



Report and Recommendation of the President to the Board of Directors

Project Number: 50088
November 2017

Proposed Loan and Grant Mongolia: Upscaling Renewable Energy Sector Project

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Asian Development Bank

CURRENCY EQUIVALENTS

(as of 20 October 2017)

Currency Unit	–	Togrug (MNT)
MNT 1.00	=	\$ 0.00049
\$1.00	=	MNT 2,034.0

ABBREVIATIONS

ADB	–	Asian Development Bank
AuES	–	Altai-Uliastai Energy System
CHP	–	combined heat and power
IEE	–	initial environmental examination
JFJCM	–	Japan Fund for the Joint Crediting Mechanism
SCF - SREP	–	Strategic Climate Fund - Scaling-up Renewable Energy Program
PAM	–	project administration manual
PV	–	Photovoltaic
MOE	–	Ministry of Energy
MOF	–	Ministry of Finance
NREC	–	National Renewable Energy Center
WRES	–	Western Region Energy System

WEIGHTS AND MEASURES

°C	–	degree Celsius
GWh	–	gigawatt hour
kGcal	–	Kilo giga calories
km	–	kilometer
kV	–	kilovolt
MW	–	megawatt
MWt	–	megawatt thermal
MWh	–	megawatt hour
t	–	ton

NOTE

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

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CONTENTS

	Page
I. THE PROPOSAL	2
II. The Project	2
A. Rationale	2
B. Impact and Outcome	4
C. Output	5
D. Investment and Financing Plans	6
E. Implementation Arrangements	7
III. Due diligence	8
A. Technical	8
B. Economic and Financial	9
C. Governance	9
D. Poverty and Social	10
E. Safeguards	10
F. Risks and Mitigating Measures	10
IV. ASSURANCES AND CONDITION	11
V. RECOMMENDATION	12
APPENDIXES	
1. Design and Monitoring Framework	11
2. List of Linked Documents	13

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on (i) a proposed project loan, and (ii) a proposed administration of grant to be provided by the ADB Strategic Climate Fund (SCF)¹, and the Japan Fund for the Joint Crediting Mechanism (JFJCM),² all to Mongolia for the Upscaling Renewable Energy Sector Project.³

2. The project will support the government policy to decarbonize the energy system in remote and less developed regions and strengthen institutional capacity for implementing the State Policy on Energy (2015-2030) and Mongolia Nationally Determined Contributions (NDC) under the Paris climate accord in 2015, which set the target to increase renewable energy capacity in total installed capacity by 20% in 2023 and 30% in 2030. It will develop 41.0 megawatt (MW) of the distributed renewable energy systems in remote and less developed regions, and is the first-of-its kind application in the country. Upon completion, the project will generate 99 gigawatt hours of clean electricity annually, thereby avoiding 87,968 tons of carbon dioxide equivalent (CO₂e) per year.⁴

II. THE PROJECT

A. Rationale

1. Sector Performance

3. Mongolia currently has a total of 1,158 megawatt (MW) of installed capacity, but because of aging power facilities that are well past their economic life, only 969 MW is available. Growing power demand over the past decade is stressing the power system. Imported electricity met around 20% of power demand in 2015.⁵ The energy sector in Mongolia relies heavily on coal-fired power generation which accounts for 91% of total installed capacity, and contributes over 63% of carbon dioxide (CO₂) emissions. Mongolia is the world's fifth most carbon-intense economy, but has tremendous renewable energy potential which could theoretically meet all long term domestic demand. Promoting a diversified energy mix with a higher share of renewable energy is a core priority both to reduce dependence on high cost imported electricity and to decarbonize the energy sector. The Government of Mongolia has taken several initiatives for renewable energy deployment since 2000, most notably (i) implementing the successful 100,000 Solar Ger Electrification Program (2000–2012) which provided access to modern energy to nomadic herders through solar home systems; and (ii) enacting the Law on Renewable Energy, which involves a set of regulatory arrangements with a US dollar denominated feed-in-tariff (FiT), which has facilitated the development of 110 MW of solar photovoltaic (PV) and wind power plants.⁶ However, as of late 2017 renewable energy in terms of total capacity is 11.3%.

¹ Under the Scaling Up Renewable Energy Program in Low-Income Countries financed by the Strategic Climate Fund.

² Administered by Asian Development Bank.

³ The design and monitoring framework is in Appendix 1.

⁴ The Asian Development Bank (ADB) provided project preparatory technical assistance. ADB. 2016. *Technical Assistance to Mongolia for preparing the Upscaling Renewable Energy Sector Project*. Manila.

⁵ Renewable energy is competitive with imported electricity which currently costs \$0.12–\$0.15 per kilowatt-hour (kWh). Total expenditure for electricity import in 2015 amounted to \$129 million.

⁶ The Law on Renewable Energy guarantees long term payment for feed-in-tariff at \$0.08–\$0.095 per kWh for wind power, \$0.15–0.18 per kWh for solar photovoltaic, and \$0.045–\$0.06 per kWh for hydropower. It was amended in 2015 to introduce renewable energy surcharge on end-user bill for financially sustainable feed-in-tariff payment.

2. Sector Challenges and Opportunities

4. The country's power system is comprised of four grid systems which have successfully expanded electricity access to 97% of the population.⁷ The central energy system, which covers around 90% of power demand, has attracted a total of around 400 MW of private sector-led renewable energy project of which 110 MW has been commissioned. At the same time, the other grid systems in Western and Altai-Uliastai regions which supply power to 25% of the population and have exhibited more than 10% annual demand growth for the last 5 years,⁸ have not attracted any private investment in utility-scale grid-connected renewable energy development mainly due to relatively small size of power demand and high transportation cost. Inadequate investment in power generation capacity addition for remote grid systems has led to 70% dependence on imported electricity from neighboring countries; the transmission lines are long relative to load, and transmission and distribution losses are well above international benchmarks.⁹ To address such unique challenges in remote grid systems, the government has sought to develop the first-of-its-kind distributed energy system utilizing a variety of renewable energy technologies and resources, comprising smaller scale and modular plants to produce reliable electricity and thermal energy for local use while minimizing imports and transmission losses.

5. The policy framework is being developed for accelerating renewable energy deployment. In 2015, the government issued its intended nationally determined contribution (INDC) to the Paris climate accord to reduce CO₂e emissions by 14% in 2030 compared to business-as-usual scenario, through renewable energy capacity expansion, transmission and distribution loss reductions, and other energy efficiency measures. In parallel, the State Policy on Energy 2015–2030 approved by the parliament in 2015, intends to achieve energy independence and increase renewable energy capacity to 20% of total installed capacity in 2023 and 30% in 2030.

6. As part of the overall policy framework to support clean energy development, the government prepared the Scaling Up Renewable Energy Program Investment Plan (SREP IP) for Mongolia in 2015, with the assistance of multilateral development banks.¹⁰ The SREP IP will help meet medium and long term renewable energy targets through a two-track approach: (i) strengthening the energy policy and regulatory framework to stimulate private-led development,¹¹ and (ii) upscaling rural renewable energy in remote grid systems through developing distributed renewable energy systems in remote and less developed regions. In November 2015, the SREP IP was endorsed by the SREP Subcommittee with total indicative grant financing of \$30 million.¹²

3. Sector Loan Modality and ADB interventions

7. The project targets geographically scattered demand centers in the less developed Western and Altai-Uliastai regions in the country.¹³ The project will be implemented with ADB's

⁷ According to the Millennium Development Goals and Poverty Map in 2011, no significant disparity in electricity access across regions was observed: 97%–99% in the central, and 95%–96% in the western and eastern regions.

⁸ 12 MW of Western Region Energy System, and 4 MW of Altai-Uliastai Energy System.

⁹ 95% of electricity has been imported from the Siberian grid of Russia has an emissions factor of 1.02 tons CO₂e per Megawatt-hour. Transmission and distribution loss were around 30%.

¹⁰ Asian Development Bank, European Bank for Reconstruction and Development, and the World Bank Group.

¹¹ The first pillar will be implemented by the World Bank's technical assistance with \$1.2 million to support regulatory framework strengthening including grid control, licensing, and feed-in-tariff adjustments.

¹² SCF-SREP supports priority investments and activities in medium and long term renewable energy investment plan of the targeted developing countries through grant and/or concessional loan co-financing.

¹³ Targeted regions comprise of six provinces (aimags): Uvs, Hovd, Bayan-Olgii, Khovsgol, Zhavhan, and Govi-Altai. These aimags are also the less developed with respect to educational attainment, life expectancy, and monetary income. Average Human Development Index (HDI) in these regions is around 0.657 whereas HDIs in national average

sector loan modality which enables time- and geographic-slicing for flexible project implementation. The time and geographic slicing approach is deemed suitable as (i) long term investment support will be ensured through batches of investments, (ii) subproject implementation complexity due to wide range of location-specific demand and grid conditions is minimized, and (iii) the capacity of local utilities in managing the grid system is appropriately enhanced through learning-by-doing. The project will also help develop (a) organizational capacity in local utilities and national dispatching centers to manage increasing renewable electricity connections to the existing grid, and (b) an investment plan up to 2030 and feed-in-tariff adjustment mechanism to appropriately incentivize the private investor to sustainably upscale distributed renewable energy systems which supply affordable electricity.¹⁴

8. The project will develop a first-of-its-kind renewable-based distributed energy system in remote and less developed regions where private sector developers have been unwilling to invest. It will help remove barriers to future private investment via learning-by-doing, including: (i) demonstration of successful utility scale solar PV and wind power plants, some of which will have integral energy storage; (ii) institutional capacity building to improve the enabling environment; and (iii) elimination of perceived risks about system performance. Upon completion in 2023, the project will deliver (a) confidence in using distributed renewable energy systems for future expansion, (b) an enhanced capacity of grid operators and local utilities to absorb progressively greater amounts of renewable energy into the grid, and (c) needed capacity expansion to help meet the 2030 renewable energy target.

9. The Energy Policy (2009) of the Asian Development Bank (ADB) supports the rationale of the project by promoting renewable energy and energy efficiency, access to energy, and sector reforms to crowd in private sector development. The project is fully aligned with the government policies and investment plan (paras 5 and 6), and Sustainable Development Goal 7: ensure access to affordable, reliable, sustainable and modern energy for all.

4. Development Partner Coordination

10. The World Bank approved a 10 MW of solar PV plant construction in Hovd, western region in 2016 with \$12.4 million of SCF-SREP grant funding in July 2016.¹⁵ ADB and the World Bank projects will be administered under single Project Management Unit of the Ministry of Energy to minimize project administration related transaction costs, and share lessons learned and issues resolved during subproject implementation for effective project administration.

B. Impact and Outcome

11. The impact will be greenhouse gas emissions avoided, imported electricity reduced, and energy security improved. The outcome will be renewable energy supply in the country increased, and institutional and organizational capacity is strengthened and enhanced.

and in Ulaanbaatar are 0.735 and 0.812 respectively. The regional disparity in HDI is correlated strongly to electricity consumption per capita: 381 kWh per month of average electricity consumption per capita in these regions against 1,776 kWh in national average and 1,536 kWh in Ulaanbaatar. The targeted regions are also vulnerable to the fluctuating macro economy which is implicated in fragile livelihood, and highly vulnerable to falling back into poverty. The incidence of poverty has fallen back to 29.6% in 2016 from 21.6% in 2014 in national average, and 36.0% in 2016 from 26.0 in 2014 in the project targeted regions.

¹⁴ The project is expected to offer low cost and affordable electricity due to recent significant capital cost reduction in international market: \$0.05 per kWh in average as compared to \$0.07 per kWh of business as usual scenario (electricity import and coal fired power).

¹⁵ The World Bank. 2016. Mongolia: Second Energy Sector Project. Washington DC.

C. Output

12. The project will have three outputs:

- (i) **Distributed renewable energy system development.** The subprojects comprise a total of 40.5 MW of solar PV and wind power in the Western and Altai-Uliastai regions. Advanced energy storage will be installed in selected subprojects for grid stability and time-shifting. These will be implemented in two stages:(i) first stage (2018-2021) with 25.5 MW capacity; and (ii) Second stage (2021-2023) with 15 MW capacity as detailed in Table 1.
- (ii) **Geothermal heat pump demonstration.** The subproject comprises installation of 500 kW thermal of geothermal heat pump capacity in public buildings in five townships of the targeted region.¹⁶ This will supply air pollutant free space heating for 10,000 square meters of floor area. The subproject will demonstrate performance of geothermal heat pump system and increase experience in design, installation, operation and maintenance for future scaling-up.
- (iii) **Institutional strengthening and capacity enhancement.** The subproject will (i) enhance technical capacity of local utilities and the national dispatching center in renewable energy investment planning, transparent selection and bidding, renewable electricity dispatch, and grid control and protection; and (ii) support preparation of renewable energy investment plan 2023-2030 in targeted regions. It will also support evolution of the FiT system to a more economically efficient tariff mechanism which reflects actual capital costs while assuring commercial financial viability sufficient to attract private investment in remote areas while providing affordable electricity and heating services.¹⁷

Table 1. List of Subprojects

Location/Province	Applied Renewable Energy Technology	Capacity (MW)	Construction Period
a. Distributed Renewable Energy System Development			
Umunogovi / Uvs	Wind Power	10.0	2018-2021
Altai / Govi-Altai	Solar PV	10.0	2018-2021
Altai Soum / Govi-Altai	Solar PV/Wind hybrid and battery storage	0.5	2018-2021
Uliastai / Zhavhan	Solar PV and battery storage	5.0	2018-2021
Telmen / Zhavhan	Wind Power	5.0	2021-2023
Moron / Khovsgol	Solar PV	10.0	2021-2023
Subtotal		40.5	
b. Geothermal Heat Pump Demonstration			
Hovd, the other Soums	Geothermal Heat Pump	0.5	2018-2023
Total		41.0	

MW = megawatt, PV = photovoltaic.

Source: The project Feasibility Study Report

¹⁶ The subcomponent will be implemented with three batches. It starts 100 kW installation in Uvs aimag center, and is rolled out in two aimag centers in western region, and two aimag centers in Altai-Uliastai region.

¹⁷ Current FiT in US dollar denomination offers \$0.15-0.18 per kWh in solar PV and \$0.08-0.095 per kWh in wind power, which have successfully attracted domestic and foreign investors for beyond 400 MW renewable energy project in the central energy system. However, such level of FiT does not longer reflect appropriate cost of energy on a basis of current overnight cost in the global market.

D. Investment and Financing Plans

13. The project is estimated to cost \$66.10 million (Table 2).

Table 2: Project Investment Plan
(\$ million)

Item	Amount ^a
A. Base Cost^a	
1. Distributed renewable energy system development	49.23
a. Umunogovi wind power	13.70
b. Altai Solar PV	9.71
c. Altai Soum renewable energy hybrid system and battery storage	0.92
d. Uliastai Solar PV and battery storage	7.95
e. Telmen wind power	6.75
f. Moron Solar PV	10.20
2. Geothermal heat pump system demonstration	1.00
3. Institutional strengthen and capacity enhancement	1.00
4. Project administration	2.00
5. Taxes and duties	5.43
Subtotal (A)	58.66
B. Contingencies^c	5.66
C. Financial Charges During Implementation^d	1.78
Total (A+B+C)	66.10

^a In November 2017 prices.

^b Physical contingencies computed at 5.0% of base cost. Price contingencies computed at an average of 1.5% on foreign exchange costs and 7.3% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

^d Includes interest and commitment charges. Interest during construction for ordinary capital resources loan has been computed at the 5-year US dollar (USD) fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for an ordinary capital resources loan are 0.15% per year to be charged on the undisbursed loan amount.

Note: Numbers may not sum precisely because of rounding.

Source: Asian Development Bank estimates.

14. The government has requested a loan of \$40 million from ADB's ordinary capital resources to help finance the project. The loan will have a 25-year term, including (i) a grace period of 5 years, (ii) a straight-line repayment method, (iii) an annual interest rate determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility, (iv) a commitment charge of 0.15% per year to be charged on undisbursed loan amount, and (v) such other terms and conditions set forth in the draft loan and project agreements. The average loan maturity is 15.25 years, and the maturity premium payable to ADB is 0.10% per year. SCF and JFJCM will provide grant cofinancing equivalent to \$14.6 million and \$6 million, respectively, to be administered by ADB. Government will finance \$5.5 million of taxes and duties through exemption, and administration fee. The financing plan is in Table 3.

Table 3: Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank		
Ordinary capital resources (loan)	40.00	60.51
Strategic Climate Fund (grant) ^a	14.60	22.09
Japan Fund for Joint Crediting Mechanism (grant) ^b	6.00	9.08
Government	5.50	8.32
Total	66.10	100.00

Source: Asian Development Bank estimates.

^a Under the Scaling Up Renewable Energy Program in Low-Income Countries financed by the Strategic Climate Fund. Administered by the Asian Development Bank.

^b Administered by the Asian Development Bank.

15. The loan will be used for the procurement of equipment and materials, civil works, services, related transportation, insurance, installation costs, consulting services, project administration cost, contingencies, and interest and commitment charge during construction. SCF grant with ADB loan cofinancing will be used for procurement and installation for Umunogovi wind power and Altai solar PV. Japan Fund for Joint Crediting Mechanism (JFJCM) with ADB loan cofinancing will be used for (i) procurement and installation of Altai soum renewable energy hybrid system and Uliastai solar PV and (ii) consulting services which is JFJCM cofinancing subprojects related procurement support, project design document preparation and validation, and monitoring and verification.

16. The government is the Borrower of the loan and the recipient of the grant, and will make the loan and the grant available to the implementing agencies on the same terms and conditions as those of ADB loan and grant. The implementing agencies will assume the foreign exchange and interest variation risks of the ADB loan. The government has assured ADB that counterpart funding will be provided in a timely manner, including any additional counterpart funding required for any shortfall of funds or cost overruns. No withdrawals for a particular subcomponent shall be made from the loan and the grant account until the Borrower shall have certified to ADB that the concerned onlending and ongranting agreements with the respective implementing agencies have been duly executed and delivered between the government and the respective implementing agencies.

E. Implementation Arrangements

17. The Ministry of Energy (MOE) is the executing agency for the project. A project steering committee, composed of MOE, Ministry of Finance, and implementing agencies, will be established to provide overall guidance on project management and implementation. A project management unit under MOE, will be responsible for managing, coordinating, and supervising the implementation of all subcomponents. The Western Region Energy System State Owned Joint Stock Company (WRES) for subproject in Umunogovi, the Altai-Uliastai Region Energy System State Owned Joint Stock Company (AuES) for subprojects in Altai, Altai Soum, Uliastai, Telmen, and Moron, and the National Renewable Energy Center (NREC) fond for geothermal heat pump, are the project implementing agencies responsible for the day-to-day management of project's activities.

18. Project management consultants will be recruited to support the project management unit, WRES, AuES, and NREC during project implementation and to assist them in (i) detailed engineering design, (ii) procurement which includes assistance in tender document preparation,

bid evaluation, and contract negotiation, (iii) social and environment impact monitoring, and (iv) JFJCM related activities including project design document preparation and validation, and monitoring and verification.

19. The implementation arrangements are summarized in Table 4.

Table 4: Implementation Arrangements

Aspects	Arrangements		
Implementation period	June 2018–June 2023		
Estimated completion date	Physical completion: 30 June 2023 Loan closing: 30 December 2023		
Management			
(i) Oversight body	The project steering committee Chair: State Secretary, Ministry of Energy Members: representatives from the Ministry of Finance and implementing agencies		
(ii) Executing agency	Ministry of Energy		
(iii) Implementing agencies	Western Region Energy System State Owned Joint Stock Company, Altai-Uliastai Region State Owned Joint Stock Company, and National Renewable Energy Center.		
(iv) Implementation unit	Project management unit at the Ministry of Energy, 16 staff		
Procurement	International competitive bidding	9 contracts	\$50.23million
Consulting services	Quality- and cost- based selection (90:10)	56 person-months	\$1.00 million
Advance contracting	The Ministry of Energy has requested advance contracting. This will include the recruitment of consulting services.		
Disbursement	The loan proceeds will be disbursed in accordance with ADB's <i>Loan Disbursement Handbook</i> (2015, as amended from time to time) and detailed arrangements agreed upon between the government and ADB.		

ADB = Asian Development Bank.

Source: Asian Development Bank estimates.

III. DUE DILIGENCE

A. Technical

20. **Resource Assessment.** A comprehensive solar and resource assessment was done based on internationally recognized methodologies and practices for each subproject site. The assessment used solar irradiation, wind speed, and meteorological datasets between 2007 and 2017. The assessment comprised (i) the ground data quality assessment to filter outlier data derived from measurement error, (ii) statistical comparison and correction of satellite database using the filtered ground measurement data, and (iii) measurement of solar irradiation and wind speed for typical meteorological year which is a basis for electricity yield simulation.

21. **Grid Stability.** It is essential to maintain transmission network stability under normal and emergency (fault) conditions. This is particularly the case in the grid systems in the targeted western and Altai-Uliatai regions where the transmission lines are very long relative to loads. The basic requirements are for (i) an adequate supply of reactive power needed to sustain the voltage under all loading conditions, and (ii) power transfer must be always maintained to ensure that the system frequency is maintained within the grid code standard in the country. In case of wind power, it also must ensure that the plant can ride through the dynamic condition that prevail at the time of transmission line and substation faults. The grid stability analysis using DlgSILET Power Factory Tools was carried out to simulate the impact of the project on grid stability, and assessed

that the renewable electricity from each subproject can be safely fed into the grid with the secondary battery storage and the power supply from the existing hydropower plants.

22. **System configuration design and costs.** The capacity size and the system configuration design were assessed considering solar and wind resources, load demand curve, grid stability impacts, and extreme cold climate in mid-winter. The subprojects include remote control, monitoring, and protection systems to stabilize the grid in line with international design standards. The power outputs from the project will be synchronized and be integrated into the existing grid using the battery storage to make up for the intermittent nature of renewable energy and ensure electricity supply throughout the day. The capital cost was estimated on a basis of current international market prices with necessary transportation costs.

B. Economic and Financial

23. Financial analysis of the project indicates a financial internal rate of return of 7.99% for the whole project, 7.69% for the distributed renewable energy system subcomponent, and 12.33% for the geothermal heat pump demonstration subcomponent, which are higher than the corresponding weighted average cost of capital of 3.83%. Sensitivity analysis shows that the project is likely to be sustainable under various adverse scenarios.

24. The economic internal rate of return (EIRR) of the project without environmental benefits is 15.46% for the overall project, 15.69% for the distributed renewable energy system subcomponent, and 16.99% for the geothermal heat pump demonstration subcomponent. These EIRRs are above the 9.00% economic opportunity cost of capital. Sensitivity analysis shows that the project is likely to be sustainable with EIRRs above 9.00% under various adverse scenarios.

C. Governance

25. Financial management assessments were conducted for WRES, AuES, and NREC. The financial management and accounting procedures used by WRES, AuES, and NREC are aligned with the regulations and policies issued by the Ministry of Finance, and are considered effective and adequate for the project. WRES, AuES, and NREC have developed and maintained financial management monitoring and supervising structure in budgeting, asset management, funding management, internal and external auditing, and reporting, with internal financial management rules and a centrally-managed online financial management system. The assessment indicates that (i) accrual-based accounting and the international financial reporting standards are followed; (ii) the separation of functions for authorization, transaction, recording, and asset management are well established; and (iii) a robust financial management and internal auditing system are in place.

26. Procurement capacity assessments were also conducted for WRES, AuES, and NREC. They have experienced and trained personnel in procurement and contract management supported by well-established internal procedures and management systems, which is consistent with ADB requirements. The accountability mechanism is also deemed effective with the following activities performed by different groups: procurement and contract awards, disbursement, and internal audit. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government and MOE, WRES, AuES, and NREC.

D. Poverty and Social

27. The project will directly benefit 253,313 population (including 118,960 female population) or 50% of population in the targeted regions through the distributed renewable energy system development. The project will have a positive social impact by avoiding air pollution associated with coal use for power generation. The project has a positive side-benefit of employment opportunities for the local population by generating 4,010 person-months (334 jobs) per year of unskilled labor during construction and 360 person-months (30 jobs) per year during operation and maintenance. Priority will be given to the low income and unemployed female population in adjacent local community.

E. Safeguards

28. **Environment.** The project is classified category B for environment. The initial environmental examination (IEE) complies with ADB's policies and requirements, including ADB's Safeguard Policy Statement (2009), and identifies potential adverse impacts. During construction, such risks would include (i) soil erosion; (ii) construction noise and dust affecting local residents; (iii) inappropriate storage of construction materials and wastes; and (iv) safety to construction workers. During operation, limited adverse impacts are anticipated, except for occupational and communal health and safety due to unexpected accident like lightening. The IEE concludes that those impacts can be mitigated through the implementation of the environmental management plan, which specifies mitigation measures, monitoring requirements, and institutional responsibilities for ensuring proper environmental management throughout the project's construction and operation. Meaningful public consultation was done in accordance with ADB's Safeguard Policy Statement. The executing and implementing agencies are committed to managing the identified environmental risks and have agreed on a comprehensive set of environment-related loan covenants and a training program with strong emphasis on environment safeguards. Potential environmental complaints or disputes will be handled in accordance with the grievance redress mechanism established for the project. A rapid climate risk assessment concludes that climate risk is *medium*, and the most significant risk to the project areas and their vicinities relates to flood and permafrost. The system configuration design considered such climate change risks and will be further reviewed during the detailed design.

29. **Involuntary resettlement and indigenous peoples.** The project is classified category C for involuntary resettlement and indigenous peoples. The project does not entail permanent or temporary land acquisition, land use restriction, demolition of any structure, or relocation of people. All subprojects are either inside the existing substation premises or the government owned land. The project will be implemented in a large urban area with no ethnic minority communities; various ethnic groups are mixed and together and there is no significant difference on lifestyle, socioeconomic status, or vulnerability between individuals of ethnic majority and minorities. Thus, it is not expected to have any impact on ethnic minorities.

F. Risks and Mitigating Measures

30. Major risks and mitigating measures are summarized in Table 5 and described in detail in the risk assessment and risk management plan.¹⁸

¹⁸ Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Table 5: Summary of Risks and Mitigating Measures

Risks	Mitigating Measures
Delay in project completion due to frequent change in key personnel of the executing and implementing agencies	Project management consultants will support the project management unit, and implementing agencies in engineering design, procurement, disbursement, project implementation supervision and monitoring to avoid possible delay in project completion.
Implementing agencies' financial performance deteriorates	Adequate loan covenants requiring the government to oversee and support the implementing agencies in maintaining sound financial health will be agreed upon. The government will regularly review electricity and heat tariff adjustment to achieve full cost recovery by 2023 in accordance with the State Policy on Energy 2015–2030.

Source: Asian Development Bank.

31. Overall, the risks associated with the project will be adequately addressed. The integrated benefits and impacts are expected to outweigh the costs.

IV. ASSURANCES AND CONDITION

32. The government, MOE, WRES, AuES, and NREC assures ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, and disbursement as described in detail in the PAM and loan documents.

33. The government, MOE, WRES, AuES, and NREC agrees with ADB on certain covenants for the project, which are set forth in the loan agreement and project agreement.

34. The effectiveness is conditional upon the effectiveness of (i) the SCF Grant Agreement between ADB and the Borrower, and (ii) the JFJCM Grant Agreement between ADB and the Borrower. The disbursement is also conditional upon the borrower's certification that all onlending and ongranting will have been duly executed and delivered, and all conditions precedent to their effectiveness will have been fulfilled.

V. RECOMMENDATION

35. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

- (i) the loan of \$ 40,000,000 to Mongolia for the Strengthening Electricity and Heat Supply Network in Ulaanbaatar from ADB's ordinary capital resources, with interest to be determined in accordance with ADB's London interbank offered rate (LIBOR)-based lending facility; for a term of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan and project agreements presented to the Board; and
- (ii) administration by ADB of the grant of \$14,600,000 to Mongolia, to be provided by the Strategic Climate Fund, for the Upscaling Renewable Energy Sector Project.
- (iii) administration by ADB of the grant of \$ 6,000,000 to Mongolia, to be provided by the Japan Fund for the Joint Crediting Mechanism, for the Upscaling Renewable Energy Sector Project

Takehiko Nakao
President

xx xx 2017

DESIGN AND MONITORING FRAMEWORK FOR THE PROJECT

The impact of the Project is Aligned with greenhouse gas reduced, imported electricity reduced, and energy security improved (State Policy on Energy 2015–2030)

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting	Risks
<p>Outcome Renewable energy supply in the country increased</p>	<p>20% of the total installed capacity will be renewable energy by 2023, which supplies clean power to 258,313 households, thereby annually avoiding 87,968 tons of carbon dioxide emission (2017 baseline: 11.3%)</p>	<p>Electric power year book of the Energy Regulatory Commission</p>	<p>Changes in climate lead to solar, wind, and water resources becoming insufficient to generate electricity as planned.</p>
<p>Outputs 1. Renewable energy capacity addition for electricity supply in remote grid systems implemented</p> <p>2. Geothermal heat pump system installed in five aimag centers in targeted regions.</p> <p>3. Capacity of local public utilities in remote grid systems in investment planning, project management, and grid control enhanced</p>	<p>1a. 25.5 MW renewable energy capacity of subprojects for electricity supply in the western and Altai Uliastai regions by 2021 (2017 baseline: 0 MW)</p> <p>1b. 15 MW renewable energy capacity of non-core subprojects for electricity supply in Western and Altai-Uliastai regions by 2023 (2017 baseline: 0 MW)</p> <p>2a. 500 kW of geothermal heat pumps are installed in the selected five aimag centers by 2030 (2017 baseline: 0 MW)</p> <p>3a. Capacity development training provided for counterpart engineers and operators for Western Region Energy System and Altai-Uliastai Energy System by 2023 (2017 baseline: none)</p> <p>3b. Renewable investment plan 2023-2030, and amendment draft for Law on Renewable Energy prepared. (2017 baseline: none)</p>	<p>Project completion report</p> <p>Quarterly progress report</p> <p>Mid-term review mission back-to-office report</p>	<p>Tight fiscal space of the state expenditure due to continued macroeconomic slowdown leads to a delay in implementation of the investment program.</p>

Key Activities with Milestones

Output 1: Renewable energy capacity addition for electricity and heating supply in remote grid systems implemented

- 1.1 Operationalize the project management unit in the Ministry of Energy (Q2 2018)
- 1.2 Complete selection of consultants for project management and capacity enhancement (Q2 2018)
- 1.3 Prepare detailed engineering design for subprojects in Batch 1(Q3 2018)
- 1.4 Conduct bidding process for Batch 1 (Q1 2019)
- 1.5 Undertake construction works and test run for subprojects in Batch 1(Q4 2019)
- 1.5 Start commercial operation for subprojects in Batch 1(Q1 2021)
- 1.6 Complete implementation of Batch 2 (Q2 2023)

Output 2: Geothermal heat pump system installed in five aimag centers in targeted regions.

- 2.1 Operationalize the project management unit in the Ministry of Energy (Q2 2018)
- 2.2 Complete selection of consultants for project management and capacity enhancement (Q2 2018)
- 2.3 Prepare detailed engineering design for subprojects in Batch 1(Q3 2018)
- 2.4 Conduct bidding process for Batch 1 (Q1 2019)
- 2.5 Undertake construction works and test run for Batch 1(Q4 2019)
- 2.6 Start commercial operation in Batch 1(Q3 2020)
- 2.7 Complete implementation of Batch 2 (Q3 2021)
- 2.8 Complete implementation of Batch 3 (Q1 2023)

Output 3: Capacity of local public utilities in non-central energy systems in investment planning, project management, and grid control enhanced

- 3.1 Complete selection of consultants for project management and capacity enhancement (Q2 2018)
- 3.2 Prepare for capacity development training program for Batch 1 (Q4 2018)
- 3.3 Implement capacity development training for Batch 1 (Q1 2022)
- 3.4 prepare renewable energy investment plan 2023-2030 (Q1 2023)
- 3.5 Prepare draft amendment of law on renewable energy (Q1 2023)

Inputs

ADB Loan:	\$40.0 million
JFJCM Grant:	\$6.0 million
SCF Grant:	\$14.6 million
Government:	\$5.5 million

ADB = Asian Development Bank, MW = megawatt, SCF = Strategic Climate Fund.

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=46343-002-3>

1. Loan Agreement
2. Project Agreement
3. Sector Assessment (Summary): Energy
4. Project Administration Manual
5. Contribution to the ADB Results Framework
6. Development Coordination
7. Financial Analysis
8. Economic Analysis
9. Country Economic Indicators
10. Summary Poverty Reduction and Social Strategy
11. Initial Environmental Examination
12. Risk Assessment and Risk Management Plan

Supplementary Documents

13. Financial Management Assessment and Financial Performance and Projections
14. Project Procurement Risk Assessment Report