TERMS OF REFERENCE FOR CONSULTANTS

A. Introduction

1. The proposed project aims to implement three clean heating and cooling subprojects to replace coal heating/cooling and accelerate air pollution reduction in Shandong Province, including (i) West Jinan Waste Heat Utilization and Clean Energy Subproject; (ii) Shanghe Coal-Free Clean Heating Demonstration Subproject; and (iii) East Jinan Low-Emission Combined District Heating and Cooling Subproject. The proposed project combines renewable energy technologies and waste heat recovered from industry and power plants to reduce the energy and carbon intensity of heat production and refrigeration, and thereby reduce air pollution and greenhouse gas emissions. The proposed project responds directly to the urgent national, provincial and municipal governments’ priorities to reduce raw coal burning and will contribute to reducing emissions of pollutants and carbon dioxide in Jinan. The outputs include: (i) integrated renewable energy and coal-free based heating and cooling systems installed; and (ii) strengthened capacity to install and maintain clean heating and cooling technologies.

2. A firm with an international expert and a set of national consultants will be engaged using quality- and cost-based selection method with a 90:10 quality-cost ratio. Asian Development Bank (ADB) will engage the consultants and carry out procurement following the ADB Procurement Policy (2017, as amended from time to time) and its associated project administration instructions and/or staff instructions. The consultants will submit the required reports and provide required services. It will require 2 person-months of inputs from international expert in distributed heating in rural areas, and 26 person-months of inputs from national consultants to provide technical support in distributed heating, energy efficiency, agriculture waste utilization, renewable energy, environmental assessment, and design of gender-inclusive capacity building program.

B. Scope of Work

3. **Distributed Heating Specialist/Team Leader** (international, 2 person-months, intermittent). The consultant must have (i) at least a master’s degree on energy engineering or relevant fields; (ii) at least 10 years of work experience in distributed heating field, out of which, minimum of 5 years of work experience based on renewable energy applications; (iii) excellent written and oral English; and (iv) experience in international cooperation and management. The consultant will be the team leader and will:

   (i) provide an overview of international best practice of distributed heating technologies;
   
   (ii) conduct site visits and propose technical options;
   
   (iii) analyze local data from an international perspective to ensure its reliability, compare it with the data collected in other countries;
   
   (iv) offer technical solutions to local problems from an international perspective by: (a) comparing distributed energy technologies (e.g., biomass, geothermal, solar energy, heat pump, and sewage treatment); and (b) developing a proposed solution that specifies what technologies should be used and under what conditions they should be applied;
   
   (v) identify the infrastructure needs based on the most cost-effective solution;
   
   (vi) compare energy usage scenarios, while taking local conditions into consideration; and propose a solution regarding energy usage that is consistent with the local economy;
   
   (vii) propose an action plan to implement the proposal; and
(viii) take the leadership in preparing the rural heating road map for northern People’s Republic of China (PRC).

4. Distributed Heating Specialist/Co-team Leader (national, 6 person-months, intermittent). The consultant must have (i) at least a master’s degree on energy engineering or relevant fields; (ii) at least 6 years of work experience in distributed heating field, out of which, minimum of 4 years of work experience based on renewable energy and with thermal storage applications; and (iii) good written and oral English. The consultant will be the co-team leader and will:

(i) provide an overview of current distributed heating technologies;
(ii) collect relevant information;
(iii) conduct site visits and propose technical options;
(iv) coordinate with relevant agencies;
(v) design technical solutions in collaboration with the team leader and other experts;
(vi) develop business models;
(vii) analyze local data to ensure its reliability in different regions;
(viii) offer technical solutions to local problems by: (a) comparing distributed energy technologies (e.g., biomass, geothermal, solar energy, heat pump, and sewage treatment); and (b) developing a proposed solution that specifies what technologies should be used and under what conditions they should be applied;
(ix) identify the infrastructure needs based on the most cost-effective solution;
(x) compare energy usage scenarios, while taking local conditions into consideration; and propose a solution regarding energy usage that is consistent with the local economy;
(xi) analyze the policies of the government and those of other countries, and then make policy recommendations to the project based on those policies;
(xii) propose an action plan to implement the proposal;
(xiii) strengthen contacts between ADB and the team of experts for the project, and make sure the project will be carried out on time, and as requested; and
(xiv) assist the team leader in preparing the rural heating road map for northern PRC.

5. Agriculture Waste Utilization Specialist (national, 4 person-month, intermittent). The expert should have (i) a postgraduate degree in engineering, chemical engineering, processing engineering, environmental engineering, or in any relevant field; and (ii) at least 10 years of experience working on agriculture waste utilization, and (iii) experience on international cooperation is preferred. Tasks include the following:

(i) provide detailed comparison of different waste utilization technologies, which includes information on feed-stock, associated emissions and other environmental discharges, cost ranges, associated operation phase utility consumptions, and others;
(ii) conduct general investigation on local biomass data in different regions to ensure reliability;
(iii) collect relevant biomass energy information;
(iv) assist the team leader and co-team leader to design proposed solutions for different regions while taking local social and environmental factors into consideration;
(v) assist the team leader and co-team team leader to analyze the social impact of the biomass for heating, including the economic influence on target customers and lifestyle impacts;
(vi) help in preparing the action plan for proposed solutions;
(vii) Identifying issues and challenges that the different agriculture biomass for heating technologies may face; and
(viii) assist the team leader and co-team leader in preparing the rural heating road map for northern PRC.

6. **Building Energy Efficiency Specialist** (national, 3 person-months, intermittent). The expert should have (i) a postgraduate degree in engineering or in a relevant field and (ii) at least 10 years of working experience in energy efficiency, including industrial and building-specific energy efficiency. Oral and written English proficiency is required. Tasks include the following:
   (i) Conduct baseline study of rural energy efficiency in different regions;
   (ii) Assess the current status of rural energy efficiency in different regions;
   (iii) Identify the potential for energy efficiency improvement for rural households;
   (iv) Propose technologies to improve energy efficiency in different regions;
   (v) Determine issues and challenges that may arise for the identified energy efficiency technologies;
   (vi) Quantify and calculate greenhouse gas reduction and air quality improvement benefits and other environmental benefits with the proposed technologies;
   (vii) Suggest the most appropriate business model to develop energy efficiency in the rural areas;
   (viii) Propose policy recommendations on how to promote deployment of energy efficiency measures in rural households; and
   (ix) assist the team leader and co-team leader in preparing the rural heating road map for northern PRC.

7. **Renewable Energy Specialist** (4 person-months, intermittent). The consultant must have (i) at least a master’s degree in bio-energy or a relevant field, (ii) a minimum of 10 years experience in bio-energy, (iii) a fair ability to communicate in English, and (iv) experience in international cooperation and management. The proposed consultant will serve as the co-team team leader and will:
   (i) analyze local data to ensure its credibility in different regions;
   (ii) collect relevant information and parameters;
   (iii) assist the team leader and co-team leader in designing solution proposals by: (a) comparing the energy technologies (like solar energy, geothermal, heat pump, natural gas, wind energy, and bio-energy), and (b) coming up with specific technical proposals while taking local social conditions and environmental conditions into account;
   (iv) assist the team leader and co-team leader in analyzing social impact, including the economic influence on target customers, impacts on lifestyles, etc.;
   (v) communicate with the local government for policy support;
   (vi) compose action plan on every step of the solution proposals; and
   (vii) assist the team leader and co-team leader in preparing the rural heating road map for northern PRC.

8. **Gender and Education Specialist** (national, 5 person-months, intermittent). The specialist will have demonstrated experience in preparing skill training courses and identifying appropriate training institutes or universities to carry out these skills training both within and outside the country. The specialist should have a maximum of 10 years in skills training development, experience in developing selection criteria to identify suitable participants, and identifying training institutes that can meet the training needs of the implementing agencies. The specialist must hold at least a master’s degree in education or relevant areas from a recognized institution and will undertake the following activities:
(i) review skills training needs of the implementing agencies and the areas that the cooling and heating sector in general needs new skills that could be supported through a study program;

(ii) design the awareness program and monitor its implementation;

(iii) identify the universities that are best able to provide a balance of both practical and class room type training at certificate, diploma and degree levels;

(iv) work with Shandong Government, the implementing agencies in developing a selection criterion that is inclusive and targets the right male and female candidates for the study tour and workshop program. Ensure that the female targets are met or surpassed;

(v) in discussion with the implementing agencies, determine the appropriate candidates for both short-term and long-term technical study programs, ensuring a balanced representation of female candidates across training types (diploma and certificate, masters and doctoral) as well as across training areas. Ensure that the female targets are met or surpassed across all types of training;

(vi) upon completion of the first batch training, the consultant will develop an evaluation report by meeting with the trainees upon their return to determine if the training had been useful or how it could be better improved in subsequent batches;

(vii) identify and assess potential barriers for women participation in the training program and provide actionable recommendations to ensure barriers are removed and grant targets met;

(viii) periodically report on the activities conducted, achievement of targets, and overall implementation; and

(ix) in consultation with Shandong Government, the consultant will check with the implementing agencies to determine the possibility having more of such trainings in the future with support from government and other development partners tailored to meet the province’s long-term needs.

9. **Environmental Impact Assessment Specialist** (4 person-months, national, intermittent). The expert must (i) have a master’s degree in environmental science, environmental engineering, environmental management, or in any relevant field; (ii) have at least 8 years of working experience; (iii) have experience in assessing environmental impact in space heating; (iv) have a good understanding in ADB’s Safeguard Policy (SPS); and (v) good written and oral English. The consultant will:

   (i) analyze local pollutant emission to ensure the reliability in different regions;

   (ii) review and collect relevant information and parameters about solutions to rural pollution;

   (iii) assist the team leader and co-team leader in designing solution proposals to rural heating and then decide what clean heating solutions should be proposed in different regions, while taking local economic, social, and environmental factors into consideration;

   (iv) provide environmental and health impacts of clean heating;

   (v) conduct an environmental risk assessment to all the propose clean heating solutions to make sure no negative impact will be cast on local residents;

   (vi) providing guidance to the trained local female residence on the emission reduction measurement; and

   (vii) assist the team leader in preparing the rural clean heating road map for northern PRC.
C. Deliverables

10. The consultant team shall submit the following reports to ADB (in both English and Chinese) and to the government (in Chinese):

(i) **Inception report.** To be submitted within 1 month of commencement of services. The report will include a detailed work program and address any major inconsistencies in the terms of reference.

(ii) **Interim report.** To be submitted within 6 months of commencement of services. The report will include interim results of activities, an updated work program, and address any issues and concerns.

(iii) **Draft rural clean heating road map for northern PRC.** To be submitted within 13 months of the commencement of services. Upon submission of the draft rural clean heating road map for northern PRC, a final consultation will be held, attended by relevant stakeholders, to obtain feedback on the road map for northern PRC.

(iv) **Final road map for northern PRC.** To be submitted within 1 month following receipt of comments from ADB and the government on the draft rural clean heating road map for northern PRC. The final rural clean heating road map for northern PRC shall take into consideration comments by ADB and the government.