



# Report and Recommendation of the President to the Board of Directors

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Project Number: 50088-002  
August 2018

## Proposed Loan and Administration of Grants Mongolia: Upscaling Renewable Energy Sector Project

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Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 1 August 2018)

|               |   |              |
|---------------|---|--------------|
| Currency unit | – | togrog (MNT) |
| MNT1.00       | = | \$0.0004057  |
| \$1.00        | = | MNT2,464.50  |

## ABBREVIATIONS

|                 |   |   |
|-----------------|---|---|
| ADB             | – | Asian Development Bank  |
| AUES            | – | Altai–Uliastai Region Energy System State-Owned Joint Stock Company |
| CO <sub>2</sub> | – | carbon dioxide  |
| EMP             | – | environmental management plan                                       |
| FIT             | – | feed-in-tariff  |
| IEE             | – | initial environmental examination                                   |
| JFJCM           | – | Japan Fund for the Joint Crediting Mechanism                        |
| kWh             | – | kilowatt-hour   |
| MOE             | – | Ministry of Energy  |
| MW              | – | megawatt  |
| NREC            | – | National Renewable Energy Center                                    |
| O&M             | – | operation and maintenance   |
| PAM             | – | project administration manual                                       |
| SCF             | – | Strategic Climate Fund  |
| SREP            | – | Scaling Up Renewable Energy Program in Low-Income Countries         |
| TA              | – | technical assistance  |
| WRES            | – | Western Region Energy System State-Owned Joint Stock Company        |

## NOTE

In this report, “\$” refers to United States dollars.

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|-------------------------|--|
| <b>Vice-President</b>   | Stephen Groff, Operations 2  |
| <b>Director General</b> | Amy S.P. Leung, East Asia Department (EARD)  |
| <b>Director</b>         | Sujata Gupta, Energy Division, EARD  |
| <b>Team leader</b>      | Shigeru Yamamura, Senior Energy Specialist, EARD   |
| <b>Team members</b>     | Ma. Carmen M. Alcantara, Associate Project Analyst, EARD<br>Jinqiang Chen, Young Professional, EARD<br>Judith B. Doncillo, Project Officer, EARD<br>Christian Ellerman, Climate Change Specialist, Sustainable Development and Climate Change Department (SDCC)<br>Shinsuke Kawazu, Senior Counsel, Office of the General Counsel<br>Teruhisa Oi, Principal Energy Specialist, EARD<br>Hiroaki Teshima, Environment Specialist, SDCC<br>Yun Zhou, Environment Specialist, EARD |
| <b>Peer reviewer</b>    | Kim Dae Kyeong, Senior Energy Specialist, SDCC   |

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## PROJECT AT A GLANCE

|  |  |  |                    |
|--|--|--|--------------------|
| <b>1. Basic Data</b>   |  | <b>Project Number:</b> 50088-002           |                    |
| <b>Project Name</b>  | Upscaling Renewable Energy Sector Project  | <b>Department /Division</b>                | EARD/EAEN          |
| <b>Country</b>   | Mongolia   | <b>Executing Agency</b>                    | Ministry of Energy |
| <b>Borrower</b>  | Government of Mongolia   |  |                    |
| <b>2. Sector</b>   |  | <b>ADB Financing (\$ million)</b>          |                    |
| ✓ <b>Energy</b>  | <b>Subsector(s)</b>  |  |                    |
|  | Renewable energy generation - solar  |  | 24.80              |
|  | Renewable energy generation - wind   |  | 15.20              |
|  |  | <b>Total</b>                               | <b>40.00</b>       |
| <b>3. Strategic Agenda</b>   |  | <b>Climate Change Information</b>          |                    |
| Inclusive economic growth (IEG)<br>Environmentally sustainable growth (ESG)                      | <b>Subcomponents</b>   | CO <sub>2</sub> reduction (tons per annum) | 87,968             |
|  | Pillar 1: Economic opportunities, including jobs, created and expanded<br>Eco-efficiency<br>Global and regional transboundary environmental concerns   | Climate Change impact on the Project       | Medium             |
|  |  | <b>ADB Financing</b>                       |                    |
|  |  | Mitigation (\$ million)                    | 40.00              |
| <b>4. Drivers of Change</b>  |  | <b>Gender Equity and Mainstreaming</b>     |                    |
| Governance and capacity development (GCD)<br>Knowledge solutions (KNS)<br><br>Partnerships (PAR) | <b>Components</b>  | No gender elements (NGE)                   | ✓                  |
|  | Institutional development<br>Organizational development<br>Application and use of new knowledge solutions in key operational areas<br>International finance institutions (IFI)<br>Official cofinancing |  |                    |
|  |  |  |                    |
| <b>5. Poverty and SDG Targeting</b>  |  | <b>Location Impact</b>                     |                    |
| Geographic Targeting   | No   | Rural                                      | Medium             |
| Household Targeting  | No   | Urban                                      | Medium             |
| SDG Targeting  | Yes  |  |                    |
| SDG Goals  | SDG7   |  |                    |
| <b>6. Risk Categorization:</b>   | Low  |  |                    |
| <b>7. Safeguard Categorization</b>   | <b>Environment: B Involuntary Resettlement: C Indigenous Peoples: C</b>  |  |                    |
| <b>8. Financing</b>  |  |  |                    |
| <b>Modality and Sources</b>  |  | <b>Amount (\$ million)</b>                 |                    |
| <b>ADB</b>   |  | <b>40.00</b>                               |                    |
| Sovereign Sector (Regular Loan): Ordinary capital resources                                      |  | 40.00                                      |                    |
| <b>Cofinancing</b>   |  | <b>20.60</b>                               |                    |
| Japan Fund for the Joint Crediting Mechanism - Project grant (Full ADB Administration)           |  | 6.00                                       |                    |
| Strategic Climate Fund - SREP - Project grant (Full ADB Administration)                          |  | 14.60                                      |                    |
| <b>Counterpart</b>   |  | <b>5.62</b>                                |                    |
| Government   |  | 5.62                                       |                    |
| <b>Total</b>   |  | <b>66.22</b>                               |                    |

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan to Mongolia for the Upscaling Renewable Energy Sector Project. The report also describes the proposed administration of grants to be provided by the Strategic Climate Fund (SCF)<sup>1</sup> and the Japan Fund for the Joint Crediting Mechanism (JFJCM) for the project, and if the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the administration of the SCF and JFJCM grants.

2. The project will (i) support the Government of Mongolia's policy of decarbonizing the energy system in remote and less-developed regions; and (ii) strengthen institutional capacity to implement the State Policy on Energy, 2015–2030,<sup>2</sup> and Mongolia's Nationally Determined Contribution under the Paris climate accord of 2015,<sup>3</sup> which set the targets of increasing the share of renewable energy capacity in total installed capacity to 20% by 2023 and to 30% by 2030. The project will develop a 41 megawatt (MW) first-of-its-kind distributed renewable energy system with a variety of renewable energy technologies supplying clean electricity and heat in geographically scattered load centers in the less-developed region of western Mongolia. Once completed, the project will generate 99 gigawatt-hours of clean electricity yearly, thereby enabling the country to reduce its carbon dioxide (CO<sub>2</sub>) emissions by 87,968 tons per year.<sup>4</sup>

## II. THE PROJECT

### A. Rationale

#### 1. Sector Performance

3. Growing power demand since 2007 has stressed the country's power system. Mongolia has a total of 1,158 MW of installed capacity, but because of aging power facilities that are well past their economic life, only 969 MW is available. Electricity imports met about 20% of power demand in 2017.<sup>5</sup> The country's energy sector relies heavily on coal-fired power generation, which accounts for 91% of total installed capacity and contributes over 63% of CO<sub>2</sub> emissions. Mongolia is the world's fifth most carbon-intensive economy, but has tremendous renewable energy potential, which could theoretically meet all domestic demand. Promoting a diversified energy mix with a higher share of renewable energy is a core priority of the government, both to reduce dependence on high-cost imported electricity and to decarbonize the energy sector.

4. Since 2000, the Government of Mongolia has taken several initiatives for renewable energy deployment, most notably (i) implementing the successful 100,000 Solar Ger Electrification Program (2000–2012), which provides nomadic herders with access to modern energy through solar home systems; and (ii) passing the Law on Renewable Energy (2007, amended in 2015), which has facilitated the development of 137 MW of renewable energy power plants through a set of regulatory arrangements with a United States dollar-denominated feed-in-tariff (FIT). However, the share of renewable energy in total installed capacity is still only 12%.

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<sup>1</sup> Under the Scaling Up Renewable Energy Program in Low-Income Countries (SREP).

<sup>2</sup> Government of Mongolia, 2015. *State Policy on Energy, 2015-2030*. Ulaanbaatar.

<sup>3</sup> [http://www4.unfccc.int/ndcregistry/PublishedDocuments/Mongolia%20First/150924\\_INDCs%20of%20Mongolia.pdf](http://www4.unfccc.int/ndcregistry/PublishedDocuments/Mongolia%20First/150924_INDCs%20of%20Mongolia.pdf)

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

<sup>5</sup> Energy Regulatory Commission of Mongolia. 2017. *Statistics of Energy Performance*. Ulaanbaatar.

## 2. Sector Challenges and Opportunities

5. The country's power system consists of four grid systems, which have successfully expanded electricity access to 97% of the population.<sup>6</sup> The central energy system, covering around 90% of power demand, has attracted private sector-led renewable energy projects totaling around 400 MW, of which 120 MW have been commissioned. At the same time, other grid systems in the western Mongolia, which supply power to 25% of the population in the country and have exhibited annual demand growth of more than 10% between 2010 and 2015, have not attracted any private investment in utility-scale grid-connected renewable energy development, mainly because of the relatively small size of power demand in geographically scattered load demand centers. Inadequate investment in power generation capacity addition for remote grid systems has led to heavy dependence on imported electricity from neighboring countries across long stretches of transmission lines, accounting for around 30% of transmission and distribution losses.<sup>7</sup> To address such unique challenges in remote grid systems, the government has sought to develop a distributed energy system using a variety of renewable energy technologies and resources comprising smaller-scale and modular plants to produce reliable electricity for local use while reducing electricity imports.

6. The government has a coherent policy framework to guide renewable energy deployment, which is being implemented. In 2015, the government issued its Intended Nationally Determined Contribution to the Paris climate accord (footnote 3), which would reduce CO<sub>2</sub> emissions by 14% by 2030 compared with the business-as-usual scenario through renewable energy capacity expansion, transmission and distribution loss reduction, and other energy efficiency measures. In parallel, the State Policy on Energy, approved by the Parliament in 2015, is aimed at achieving energy independence and increasing renewable energy capacity to 20% of total installed capacity by 2023 and 30% by 2030.

7. As part of the overall policy framework in support of renewable energy development, the government prepared the renewable energy investment plan in 2015, with the assistance of multilateral development banks.<sup>8</sup> The investment plan 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 sector-led development; and (ii) scaling up rural renewable energy in remote grid systems through the development of a distributed renewable energy system in remote and less-developed regions of western Mongolia. In November 2015, the investment plan was endorsed by the Scaling Up Renewable Energy Program in Low-Income Countries (SREP) subcommittee, with total indicative grant financing of \$30 million.<sup>9</sup>

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<sup>6</sup> United Nations Development Programme and National Statistical Office of Mongolia. 2012. *Millennium Development Goals and Poverty Map-2011*. Ulaanbaatar.

<sup>7</sup> Imported electricity meets around 70% of electricity demand in western and Altai-Uliastai regions. 95% of electricity has been imported from the Siberian grid of the Russian Federation with an emission factor of 1.02 tons of CO<sub>2</sub> equivalent per megawatt-hour.

<sup>8</sup> ADB, the European Bank for Reconstruction and Development, and the World Bank.

<sup>9</sup> The SREP is a Climate Investment Fund subprogram that supports transformation in eligible developing countries through the deployment of scaled-up renewable energy solutions. The first pillar of the investment plan is being implemented with \$1.2 million in World Bank TA to support regulatory framework strengthening, including grid control, licensing, and FIT adjustments. SREP grant cofinancing of \$28.5 million supports project preparatory TA (\$1.5 million), and distributed renewable energy development under ADB (\$14.6 million) and the World Bank (\$12.4 million).

### 3. Sector Loan Modality and Asian Development Bank Interventions

8. The project is targeted at geographically scattered demand centers in the less-developed region of western Mongolia. These regions are vulnerable to macroeconomic fluctuations, which make livelihoods more fragile and the regions more likely to fall back into poverty. In the ongoing economic downturn since 2015, poverty incidence in western Mongolia has worsened, rising to 41.0% in 2017 from 26.0% in 2014.<sup>10</sup> The project will be implemented under the sector loan modality of the Asian Development Bank (ADB) for more flexible project implementation. The approach is deemed suitable as it will (i) ensure the grid stability based upon actual core subproject impacts upon the grid; (ii) minimize the complexity of subproject implementation because of the wide range of location-specific demand and grid conditions; and (iii) appropriately enhance the capacity of local utilities to manage the grid system through learning by doing. The project will also help (i) develop technical capacity in local utilities and national dispatching centers to manage renewable electricity connections to the existing grid, (ii) prepare an investment plan up to 2030, and (iii) facilitate policy reform to establish a FIT adjustment mechanism to give private investors appropriate incentives, through output 3, for the sustainable scaling up of distributed renewable energy systems.

9. The project will help remove barriers to future private investment through (i) demonstrating successful distributed utility-scale solar photovoltaic and wind power plants; and (ii) building appropriate financial incentives. Once it is completed in 2023, the project will deliver (i) confidence in using distributed renewable energy systems for future expansion, (ii) enhanced capacity among grid operators and local utilities to absorb progressively greater amounts of renewable energy into the grid, and (iii) needed capacity expansion to help meet the renewable energy target for 2030 (para. 6).

10. ADB's Energy Policy supports the project rationale by promoting renewable energy and energy efficiency, access to energy, and sector reforms to catalyze private sector development.<sup>11</sup> The project is fully aligned with the policies of the government and its renewable energy investment plan in 2015 (paras. 6–7), and with Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all.

### 4. Development Partner Coordination

11. In 2017, the World Bank approved \$12.4 million in SCF grant funding for the construction of a 10 MW solar photovoltaic power plant in Hovd, western region.<sup>12</sup> ADB and the World Bank projects will be administered by a single project steering committee under the Ministry of Energy (MOE) to minimize project administration-related transaction costs, and to allow for the sharing of lessons learned and issues resolved during subproject implementation for effective project administration.

### B. Impact and Outcome

12. The project is aligned with the following impact: greenhouse gas emissions reduced and imported electricity reduced. The project will have the following outcome: clean sources of energy supply in the country increased.<sup>13</sup>

<sup>10</sup> Sector Assessment (Summary): Energy (accessible from the list of linked documents in Appendix 2).

<sup>11</sup> ADB. 2009. *Energy Policy*. Manila.

<sup>12</sup> World Bank. 2017. *Mongolia: Second Energy Sector Project*. Washington, DC.

<sup>13</sup> The design and monitoring framework is in Appendix 1.

## C. Outputs

13. **Output 1: Distributed renewable energy system developed.** A total of 40.5 MW of solar photovoltaic and wind power subprojects will be set up in the western and Altai–Uliastai regions. The project will also demonstrate advanced battery storage technology with energy management systems, a first-of-its kind application in the country.<sup>14</sup> The subprojects will be implemented in two batches: (i) core subprojects with 25.5 MW of capacity in the first batch (2018–2021); and (ii) noncore subprojects with 15 MW of capacity in the second batch (2019–2022), as detailed in Table 1.<sup>15</sup>

14. **Output 2: Shallow-ground heat pump system developed.** In selected targeted regions, 500 kilowatts-thermal of shallow-ground heat pump capacity will be installed in public buildings in three batches.<sup>16</sup> This will supply air pollutant-free space heating for 10,000 square meters of floor area. The subprojects will demonstrate the performance of the heat pump systems and increase experience in design, installation, operation, and maintenance for future scale-up.

15. **Output 3: Institutional framework strengthened and organizational capacity enhanced.** This output will (i) enhance the technical capacity of local utilities and the national dispatching center for renewable energy investment planning, renewable electricity dispatching, and grid control and protection; (ii) support the preparation of a renewable energy investment plan (2023–2030) for the targeted regions; and (iii) support the project management unit for the project implementation. It will also support the evolution of the FIT system into a more economically efficient tariff mechanism that reflects actual capital costs, while ensuring sufficient commercial financial viability.

**Table 1: Subprojects**

| Location and Province  | Applied Renewable Energy Technology    | Capacity (MW) | Construction Period |
|--|--|---------------|---------------------|
| <b>Output 1: Distributed renewable energy system developed</b> |  |               |                     |
| Umunogovi, Uvs   | Wind power                             | 10.0          | 2018–2021           |
| Altai City, Govi–Altai   | Solar PV                               | 10.0          | 2018–2021           |
| Altai <i>soum</i> (county), Govi–Altai                         | Solar PV and wind with battery storage | 0.5           | 2018–2021           |
| Uliastai, Zavha  | Solar PV and battery storage           | 5.0           | 2018–2021           |
| Telmen, Zavhan   | Wind power                             | 5.0           | 2019–2022           |
| Moron, Khovsgol  | Solar PV                               | 10.0          | 2019–2022           |
| <b>Subtotal</b>  |  | <b>40.5</b>   |                     |
| <b>Output 2: Shallow-ground heat pump system developed</b>     |  |               |                     |
| Hovd, the other <i>soums</i> (counties)                        | Shallow-ground heat pump               | 0.5           | 2018–2023           |
| <b>Total</b>   |  | <b>41.0</b>   |                     |

MW = megawatt, PV = photovoltaic.

Source: Project feasibility study report approved by the Ministry of Energy in 2018.

## D. Summary Cost Estimates and Financing Plan

16. The project is estimated to cost \$66.22 million (Table 2).

<sup>14</sup> The JFJCM is supporting the installation of advanced battery technology resilient up to –40 degrees Celsius with a minimum of 4,400 charge–discharge cycles.

<sup>15</sup> The scope of noncore subprojects will be finalized during project implementation.

<sup>16</sup> The subproject will be implemented in three batches, starting with a 100-kilowatt installation in the Uvs *aimag* center (core subproject), followed by a rollout in four *aimag* centers in the western Mongolia.



**Table 2: Summary Cost Estimates**  
(\$ million)

| Item  | Amount <sup>a</sup> |
|---|---------------------|
| <b>A. Base Cost<sup>b</sup></b>   |                     |
| Output 1: Distributed renewable energy system developed                             |                     |
| a. Umunogovi wind power   | 15.61               |
| b. Altai solar photovoltaic   | 11.05               |
| c. Altai <i>soum</i> (county) renewable energy hybrid system and battery storage    | 1.05                |
| d. Uliastai solar photovoltaic and battery storage                                  | 9.05                |
| e. Telmen wind power  | 6.83                |
| f. Moron solar photovoltaic   | 10.24               |
| Output 2: Shallow-ground heat pump system developed                                 | 1.14                |
| Output 3: Institutional framework strengthened and organizational capacity enhanced | 1.76                |
| <b>Subtotal (A)</b>   | <b>56.73</b>        |
| <b>B. Contingencies<sup>c</sup></b>   | <b>4.37</b>         |
| <b>C. Financial Charges during Implementation<sup>d</sup></b>                       | <b>5.12</b>         |
| <b>Total (A + B + C)</b>  | <b>66.22</b>        |

<sup>a</sup> Includes taxes and duties of \$5.62 million. Such amount does not represent an excessive share of the project cost.

<sup>b</sup> In April 2018 prices.

<sup>c</sup> Physical contingencies computed at 5.0% of base cost. Price contingencies computed at an average of 3.9% on foreign exchange costs and 20.3% on local currency costs; includes provision for potential exchange rate fluctuation assuming a purchasing power parity exchange rate.

<sup>d</sup> Includes interest and commitment charges. Interest during construction for the loan from ordinary capital resources has been computed at the 5-year United States dollar fixed swap rate plus an effective contractual spread of 0.5% and maturity premium of 0.1%. Commitment charges for this loan are 0.15% per year, to be charged on the undisbursed loan amount.

Source: Asian Development Bank estimates.

17. 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 a grace period of 5 years; an annual interest rate determined in accordance with ADB's London interbank offered rate-based lending facility; a commitment charge of 0.15% per year (interest and other charges during construction to be capitalized in the loan); and such other terms and conditions set forth in the draft loan and project agreements. Based on the straight-line method, the average maturity is 15.25 years, and the maturity premium payable to ADB is 0.10% per year. The SCF (footnote 1) will provide grant cofinancing equivalent to \$14.6 million and the JFJCM will provide grant cofinancing equivalent to \$6 million, both to be administered by ADB. The government will finance \$5.62 million in taxes and duties through exemption, except taxes applicable to output 3 (institutional framework strengthened and organizational capacity enhanced), and the project management unit operation cost. The summary financing plan is in Table 3.

**Table 3: Summary Financing Plan**

| Source  | Amount<br>(\$ million) | Share of Total<br>(%) |
|---|------------------------|-----------------------|
| Asian Development Bank  |                        |                       |
| Ordinary capital resources (regular loan)                         | 40.00                  | 60.40                 |
| Strategic Climate Fund <sup>a</sup> (grant)                       | 14.60                  | 22.05                 |
| Japan Fund for the Joint Crediting Mechanism <sup>b</sup> (grant) | 6.00                   | 9.06                  |
| Government of Mongolia  | 5.62                   | 8.49                  |
| <b>Total</b>  | <b>66.22</b>           | <b>100.00</b>         |

<sup>a</sup> Under the Scaling Up Renewable Energy Program in Low-Income Countries. Administered by the Asian Development Bank.

<sup>b</sup> Administered by the Asian Development Bank.

Source: Asian Development Bank estimates.

18. The loan will be used for civil works, related procurement of equipment and materials, and consulting and other services, and will also cover related transportation, insurance, and

installation costs, as well as project administration costs, contingencies, and interest and commitment charges during construction. The SCF grant cofinancing, to be administered by ADB, will be front-loaded for the procurement and installation of the Umunogovi wind power, Altai solar photovoltaic plants, and shallow-ground heat pumps. The JFJCM grant cofinancing, to be administered by ADB, will be front-loaded for (i) the procurement and installation of the Uliastai solar photovoltaic plant with an advanced battery storage system; and (ii) related consulting services, procurement support, project design document preparation and validation, and monitoring and verification. All procurement financed by ADB loan, and the SCF and JFJCM grants will be carried out in accordance with ADB's Procurement Guidelines (2015, as amended from time to time) and Guidelines on the Use of Consultants (2013, as amended from time to time). Because the project will be cofinanced by an SCF grant, universal procurement will be applied except for the cofinancing component of the JFJCM grant.

19. The government will be the loan borrower and the grant recipient, and will make the loan and the grants available to the implementing agencies on the same terms and conditions as those of the ADB loan, and the SCF and JFJCM grants. The implementing agencies will assume the foreign exchange and interest rate risks of the ADB loan. The government has assured ADB that counterpart funding, including any additional counterpart funding needed to cover fund shortfalls or cost overruns, will be provided in a timely manner.

## **E. Implementation Arrangements**

20. MOE will be the executing agency for the project. A project steering committee, composed of MOE, Ministry of Finance, and the implementing agencies, will be established to provide overall guidance in project management and implementation. A project management unit under MOE will be responsible for managing, coordinating, and supervising the implementation of all components. The following project implementing agencies will be responsible for the day-to-day management of the project activities: the Western Region Energy System State-Owned Joint Stock Company (WRES) for the Umunogovi subproject under output 1; the Altai–Uliastai Region Energy System State-Owned Joint Stock Company (AUES) for the subprojects in Altai, Altai *soum* (county), Uliastai, Telmen, and Moron under output 1; and the National Renewable Energy Center (NREC) for output 2 (shallow-ground heat pump system developed).

21. Consultants will be recruited to implement output 3 (institutional framework strengthened and organizational capacity enhanced). They will also support the project management unit, WRES, AUES, and NREC during project implementation, and to assist them in conducting (i) detailed engineering design; (ii) procurement, including tender document preparation, bid evaluation, and contract negotiation; (iii) social and environmental impact monitoring; and (iv) JFJCM-related activities, including project design document preparation and validation, and monitoring and verification.

22. The implementation arrangements are summarized in Table 4 and described in detail in the project administration manual (PAM).<sup>17</sup>

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<sup>17</sup> Project Administration Manual (accessible from the list of linked documents in Appendix 2).

**Table 4: Implementation Arrangements**

| <b>Aspects</b>              | <b>Arrangements</b>   |                               |                 |
|-----------------------------|---|-------------------------------|-----------------|
| Implementation period       | August 2018–August 2023   |                               |                 |
| Estimated completion date   | Physical completion: 31 August 2023<br>Loan closing: 29 February 2024   |                               |                 |
| <b>Management</b>           |   |                               |                 |
| (i) Oversight body          | Project steering committee<br>State secretary, Ministry of Energy (chair)<br>Representatives of the Ministry of Finance and implementing agencies (members)   |                               |                 |
| (ii) Executing agency       | Ministry of Energy  |                               |                 |
| (iii) Implementing agencies | Western Region Energy System State-Owned Joint Stock Company, Altai–Uliastai Region Energy System 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   | 8 contracts                   | \$48.28 million |
| Consulting services         | Quality- and cost- based selection (90:10)  | 81 person-months              | \$1.55 million  |
|                             | Individual  | 480 person-months (9 experts) | \$1.28 million  |
| Advance contracting         | The Ministry of Energy has requested advance contracting, which will include the recruitment of staff in the project management unit.   |                               |                 |
| Disbursement                | The loan and grants proceeds will be disbursed in following Asian Development Bank's (ADB) Loan Disbursement Handbook (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB. |                               |                 |

Source: ADB.

### III. DUE DILIGENCE

#### A. Technical

23. **Resource assessment, grid stability, system design.** A comprehensive renewable energy resource assessment was done for each core subproject site. Intermittency of renewable power generation could result in variability of frequency and voltage. As the project is designed as a distributed renewable energy system, the transmission grids in the targeted sites in western Mongolia should be able to respond to such variability. Existing hydropower plants and the battery storage system to be installed under the project will also be able to make up for the intermittence of renewable energy sources and ensure electricity supply throughout the day. An assessment of necessary generation capacity and system configuration design was made, considering solar and wind resources, peak load demand, and grid stability. The subprojects under output 1 (distributed renewable energy system developed) will include remote control, monitoring, and protection systems to stabilize the grid in line with international design standards. Capital cost estimates were based on current international market prices plus the necessary costs for associated facilities, transportation, and insurance.

#### B. Economic and Financial

24. Financial analysis of the project indicated a financial internal rate of return of 7.42%, which is higher the corresponding weighted average cost of capital of 4.77%. Sensitivity analysis showed that financial internal rates of return would be (i) 6.37% when project capital costs increase by 10%, (ii) 7.25% when operation and maintenance (O&M) costs increase by 10%, and (iii) 6.01% if the energy yield decreases by 10%. The project's overall financial viability is sensitive to changes in capital cost and energy yield, but remains robust under all scenarios.

25. Economic analysis of the project indicated an economic internal rate of return of 15.18% with environmental benefit, which is higher the economic opportunity cost of capital of 9.00%.

Sensitivity analysis showed that economic internal rates of return with environmental benefit would be (i) 13.74% when project capital costs increase by 10%, (ii) 15.08% when O&M costs increase by 10%, (iii) 13.49% if the energy yield decreases by 10%, and (iv) 14.25% if the imported electricity tariff decreases by 10%. The project's economic viability is also robust under all adverse scenarios.

### **C. Governance**

26. Financial management assessments were conducted for MOE, WRES, AUES, and NREC, and overall financial management risk is assessed *moderate*. The financial management and accounting procedures are aligned with the regulations and policies issued by the Ministry of Finance, and are considered effective and adequate for the project. However, since WRES, AUES, and NREC have no prior experience in ADB-financed projects, continuous capacity enhancement trainings in financial management for the implementing agencies are essential. These agencies have developed and maintained financial management monitoring and supervision structures for budgeting, asset management, fund management, internal and external auditing, and reporting, with internal financial management rules and a centrally managed online financial management system. The assessments indicated that (i) accrual-based accounting and international financial reporting standards are being followed by the agencies; (ii) the separation of authorization, transaction, recording, and asset management functions is well established; and (iii) robust financial management and internal auditing systems are in place. However, business operations of the implementing agencies have been largely dependent on the government subsidy because of low level of end user's tariff. Improving financial sustainability of the implementing agencies through a tariff increase while ensuring affordability for end users is essential to meet the net profit margin targets in 2023 and 2030.<sup>18</sup>

27. Procurement capacity assessments were also carried out for MOE, WRES, AUES, and NREC, and overall procurement risk is assessed *moderate*. The four entities have experienced and trained personnel in procurement and contract management, supported by well-established internal procedures and management systems. The accountability mechanism is also deemed effective to perform procurement and contract award, disbursement, and internal audit activities. ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government, WRES, AUES, and NREC. The specific policy requirements and supplementary measures are described in the PAM. Integrity due diligence for related risk analysis for WRES, AUES, and NREC were carried out and assessed *low* risk.

### **D. Poverty, Social, and Gender**

28. The project will directly benefit 258,313 people (118,960 of whom are women), or 50% of the population in the project areas, through distributed renewable energy system development. By providing cleaner and more affordable electricity while reducing air pollution associated with coal use in power generation, the project will have a positive social impact. A side benefit will be the generation of employment opportunities for the local population: 2,365 person-months of unskilled labor per year during construction and 450 jobs per year during O&M. Priority will be given to low-income and unemployed women in local communities adjacent to the project sites.

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<sup>18</sup> The State Policy on Energy, 2015-2030 (para. 6) includes the financial sustainability targets of public utilities: 0% net profit margin by 2023 and 5% by 2030.

## E. Safeguards

29. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.<sup>19</sup>

30. **Environment (category B).** An initial environmental examination (IEE) of the core subprojects (paras. 13 and 14), including an environmental management plan (EMP), has been prepared following ADB's Safeguard Policy Statement and national environmental regulations. Environmental audits of the existing facilities have been conducted. The IEE will be updated after the completion of detailed design, if needed. Domestic environmental clearance was obtained in June 2018. An environmental and social assessment and review framework was drawn up to guide the selection and environmental assessment of subsequent noncore subprojects. Both the IEE and environmental and social assessment and review framework were disclosed on ADB's website upon obtaining the domestic environmental clearance.<sup>20</sup> Meaningful public consultation has been conducted and information disclosure requirements have been met. Grievance redress mechanisms will be established by the implementing agencies. Potential impacts, including soil erosion, construction noise and dust, waste generation, and effects on community and worker health and safety, are mostly temporary, predictable, and reversible, and can be mitigated through regulatory compliance and through EMP implementation. Sensitive ecosystems will not be affected. Core subproject sites are far from sensitive receptors, which helps to minimize noise, shadow flicker, glare, and blade throw risks. Sufficient budgets have been allocated in the EMP to ensure the proper implementation of mitigation and monitoring measures. Capacity building programs will be conducted to ensure that the executing and implementing agencies and contractors are able to undertake all construction and operation activities following the IEE and EMP. Environmental monitoring reports will be submitted to ADB every 6 months during construction and every year during operation. Contractors will be required to comply with the EMP during the preconstruction and construction stages. The EMP will be updated as necessary if unanticipated impact is identified during implementation. The executing and implementing agencies have agreed on a comprehensive set of environment-related loan covenants and training programs in environmental safeguards.

31. **Involuntary resettlement (category C) and indigenous peoples (category C).** The project will not entail permanent or temporary land acquisition, land use restriction, demolition of structures, or relocation of people. All subproject sites are either within existing substation premises or on government-owned land. The project will be implemented in ethnically diverse provincial capitals and townships with no boundaries between majority and minority groups, whether in lifestyle, socioeconomic status, or vulnerability. No impact on ethnic minorities is therefore expected.

## F. Summary of Risk Assessment and Risk Management Plan

32. Significant risks and mitigating measures are summarized in Table 5 and described in detail in the risk assessment and risk management plan.<sup>21</sup>

<sup>19</sup> ADB. Safeguard Categories. <https://www.adb.org/site/safeguards/safeguard-categories>.

<sup>20</sup> Initial Environmental Examination and Environmental and Social Assessment and Review Framework (accessible from the list of linked documents in Appendix 2).

<sup>21</sup> Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

**Table 5: Summary of Risks and Mitigating Measures**

| <b>Risks</b>   | <b>Mitigation Measures</b>   |
|--|--|
| Delay in procurement and disbursement  | Project management consultants will support the project management unit and implementing agencies in engineering design, procurement, disbursement, and project implementation supervision and monitoring to avoid possible delays in project completion.  |
| Shortage of qualified staff to carry out procurement and financial management practices in accordance with Asian Development Bank guidelines | The executing and implementing agencies received training in Asian Development Bank-compliant procurement and financial management under the project preparatory technical assistance. The project management unit within the Ministry of Energy will support the implementing agencies throughout the procurement process, with the assistance of a project management consultant for financial management and procurement to be engaged under the project.   |
| Deteriorating financial performance of implementing agencies   | Sustained tariff increases until 2030 are essential to meet the government's targets for financial sustainability: 0% net profit margin by 2023 and 5% by 2030. Adequate loan covenants requiring the government to oversee and support the implementing agencies in maintaining sound financial health are set forth in the draft loan agreement and project agreement. The government will regularly review electricity tariff adjustments to achieve full cost recovery by 2023 in accordance with the State Policy on Energy, 2015–2030. |

<sup>a</sup> Government of Mongolia, 2015. *State Policy on Energy, 2015-2030*. Ulaanbaatar.

Source: Asian Development Bank.

33. 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 CONDITIONS**

34. The government and WRES, AUES, and NREC have assured 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. The government and the WRES, AUES, and NREC have agreed with ADB on certain covenants for the project, which are set forth in the draft loan agreement, grant agreements, and project agreement.

35. The loan effectiveness is conditional on the effectiveness of the (i) SCF grant agreement between ADB and the borrower, and (ii) JFJCM grant agreement between ADB and the borrower. The disbursement is also conditional on the borrower's certification that a relending arrangement for the loan and an arrangement for passing on the grants are in place.

#### **V. RECOMMENDATION**

36. 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 the loan of \$40,000,000 to Mongolia for the Upscaling Renewable Energy Sector Project, from ADB's ordinary capital resources, in regular terms, 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.

Takehiko Nakao  
President

29 August 2018

### DESIGN AND MONITORING FRAMEWORK

| <b>Impact the Project Is Aligned With</b>   |   |   |   |
|---|---|---|---|
| Greenhouse gas emissions reduced and imported electricity reduced (State Policy on Energy, 2015–2030) <sup>a</sup>            |   |   |   |
| <b>Results Chain</b>  | <b>Performance Indicators with Targets and Baselines</b>  | <b>Data Sources and Reporting Mechanisms</b>  | <b>Risks</b>  |
| <p><b>Outcome</b><br/>Clean sources of energy supply in the country increased</p>   | <p>a. Renewable energy makes up 20% of total installed capacity by 2023 (2018 baseline: 11.3%)</p> <p>b. Additional 258,313 people connected to clean electricity supply by 2023 (2018 baseline: 271,227 people)</p> <p>c. Additional carbon dioxide emissions reduced by 87,968 tons equivalent annually by 2023 (2018 baseline: Not applicable)</p>   | <p>a–c. Annual statistics on energy performance of the Energy Regulatory Commission</p>   | <p>Changes in climate lead to insufficiency of solar, wind, and underground heat resources, preventing the generation of electricity as planned</p> |
| <p><b>Output</b><br/>1. Distributed renewable energy system developed</p> <p>2. Shallow-ground heat pump system developed</p> | <p>1a. Core subprojects install 10 MW of distributed renewable energy capacity in the western grid system, and 15.5 MW capacity with battery storage in the Altai–Uliastai grid system by 2021<sup>b</sup> (2018 baseline: 0 MW)</p> <p>1b. Noncore subprojects install 15 MW of distributed renewable energy capacity in Altai–Uliastai grid system by 2022<sup>c</sup> (2018 baseline: 0 MW)</p> <p>2a. 500 kilowatts of shallow-ground heat pumps are installed in the five selected <i>aimag</i> (province) centers by 2023 (2018 baseline: 0 MW)</p> | <p>1a–1b. Annual statistics on energy performance of the Energy Regulatory Commission</p> <p>1a–1b. Quarterly progress reports</p> <p>1a–1b. Back-to-office report of the midterm review mission</p> <p>1a–1b. Project completion report</p> <p>2a. Annual statistics on energy performance of the Energy Regulatory Commission</p> <p>2a. Quarterly progress reports</p> <p>2a. Back-to-office report of the midterm review mission</p> <p>2a. Project completion report</p> | <p>Tight fiscal space because of a continued economic slowdown delays implementation of the project</p>   |

| Results Chain  | Performance Indicators with Targets and Baselines   | Data Sources and Reporting Mechanisms  | Risks |
|--|---|--|-------|
| 3. Institutional framework strengthened and organizational capacity enhanced   | <p>3a. Capacity development training provided for at least 50 counterpart engineers and operators for Western Region Energy System State-Owned Joint Stock Company and Altai-Uliastai Region Energy System State-Owned Joint Stock Company by 2023 (2018 baseline: Not applicable)</p> <p>3b. A renewable investment plan for 2023–2030 and amendments to the Law on Renewable Energy drafted by 2023 (2018 baseline: Not applicable)</p> | <p>3a–3b. Quarterly progress reports</p> <p>3a–3b. Back-to-office report of the midterm review mission</p> <p>3a–3b. Project completion report</p> |       |
| <p><b>Key Activities with Milestones</b></p> <p><b>1. Distributed renewable energy system developed</b></p> <p>1.1 Operationalize the project management unit in the Ministry of Energy (Q4 2018)</p> <p>1.2 Complete the selection of consultants for project management and capacity enhancement (Q4 2018)</p> <p>1.3 Conduct bidding process for batch 1: Umunogovi wind power, Altai City Solar PV, Altai Soum Solar PV and wind hybrid system, and Uliastai Solar PV (Q4 2018)</p> <p>1.4 Undertake construction work and test run for subprojects in batch 1 (Q4 2020)</p> <p>1.5 Start commercial operation for subprojects in batch 1 (Q1 2021)</p> <p>1.6 Complete implementation of batch 1 (Q2 2021)</p> <p>1.7 Conduct bidding process for batch 2: Telmen Wind power and Moron Solar PV (Q3 2019)</p> <p>1.8 Undertake construction work and test run for subprojects in batch 2 (Q4 2021)</p> <p>1.9 Complete implementation of batch 2 (Q2 2022)</p> <p><b>2. Shallow-ground heat pump system developed</b></p> <p>2.1 Operationalize the project management unit in the Ministry of Energy (Q4 2018)</p> <p>2.2 Complete the selection of consultants for project management and capacity enhancement (Q4 2018)</p> <p>2.3 Prepare detailed engineering design for subproject in batch 1: 100 kW in Hovd (Q3 2018)</p> <p>2.4 Conduct bidding process for batch 1 (Q3 2018)</p> <p>2.5 Complete implementation of batch 1 (Q4 2019)</p> <p>2.6 Complete implementation of batch 2: 200 kW in the other soum centers (Q2 2021)</p> <p>2.7 Complete implementation of batch 3: 200 kW in the other soum centers (Q2 2023)</p> <p><b>3. Institutional framework strengthened and organizational capacity enhanced</b></p> <p>3.1 Complete selection of consultants for project management and capacity enhancement (Q4 2018)</p> <p>3.2 Prepare for capacity development training program (Q4 2018)</p> <p>3.3 Implement capacity development training (Q1 2022)</p> <p>3.4 Prepare renewable energy investment plan for 2023–2030 (Q1 2023)</p> <p>3.5 Draft amendments to the Law on Renewable Energy, passed in 2007 and amended in 2015 (Q1 2023)</p> |   |  |       |
| <p><b>Inputs</b></p> <p>Asian Development Bank: \$40.00 million (loan)</p> <p>Japan Fund for the Joint Crediting Mechanism: \$6.00 million (grant)</p> <p>Strategic Climate Fund: \$14.60 million (grant)</p> <p>Government of Mongolia: \$5.62 million</p>  |   |  |       |



**Assumption for Partner Financing**

Not Applicable

MW = megawatt, Q = quarter.

<sup>a</sup> Government of Mongolia. 2015. *State Policy on Energy, 2015–2030*. Ulaanbaatar.

<sup>b</sup> 10 MW of Umnogovi wind power in the western region, 10 MW of Altai solar photovoltaic power, 0.5 MW of Altai *soum* (county) renewable energy system with battery storage, and 5 MW of Uliastai solar photovoltaic power with battery storage in the Altai–Uliastai region.

<sup>c</sup> 10 MW of Moron solar photovoltaic power and 5 MW of Telmen wind power.

Source: Asian Development Bank.

### **LIST OF LINKED DOCUMENTS**

<http://www.adb.org/Documents/RRPs/?id=50088-002-3>

1. Loan Agreement
2. Grant Agreement: Strategic Climate Fund
3. Grant Agreement: Japan Fund for the Joint Crediting Mechanism
4. Project Agreement
5. Sector Assessment (Summary): Energy
6. Project Administration Manual
7. Contribution to the ADB Results Framework
8. Development Coordination
9. Financial Analysis
10. Economic Analysis
11. Country Economic Indicators
12. Summary Poverty Reduction and Social Strategy
13. Risk Assessment and Risk Management Plan
14. Initial Environmental Examination
15. Environmental and Social Assessment and Review Framework

### **Supplementary Documents**

16. Financial Management Assessment and Financial Performance and Projections
17. Project Procurement Risk Assessment Report