ADB

Technical Assistance Report

Project Number: 48363-001
Capacity Development Technical Assistance (CDTA)
November 2014

Mongolia: Preparation of an Investment Plan for Scaling Up Renewable Energy

(Financed by the ADB Strategic Climate Fund)

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Asian Development Bank

CURRENCY EQUIVALENTS
(as of 1 October 2014)

Currency unit	–	togrog (MNT)
MNT1.00	=	$0.00054
$1.00	=	MNT1,839.00

ABBREVIATIONS

ADB	–	Asian Development Bank
FIT	–	feed-in-tariff
m^2	–	square meter
MDB	–	multilateral development bank
MW	–	megawatt
SREP	–	Scaling Up Renewable Energy in Low-Income Countries Program
TA	–	technical assistance
UN	–	United Nations

NOTE

In this report, "$" refers to US dollars.

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CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 48363-001

Project Name	Preparation of an Investment Plan for Scaling Up Renewable Energy	**Department /Division**	EARD/EAEN
Country	Mongolia	**Executing Agency**	Ministry of Energy, Geology and Mining
Borrower	Mongolia		

2. Sector	**Subsector(s)**	**Financing ($ million)**
✓ Energy	Energy sector development and institutional reform	0.30
	Total	**0.30**

3. Strategic Agenda	**Subcomponents**	**Climate Change Information**	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Mitigation ($ million)	0.30
Environmentally sustainable growth (ESG)	Eco-efficiency	CO_2 reduction (tons per annum)	1,730,000
	Global and regional transboundary environmental concerns	Climate Change impact on the Project	Medium

4. Drivers of Change	**Components**	**Gender Equity and Mainstreaming**	
Governance and capacity development (GCD)	Institutional development	No gender elements (NGE)	✓
Knowledge solutions (KNS)	Knowledge sharing activities		
Partnerships (PAR)	Bilateral institutions (not client government) Implementation International finance institutions (IFI) Official cofinancing Private Sector		
Private sector development (PSD)	Conducive policy and institutional environment		

5. Poverty Targeting		**Location Impact**
Project directly targets poverty	No	Not Applicable

6. TA Category: B

7. Safeguard Categorization Not Applicable

8. Financing

Modality and Sources	Amount ($ million)
ADB	**0.00**
None	0.00
Cofinancing	**0.30**
Strategic Climate Fund - SREP	0.30
Counterpart	**0.00**
None	0.00
Total	**0.30**

9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	No

I. INTRODUCTION

1. In May 2014, the Government of Mongolia requested the Asian Development Bank (ADB) to provide capacity development technical assistance (TA)[1] to prepare an investment plan for scaling up renewable energy.

2. The TA is aligned with ADB's interim country partnership strategy, 2014–2016 for Mongolia.[2] Under the strategy, ADB supports the following energy sector objectives: (i) improve environmental quality and energy efficiency, (ii) improve energy access and efficiency in urban centers and remote rural areas, (iii) initiate measures to support foreign direct investment in the sector, and (iv) build capacity for energy sector planning. During the 29 September–3 October 2014 fact-finding mission, the TA impact, outcome, outputs, financial plan, implementation arrangements, and outline of terms of reference for consultants were agreed with the Ministry of Geology, Mining and Energy. The design and monitoring framework is in Appendix 1.

II. ISSUES

3. Mongolia currently has a total of 1,062 megawatts (MW) of installed capacity, but because of aging power facilities that are well past their economic life, only 836 MW is available. Power supply is unreliable and losses exceed 30%, largely because of the aging transmission lines and substation facilities, and poor maintenance. Rapid economic growth has increased demand for electricity and heating. In 2013, the reserve margin for electricity and heat supply was reduced to almost zero. The ADB-assisted energy sector master plan study concludes that new capacity additions of 900 MW in 2020 and 1,020 MW in 2025 are essential to meet the growing demand by 2025, while maintaining an adequate reserve margin of about 20%.[3]

4. The development gap between urban and rural areas is significant due to uneven access to productive employment opportunities, education and health services, and basic infrastructure. In 2011, poverty incidence in rural areas is 33.3% compared with 26.6% in urban areas. While about 94% of the population has access to either a grid system or stand-alone electricity supply, access to electricity is uneven among regions and households. About 13% of the rural population and 17% of the rural poor do not have access to electricity.[4] Access to reliable heating service is even worse. About 1,200 coal-fired heat-only boilers with a low thermal efficiency of about 40% (compared with a modern combined heat and power plant of about 80% efficiency) are used for heating in *aimag* (province) and *soum* (district) centers.[5] The condition of boilers and the associated heating pipeline has deteriorated significantly because of poor maintenance and aging.

5. The coal-dependent energy system and the prevailing low energy efficiency is resulting in significant air pollution in Ulaanbaatar, especially during heating season, which lasts more than 9 months. During winter, particulate matter (less than 10 micrometers) in Ulaanbaatar's atmosphere routinely measures 279 micrograms/cubic meter of air, which is about five times higher than the World Health Organization's air quality guideline of 50 micrograms/cubic meter.[6] The use of low calorie coal and inefficient coal-fired family stoves without proper pollution

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[1] The TA first appeared in the business opportunities section of ADB's website on 7 October 2014.
[2] ADB. 2014. *Interim Country Partnership Strategy: Mongolia, 2014–2016*. Manila.
[3] ADB. 2013. *Updating the Energy Sector Development Plan.* Consultant's report. Manila (TA 7619-MON).
[4] National Statistics Office. 2012. *The 2011 Household Social Economic Survey.* Ulaanbaatar.
[5] ADB. 2011. *Community-Based Heating Supply in Rural Remote Areas of Mongolia.* Consultant's report. Manila (Grant 9109-MON).
[6] World Health Organization. 2014. *Ambient Air Quality Database*. Geneva.

control measures in the ger district (where low-income households and the poor reside) is exacerbating poor air quality and contributes to indoor air pollution.

6. Mongolia is currently the world's fifth most carbon-intense economy (2.86 tons of carbon dioxide equivalent per $1,000).[7] Moving toward a more diversified energy mix with a reduced share of coal is a policy imperative. Renewable energy, most notably wind and solar energy and hydropower, is abundantly available. The country's estimated 3,800 small rivers with a total length of 65,000 kilometers have 6.2 gigawatts of hydropower potential. Solar energy has moderate potential, ranging from 4.5 kilowatts/square meter (m^2) in the north to 6.0 kilowatts/m^2 in the southern Gobi. Wind resources are excellent with 400–600 watts per m^2 in 10% of the country's land area, with the potential for 1,100 gigawatts of utility-scale wind power (footnote 3).

7. In 2007, the government enacted the Renewable Energy Law to stimulate renewable energy development. It was accompanied by a set of regulatory arrangements with a feed-in-tariff (FIT) for renewable energy to increase its share to 3%–5% by 2010 and 20%–25% by 2020. The government has taken several initiatives for renewable energy deployment, most notably, (i) implementing the successful 100,000 Solar Ger Electrification Program (2000–2012), which provided access to modern energy to over half a million nomadic herders through solar home systems; and (ii) facilitating the development of the 50 MW Salkhit wind farm, the first private power producer. Renewable energy deployment has made steady progress. The current share of renewable energy in total capacity is 7.92% (84.15 MW).

8. However, increasing the use of renewable energy further is a challenge. Persisting fundamental bottlenecks include (i) diminishing reserve margin and lack of regulating capacity in the power system to compensate for fluctuating outputs from intermittent renewable energy such as wind and solar power; (ii) inadequate balance in the renewable energy fund account to pay the FIT premium; (iii) inadequate FIT, which deters potential project developers and investors from setting up new capacity; and (iv) lack of government targeted support to scale up stand-alone and mini-grid systems in rural areas, and to switch to renewable energy from coal for heating.

9. Mongolia is currently on the reserve list of the Scaling Up Renewable Energy in Low-Income Countries Program (SREP), which operates under the Strategic Climate Fund, one of two subfunds of the climate investment funds framework. The SREP supports developing countries to expand energy access and stimulate economic growth through scaled-up deployment of renewable energy solutions, and provides a trigger for transforming the renewables market in each target country through a programmatic approach that involves government support for market creation, private sector implementation, and productive energy use. Multilateral development banks (MDBs) implement the SREP in close collaboration with other development partners including the United Nations (UN) and bilateral agencies. In March 2012, the SREP subcommittee agreed to support the preparation of investment plans for countries on the reserve list and to provide up to $300,000 for that purpose for Mongolia. It also agreed upon the maximum amount of $30 million for Mongolia, should additional funding become available.

10. In its endeavor to support renewable energy, the government is keen to utilize the SREP investment. It expressed its interest in being one of the pilot countries included in the SREP reserve list. Participation in the SREP is expected to help the government attain its targeted 20%–25% renewable energy in the energy mix by 2020. This will help overcome current

[7] United States Energy Information and Administration. 2012. *International Energy Statistics*. Washington, DC.

capacity constraints in meeting heating and electricity demand in an environmentally sustainable manner, especially in remote rural areas where renewable energy is an attractive alternative.

III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

11. The TA will support the government in (i) comprehensively assessing the country's renewable energy subsector to identify bottlenecks and recommend urgent policy actions to overcome these barriers and create an enabling environment for sustained public and private investments; (ii) developing a comprehensive investment plan to meet 20%–25% of the renewable energy target by 2020; and (iii) enhancing government capacity in renewable energy policymaking and planning, grid control and protection, and technology and tariff analysis.

A. Impact and Outcome

12. The impact will be increased renewable energy capacity. The outcome will be increased readiness for investments in renewable energy.

B. Methodology and Key Activities

13. The TA will have two key outputs:

(i) **Renewable energy investment plan for Scaling Up Renewable Energy in Low-Income Countries Program funding prepared.** The TA will conduct a comprehensive assessment of the country's renewable energy subsector, including (a) renewable energy resource potential assessment, (b) levelized cost of electricity and heat analysis for potential renewable energy technologies, (c) grid stability assessment for renewable energy evacuation, (d) a policy note with recommended policies and reforms to overcome renewable energy investment constraints, and (e) a renewable energy investment plan that identifies priority investment projects for SREP funding up to 2020.

(ii) **Government capacity for renewable energy policy and investment planning enhanced.** The TA will support capacity development for the executing and implementing agencies, and relevant government agencies, in investment planning for the country's renewable energy development, assessment of required amount of the FIT, and grid protection and stability.

14. The main assumptions are (i) the government will continue to support renewable energy development, and (ii) project developers and investors show strong interest in participating in developing priority projects. The main risks of the project are (i) inadequate implementation capacity and lack of priority within the government; and (ii) weak ownership of the investment plan by the government, which delays action. During TA preparation, the design was discussed extensively with all relevant stakeholders to ensure their buy-in. TA implementation will involve all relevant government agencies, MDBs, the UN, bilateral development agencies, civil society, and potential private investors in formulating a renewable energy investment plan for SREP funding.

C. Cost and Financing

15. The TA is estimated to cost $360,000, of which $300,000 will be financed on a grant basis by the ADB Strategic Climate Fund and administrated by ADB.[8] The government will provide counterpart support in the form of logistics, facilities, remuneration of counterpart staff, studies, report, data, other information and support needed for TA implementation, and other in-kind contributions. The cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

16. The TA will be implemented from 20 December 2014 to 19 January 2016. The consultants will submit the following report in English and Mongolian: (i) report on country and energy sector overview within 8 weeks after TA commencement; (ii) renewable energy technology assessment and policy recommendation note within 20 weeks after TA commencement; (iii) priority renewable energy projects report within 28 weeks after TA commencement; (iv) draft renewable energy investment plan for the SREP within 32 weeks after TA commencement; and (v) final renewable energy investment plan for the SREP within 2 months after receipt of comments from MDBs, including ADB and the government. Consultation meetings will be organized for inception, interim, and draft final outputs inviting all officials concerned from the government, private sector, nongovernment organizations, the UN, and bilateral development agencies to disseminate findings and receive comments.

17. The Ministry of Geology, Mining and Energy is the executing agency for the TA,[9] and the National Renewable Energy Center is the implementing agency.[10] ADB's Energy Division, East Asia Department, and the Climate Investment Fund Team in ADB's Sustainable Infrastructure Division, Regional and Sustainable Development Department, with the assistance of the Mongolia Resident Mission, jointly lead the MDB group to guide and administer TA implementation under the executing and implementing agencies.[11]

18. The TA will require international (5 person-months) and national (13 person-months) consulting services. International experts include (i) senior renewable energy sector specialist and team leader, and (ii) renewable energy economist. National experts include (i) renewable energy sector specialist and deputy team leader, and (ii) renewable energy economist. ADB will engage the consultants in accordance with its Guidelines on the Use of Consultants (2013, as amended from time to time) using individual consultant selection because only four experts are required; and renewable energy in Mongolia is a nascent industry and very few national or international experts have prior experience in Mongolia, which is crucial to prepare a realistic renewable energy investment plan, including the necessary policy reform recommendations.

19. The TA consultants will procure equipment following ADB's Procurement Guidelines (2013, as amended from time to time). The TA proceeds will be disbursed in line with ADB's

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[8] Under the Scaling Up Renewable Energy Program in Low-Income Countries financed by the Strategic Climate Fund.

[9] The Ministry of Geology, Mining and Energy will be responsible for TA implementation and for counterpart support needed for implementation, and will administer the fund under advance payment facilities.

[10] The National Renewable Energy Center is responsible for supervising day-to-day TA activities. It was established in 2006 for (i) research and study of renewable energy technologies, (ii) assessment of renewable energy resources, (iii) development of national technical standards and quality control for renewable energy systems, and (iv) implementation of the national renewable energy program. It reports to the Ministry of Geology, Mining and Energy, and has 60 staff members.

[11] The Asian Development Bank, the European Bank for Reconstruction and Development, the International Bank for Reconstruction and Development, and the International Finance Corporation.

Technical Assistance Disbursement Handbook (2010, as amended from time to time). The equipment procured under the TA will be turned over to the Ministry of Geology, Mining and Energy upon TA completion. An advance payment facility will be provided to the ministry for workshops, training, seminars, and conferences.[12] The outline terms of reference for consultants are in Appendix 3.

IV. THE PRESIDENT'S DECISION

20. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of $300,000 to the Government of Mongolia to be financed on a grant basis by the ADB Strategic Climate Fund for the Preparation of an Investment Plan for Scaling Up Renewable Energy, and hereby reports this action to the Board.

[12] The Ministry of Geology, Mining and Energy has sufficient experience in administrating ADB-funded projects including ADB. 2007. *Proposed Grant Assistance to Mongolia for Community-Based Heating Supply in Remote Areas*. Manila (Grant 9109-MON); ADB. 2008. *Proposed Grant Assistance to Mongolia for Energy Conservation and Emissions Reduction from Poor Households*. Manila (Grant 9127-MON); and ADB. 2009. *Proposed Grant Assistance to Mongolia for Demonstration Project for Improved Electricity Services to the Low Income Communities in Rural Areas*. Manila (Grant 9139-MON).

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Increased renewable energy capacity	20%–25% renewable energy share in total installed capacity achieved by 2020 At least 440 megawatt of new renewable energy plants constructed during 2015–2020	Government statistical and census reports	**Assumptions** The government remains committed to achieving its renewable energy target. The additional SREP funding becomes available in a timely manner. **Risk** Higher costs of renewable energy plants deter investments.
Outcome Increased readiness for investments in renewable energy	Bankable priority projects developed with SREP financing by 2015 Policy and regulatory impediments removed for renewable energy investments by 2016	MGME reports	**Assumptions** The government prioritizes implementation of the investment plan. Project developers and investors show strong interest in developing priority projects. **Risk** Weak ownership of the investment plan by the government delays action.
Outputs 1. Renewable energy investment plan for SREP funding prepared 2. Government capacity for renewable energy policy and investment planning enhanced	The government approves the investment plan by 2015 Various capacity enhancement training sessions held to train 30 staff from MGME and other relevant government agencies	Consultant's report TA review mission	**Assumption** MGME and other stakeholders (development partners, civil society, and government agencies) effectively participate in TA implementation. **Risk** The government lacks adequate implementation capacity and plans.

Activities with Milestones	Inputs
1. Renewable energy investment plan for SREP funding prepared 1.1 Prepare country and energy sector overview (week 8) 1.2 Assess various renewable energy technologies applicable in Mongolia and propose measures to overcome the barriers hindering renewable energy development (week 20) 1.3 Identify prospective renewable energy projects (week 28) 1.4 Prepare the draft renewable energy investment plan (week 32) 2. Government capacity for renewable energy policy and investment planning enhanced 2.1 Prepare capacity development training plan (week 35) 2.2 Conduct capacity enhancement training sessions on renewable energy policy and investment planning (week 40)	ADB Strategic Climate Fund: $300,000 The government will provide counterpart support in the form of logistics, facilities, remuneration of counterpart staff, studies, report, data, other information and support needed for the TA implementation, and other in-kind contributions.

ADB = Asian Development Bank; MGME = Ministry of Geology, Mining and Energy; SREP = Scaling Up Renewable Energy in Low-Income Countries Program; TA = technical assistance.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN

($'000)

Item	Amount
ADB Strategic Climate Fund[a]	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	144.0
ii. National consultants	52.0
b. International and local travel	34.0
c. Reports and communications	10.0
2. Equipment[b]	5.0
3. Workshops, training, seminars, and conferences[c]	20.0
4. Miscellaneous administration and support costs[d]	20.0
5. Contingencies	15.0
Total	**300.0**

Note: The technical assistance (TA) is estimated to cost $360,000, of which contributions from the ADB Strategic Climate Fund are presented in the table above. The government will provide counterpart support in the form of logistics, facilities, remuneration of counterpart staff, studies, report, data, other information and support needed for TA implementation, and other in-kind contributions. The value of the government contribution is estimated to account for 17% of the total TA cost.

[a] Under the Scaling Up Renewable Energy in Low-Income Countries Program financed by the Asian Development Bank (ADB) Strategic Climate Fund. Administered by ADB.

[b] Includes two laptop computers costing $2,500 each.

[c] ADB will review and approve detailed activities for workshops, training, seminars, and conferences, and estimated cost. An advance payment facility will be provided.

[d] Includes costs for translation and data acquisition.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Tasks

1. **Task 1: Prepare country and energy sector overview**. Under this task the consultant will undertake the following:

(i) Prepare a background note describing the country context, including main demographic, social, and economic indicators as of the most recent date.

(ii) Prepare an overview of the energy sector, including (a) basic energy balance (for at least 2008–2013); (b) description of the sector structure; (c) legislation and regulatory framework and government strategy; (d) electricity generation, transmission, and distribution assets; (e) electricity generation mix; (f) tariffs and tariff structures; (g) key entities involved in sector regulation; and (h) key sector challenges.

(iii) Assess the larger loads (e.g., mines) along with location and potential timing, while putting the analysis together. Include the ability of the private sector to service the loads through a third party entity and on a captive basis.

(iv) Prepare an overview of the estimated potential for various renewable energy technologies and renewable energy penetration targets as well as a review of ongoing and planned renewable energy activities and projects in Mongolia. Include expected country-specific environmental and social opportunities and risks associated with developing the considered renewable energy technologies.

(v) Summarize the key barriers (technical, regulatory, and financial) for the public and private sectors that hinder the development of renewable energy technologies and propose measures to overcome them. Consider the experience of the Salkhit wind farm as the only significant provider of renewable energy to date. Provide a detailed description of the availability of private (firms and financial institutions) and/or other government financing for renewable energy projects, including terms of financing, and discuss the bottlenecks to developing renewable energy associated with availability and terms of financing.

2. **Task 2: Assess various renewable energy technologies applicable in Mongolia and propose measures to overcome the barriers hindering renewable energy development.** The consultant is expected to undertake the following:

(i) Assess the levelized economic costs (LECs) of various renewable energy technologies, including small hydropower, geothermal, wind, solar photovoltaic, pumped storage, biomass, biogas, solar heaters, heat pumps, and any other technology suggested by the Ministry of Geology, Mining and Energy (MGME). Build a supply cost curve using the potential and estimated LECs of renewable energy technologies. Since that supply curve will be limited to electricity, the use of renewable energy for heating (e.g., solar heating) would require a similar separate analysis.

(ii) Simulate combinations of assessed renewable energy-based electricity generation options with other fossil fuel-based generation options considered by the government to meet electricity demand considering the planned shutdown of some existing generation assets, planned commissioning of the generation plants under construction, and their future availability to meet domestic demand. The simulation analysis should assume a base-case electricity demand growth scenario and commercial and concessional financing terms for all types of new generation assets. Define the maximum capacity of grid-connected renewable

energy projects that could be implemented in each network (central, eastern, and western).

(iii) Identify and propose the required policy and procedural changes required to facilitate the payment of a feed-in tariff for renewable energy producers and overcome existing curtailment issues currently incurred with the Salkhit wind farm.

(iv) Assess the structure, size, and funding sources of the Renewable Energy Fund contemplated in the Renewable Energy Law and currently being implemented; it is meant to mitigate the increased cost of renewable energy.

(v) Assess the viability of renewable-based heating technologies included in the analysis, and estimate the relative economic attractiveness of renewable-based alternatives to electricity and gas, coal, or firewood-based heating. Estimate the potential impact of heating-related fuel switching on projected electricity demand.

(vi) Determine generic environmental and social opportunities and risks of various renewable energy-generation technologies considered for Mongolia. Based on the available information on the physical, natural, and social environment of various administrative and ecoclimatic areas of the country, identify those where environmental and social risks and benefits of individual renewable energy technologies are expected to be particularly significant and areas where additional information is required to estimate these risks and benefits.

(vii) Based on the analysis, identify the viable renewable options to be pursued. Besides purely economic considerations, for the evaluation of technologies consider other costs and benefits including energy security; reduction of greenhouse gas emissions; and environmental and social costs, including potential impacts related to connection of the specific renewable energy projects to high-voltage grids. If some of the economic and other benefits are not quantifiable, then provide a description of those benefits.

3. **Task 3**: **Identify prospective renewable energy projects.** The consultant is expected to undertake the following:

(i) Identify specific renewable energy projects, based on the analysis, existing assessments of renewable energy resources and potential, prefeasibility and feasibility studies, and resource mapping. Survey and identify potential local private sector firms with business interest and capability (financial and technical) to sponsor renewable energy projects (most likely joint ventures between local firms and an international consortium).

(ii) Assess current grid system capacity and stability in view of power evacuation from renewable energy plants, and the required investments to strengthen the transmission and distribution network and enable additional renewable energy capacity to be integrated.

(iii) Identify potential interest of local financial institutions in financing renewable energy projects. Identify potential sector uses of the Scaling Up Renewable Energy in Low-Income Countries Program (SREP) resources in line with the SREP objectives, including providing funding to the Renewable Energy Fund or additional studies required.

(iv) Conduct trade-off analysis of promising renewable energy projects considering advantages and disadvantages, and prioritize the projects based on at least four criteria agreed with the government, i.e., LECs, employment impacts, energy security, greenhouse gas emission reduction, possibility for financing.

(v) Assess total investment costs for identified renewable energy projects.

(vi) Assess the impact of identified priority renewable projects on end-user tariffs by drawing upon the analytical framework.

(vii) Recommend business models and financing schemes for identified priority projects, including discussion of the potential sources of funding. Review existing financial mechanisms used for renewable energy projects and consider whether these mechanisms can be expanded to cover the new renewable energy technologies or set up new mechanisms.

(viii) Conduct environmental and social screening of available documents analyzed to identify specific renewable energy projects. Depending on the scope and nature of the reviewed material, (a) identify possible gaps in the coverage of the expected positive and negative environmental and social impacts of the proposed projects, pointing out whether existing information and data gaps will preclude proper analysis and prioritization of a project and will need to be filled in before it is recommended for inclusion in the investment plan; and (b) conduct environmental and social assessment of available prefeasibility and feasibility studies. Discuss the potential gender benefits from the identified priority renewable energy projects.

4. **Task 4: Prepare the draft renewable energy investment plan.** The consultant is expected to undertake the following:

(i) Prepare the draft investment plan based on a prioritized list of renewable energy investments. The plan should include (a) the role of the SREP in initiating a process leading to transformational low carbon growth by addressing key barriers identified for renewable energy development; (b) how the identified investments meet the SREP investment criteria and results framework; (c) the likely development impacts and cobenefits from SREP investments; (d) an estimate of the financing requested from the SREP, including cofinancing required from public and private sectors; and (e) an assessment of absorptive capacity of the SREP and leveraged resources.

(ii) Prepare concept briefs for priority investments for the SREP.

(iii) Identify issues that need to be addressed to successfully allow implementation of the investment plan.

5. **Task 5: Conduct capacity enhancement training in renewable energy policy and investment planning.** The consultant is expected to provide the MGME and relevant agencies with capacity enhancement training in

(i) renewable energy policy and investment planning, and grid integration, which includes dispatching and scheduling; and

(ii) economic and financial analysis of renewable energy projects, tariff-setting and other financial incentive development, and power purchase arrangements with private developers.

6. The renewable energy investment plan will meet the requirements of, and be compatible with, SREP procedures, investment criteria, and goals. The draft plan will be revised and finalized in response to stakeholder comments.

B. Implementation

7. **Senior renewable energy sector specialist and team leader** (international, 3 person-months, intermittent). The specialist should have (i) a postgraduate degree in electrical engineering, economics, or a relevant field; (ii) at least 10 years of experience in power system planning, including renewables; (iii) working experience in a similar geographic area, preferably

in Mongolia; and (iv) a good command of English. The specialist will undertake tasks 1, 4, and 5 and be responsible for supervising tasks 1–5 as team leader, including the following activities:

(i) Lead the other international and national experts.
(ii) Ensure timely and successful implementation of the technical assistance, including managing overall quality of the deliverables and outputs.
(iii) Coordinate with MGME and other counterparts including the private sector, civil society, and nongovernment organizations.
(iv) Review existing government policies and plans relevant to renewable energy promotion and development, including policies and regulatory framework for private sector participation.
(v) Prepare country and energy sector overview.
(vi) Identify possible opportunities for private sector participation on renewable energy development.
(vii) Assess various renewable energy technologies applicable in Mongolia and propose measures to overcome barriers hindering renewable energy development.
(viii) Identify prospective renewable energy projects.
(ix) Prepare the draft renewable energy investment plan, and finalize it reflecting stakeholder comments.
(x) Conduct capacity-enhancement training in renewable energy policy and investment planning, and grid integration, including dispatching and scheduling.

8. **Renewable energy economist** (international, 2 person-months, intermittent). The economist should have (i) a postgraduate degree in finance, economics, or a relevant field; (ii) at least 10 years of experience in power system planning, including renewables, and financial and economic analysis of power and heating projects, including renewables; (iii) working experience in a similar geographic area, preferably in Mongolia; and (iv) a good command of English. The economist will undertake tasks 2, 3, and 5 (ii) including the following activities:

(i) Identify possible opportunities for private sector participation on renewable energy development.
(ii) Conduct LEC analysis for various renewable energy technologies for electricity and heating supply.
(iii) Assess current need and amount of feed-in tariff, size of renewable energy fund, and other financial incentives for renewable energy deployment.
(iv) Assess various renewable energy technologies applicable in Mongolia and propose measures to overcome barriers hindering renewable energy development.
(v) Assist the team leader in identifying prospective renewable energy projects.
(vi) Assist the team leader in reviewing existing government policies and plans relevant to renewable energy promotion and development, including policies and regulatory framework for private sector participation.
(vii) Assist the team leader in preparing the country and energy sector overview.
(viii) Assist the team leader in preparing the draft renewable energy investment plan, and finalize it reflecting stakeholder comments.
(ix) Conduct capacity enhancement training in economic and financial analysis of renewable energy projects, tariff-setting and other financial incentive development, and power purchase arrangements with private developers.

9. **Renewable energy sector specialist** (national, 7 person-months, intermittent). The specialist should have (i) a postgraduate degree in engineering, economics, or a relevant field;

(ii) at least 5 years of engineering experience in renewable energy and similar projects, and working experience in bilateral and international aid-funded projects; and (iii) a good command of English. The specialist will provide assistance to support the corresponding international consultant (para. 7).

10. **Renewable energy economist** (national, 6 person-months, intermittent). The economist should have (i) a postgraduate degree in engineering, economics, or a relevant field; (ii) at least 5 years of engineering experience in renewable energy, heating, and similar projects; and working experience in bilateral and international aid-funded projects; and (iii) a good command of English. The economist will provide assistance to support the corresponding international consultant (para. 8).

C. Reporting Requirements

11. The consultants will closely coordinate implementation of the activities with the task force at MGME and the National Renewable Energy Center, and will report to the designated staff of MGME and the National Renewable Energy Center. The consultant should closely collaborate with the project teams from the Asian Development Bank, the European Bank for Reconstruction and Development, the International Finance Corporation, the World Bank, and keep them up-to-date on the progress, deliverables, and issues during all stages of project implementation.

D. Deadlines and Deliverables

12. The consultants will submit the reports and deliverables specified in the Table below. All reports and deliverables must be submitted in English accompanied by a Mongolian translation. The consultants should also make available all the relevant analytical material in MS Excel or other software formats.

Table: Reports and Deliverables

Deliverable	Deadline
Report for task 1	Contract signing + 8 weeks (January 2015)
Report for task 2	Contract signing + 20 weeks (May 2015)
Report for task 3	Contract signing + 28 weeks (August 2015)
Report for task 4	Contract signing + 32 weeks (October 2015). Final report for task 4 should be submitted within 2 months after comments from the Asian Development Bank and the government.

Source: Asian Development Bank.