on urban planning and transport system innovation** (national, 3 person-months, intermittent). The researcher should have a postgraduate degree in environmental management, policy, laws, and/or governance; urban planning; civil engineering; or another relevant field. The researcher should also have at least 10 years' policy research experience in urban planning, urban transport systems, sustainable urban transport design, and system innovation in urban settings, and a good command of English. Collaborating closely with the innovation policy and governance expert, the consultant will research policy schemes, green procurement policy, and other incentive schemes to promote low-carbon sustainable transport systems and low-carbon technologies in urban transport systems in the PRC and other countries. The expert shall provide inputs in designing green procurement policy suitable to the proposed Xiangtan low-carbon city development program.

17. **Green public procurement specialist** (international, 2 person-months, intermittent; national, 3 person-months, intermittent). The consultants should each have a postgraduate degree in environmental management, finance, public administration and public policy, laws, and/or governance; climate change policy; environmental engineering; social science; environmental law; economics; or another relevant field. The consultants should have at least 5 years' experience working with green procurement policy design and/or implementation; and a good command of English. The consultants will collect successful green procurement policy (GPP) cases, prepare GPP manuals, propose a GPP strategy and action plans with special focus on low-carbon energy and technology promotion, and carry out GPP training suitable to the PRC and/or Xiangtan.

18. **Policy and legal system specialist** (national, 4 person-months, intermittent). The expert should have (i) a postgraduate degree in public policy and public administration, law, or other relevant field; (ii) at least 7 years' working experience in PRC policy and legal framework formulation; and (iii) a good command of English. The consultant will draft green procurement policy notes and legal framework suitable to Xiangtan policy and legal systems.

19. **Waste-to-energy specialist** (international, 1 person-month, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in engineering, science, or other relevant field; (ii) at least 7 years' working experience in refuse-derived fuel (RDF) and solid recovered fuel (SRF) production from waste; and (iii) a good command of English. The consultants will assess the potential of RDF and SDF production and utilization potentials at Xiangtan; assess the market for such waste-to-energy (WTE) technologies; calculate greenhouse gas (GHG) reduction potentials; and prepare a policy proposal or incentive schemes to promote RDF, SRF, and applicable WTE technologies and businesses.

20. **Waste-to-energy (non-combustion) specialist** (international, 1 person-month, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in engineering, science, or in any relevant field; (ii) at least 7 years' working experience in thermal gasification, plastic waste conversion, and other non-combustion WTE technology solutions; and (iii) a good command of English. The consultants will assess the potential of thermal gasification, waste plastic to clean fuel conversion technology, and other non-

combustion based technologies; assess their market maturity; collect international and PRC best practices on these types of technology applications; and prepare a policy proposal or incentive schemes to promote WTE with non-combustion technologies and business.

21. **Distributed energy and district heating and cooling specialist** (international, 1 person-month, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in heating engineering, electrical engineering, or other relevant field; (ii) at least 10 years' working experience in district heating projects; and (iii) a good command of English. The consultants will assess potentials of (i) distributed energy based on renewable and clean energy and/or (ii) district heating and cooling systems for Xiangtan. The consultants will propose a policy and other incentive mechanisms to promote distributed energy, and district heating, and cooling technologies and their applications to lower GHG emissions in Xiangtan.

22. **Building energy specialist** (international, 1 person-month, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in engineering, or other relevant field; (ii) at least 7 years' working experience in building, building energy and resource conservation, passive building design, green building, building energy management system and system design; and (iii) a good command of English. The consultants will assess GHG reduction potentials through building energy and resource efficiency improvement. The consultants will propose options for public building energy reduction; assess GHG reduction potential; and design smart building energy management systems.

23. **Energy efficiency and renewable energy specialist** (international, 1 person-month, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in engineering, or other relevant field; (ii) at least 7 years' working experience in energy system, industrial energy savings, clean and renewable energy promotion, and smart energy management system design; and (iii) a good command of English. The consultants will assess potentials of (i) GHG reduction through energy efficiency measures and (ii) clean and renewable energy application options at a city and an industrial park level. The consultants will design energy management systems and assess GHG reduction potentials for the proposed scale of priority energy systems.

## **B. Individual Consultants**

24. **Parking policy specialist** (international, 1 person-month, intermittent; national, 1 person-month, intermittent). The consultants should each have (i) a postgraduate degree in transport and urban planning, or other relevant field; (ii) at least 7 years' working experience in parking policy design or market-based instruments in transport; and (iii) a good command of English. The consultants will carry out a parking issue survey and propose parking policy options with specific design options, including designated parking area, parking fee and penalty system, intelligent parking fee payment system, and all other parking policy related issues for data for Xiangtan urban transport system.

25. **Public finance and fiscal management specialist** (international, 2.5 person-months, intermittent; national, 3 person-months, intermittent). The experts should each have (i) a postgraduate degree in public sector economics, public administration, finance, or public finance; (ii) at least 10 years' working experience in public financial and fiscal management, with special expertise in preparing debt sustainability assessments. Building on the debt sustainability assessment recently prepared under the World Bank-supported Hunan Fiscal Sustainability Development Policy Financing, the specialists will provide a detailed analysis of the fiscal

sustainability position of the Hunan provincial government and the Xiangtan municipal government.<sup>1</sup> The analysis will help ensure that the program will not undermine the municipal government's fiscal sustainability.

26. **Human-centered design specialist** (international, 1 person-month, intermittent; national, 1 person-month, intermittent). The consultants should each have (i) a bachelor's degree in anthropology, design policy, ethnography, or a related field; (ii) at least 7 years' experience in human-centered design, participatory research, or working on infrastructure projects and encompassing human needs into the design of infrastructure and systems; (iii) experience developing and running consultations or design research activities for multi-disciplinary stakeholders in developing countries (ideally in the PRC); and (iv) a good command of English. The consultants will develop design criteria to ensure human insights are encompassed in the investment components.

27. **Communication and behavior change specialist** (international, 1.5 person-months, intermittent; national, 2 person-months, intermittent). The experts should each have (i) a postgraduate degree in social science, communications, behavior science, or other relevant field; (ii) at least 5 years' working experience; and (iii) a good command of English. The experts will develop a communication strategy to promote a sustainable and low-carbon lifestyle; design, plan and execute a behavior change campaign; and design a low-carbon lifestyle online platform. The experts will conduct a survey on low-carbon lifestyle and assess the effectiveness of the campaign.

28. **Project and institutional coordinator** (national, 6 person-months, intermittent). The expert should (i) have a degree in English, engineering, business administration, economics, finance, or other relevant field; (ii) at least 3 years' working experience in ADB or World Bank projects; and (iii) a good command of English. The expert will assist the team leader and ADB to (i) liaison with the executing agency and implementing agencies to obtain relevant project documents and organize project activities including site visits and review missions; (ii) provide English–Chinese interpretation for ADB during meetings with relevant local entities; and (iii) provide Chinese translations of ADB meeting minutes, memoranda of understanding, and other documents upon request from ADB.

29. **Environment safeguards expert** (international, 2.5 person-months, intermittent; national, 3 person-months, intermittent). The consultants should each have (i) a bachelor's degree in environmental science, environmental engineering, environmental management, or other relevant field; (ii) at least 7 years' working experience; and (iii) a good command of English. The experts will undertake environmental due diligence for the proposed Xiangtan investment component in accordance with ADB's Safeguard Policy Statement (2009).

30. **Social development and gender specialist** (international, 1.5 person-months, intermittent; national, 2 person-months, intermittent). The social development and gender specialists should each have (i) a graduate and/or postgraduate degree in social science or other relevant field; (ii) at least 10 years' working experience for the international consultant and 8 years' experience for the national consultant in carrying out social, poverty, and gender analyses and developing social development, indigenous peoples, and gender action plans under projects financed by international financial institutions; and (iii) a good command of English. The specialists will ensure the proposed program meets ADB social safeguards requirements

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<sup>1</sup> World Bank. 2016. [Hunan Fiscal Sustainability Development Policy Financing \(Report Number 101492-CN\)](#).

including in intellectual property. The consultants shall contribute to improving the social dimension of the program.

31. **Resettlement Specialist** (international, 1 person-month, intermittent; national, 3 person-months, intermittent). The consultants should each have (i) a graduate and/or postgraduate degree in social science or other relevant field; (ii) at least 7 years' working experience; (iii) experience preparing and implementing resettlement plans of similar projects; and (iv) a good command of English. The specialists will ensure the proposed program meets the ADB social safeguards requirements in terms of resettlement.

32. **Economist** (international, 1.5 person-months, intermittent; national, 1.5 person-months, intermittent). The consultants should each have (i) a postgraduate degree in economics or other relevant field; (ii) at least 7 years' working experience in project- or program-level economic analysis and assessment relevant to urban transport; and (iii) a good command of English. Consultants with experience in ADB and World Bank projects, particularly in policy-based lending, will have an advantage. The consultants will undertake relevant economic analysis and assessment of both investment and policy-based lending components, as per ADB Guidelines for Economic Analysis of Projects (2017).

33. **Financial management specialists** (international, 1.5 person-months, intermittent; national, 3 person-months, intermittent). The specialists should (i) be a certified public accountant or have a postgraduate degree in finance; (ii) have at least 7 years' professional experience with financial analysis and financial management assessment for urban sector projects or other similar assignments; (iii) be conversant with ADB's financial analysis and financial management due diligence requirements; and (iv) have a good command of English. The specialist shall also work closely with other experts, Xiangtan government, and ADB to carry out financial management assessment and financial analysis and design the flow of funds, financial reporting, and internal control systems for the program. These tasks should be performed in compliance with Financial Management and Analysis of Projects (2005) and be guided by the advice given in the Financial Due Diligence Methodology Note (2009) and Technical Guidance Note on Financial Management Assessment (2015).

34. **Procurement specialists** (international, 1 person-month, intermittent; national, 2 person-months, intermittent). The specialists should each have (i) a postgraduate degree in finance, procurement, engineering or other related field of study; (ii) at least 5 years' professional experience with procurement planning for transport, infrastructure, ICT projects and other similar assignments; (iii) at least one year of ADB project procurement experience, including procurement package arrangements for the project; procurement procedures, contracts, and guides; preparation of bidding documents for all works; and equipment packages for various types of infrastructure project components.