ADB ASIAN DEVELOPMENT BANK

Mongolia: Supporting Renewable Energy Development

Project Name	Supporting Renewable Energy Development
Project Number	52240-001
Country	Mongolia
Project Status	Proposed
Project Type / Modality of Assistance	Loan
Source of Funding / Amount	Loan: Supporting Renewable Energy Development Ordinary capital resources — US$ 50.00 million
Strategic Agendas	Environmentally sustainable growth Inclusive economic growth
Drivers of Change	Governance and capacity development Knowledge solutions Partnerships
Sector / Subsector	Energy - Electricity transmission and distribution - Energy efficiency and conservation - Large hydropower generation - Renewable energy generation - geothermal
Gender Equity and Mainstreaming	Some gender elements
Description	This project will have the following four outputs: Output 1: Transmission strengthened to help evacuate more renewable energy to grid. It is proposed to connect isolated western and Altai Uliastai grid systems to the national grid systems. In the western region, ADB and the World Bank have been implementing each investment project, which includes some generation plants with solar and wind power up to 10 MW for each. In the Altai Uliastai region, the demand and supply gap has been tightening. From these regions to the central grid region, there are private licensees of renewable energy project sites. Once these regions are interconnected and integrated, the nationwide grid systems will help reduce the systems losses, stabilize power supply as a whole, and enable power transfer among the regions. Since the western region is mostly dependent on power import from Russia with high electricity prices, the grid integration and combination will also enhance the energy security and reduce power import costs. Given this output, the Altai-Uliastai grid region's demand-supply gap will be reduced, and the central grid region's renewable energy licensees will also benefit from the grid strengthening. Output 2: Pilot pumped storage hydropower generation assessed for detailed engineering studies. To deal with fluctuating and weather-dependent solar and wind power, battery storage systems will be required. While the government requested ADB for a physical battery storage project for the 2020 lending, this will respond to peak demand for the limited time and size as an immediate solution. As a long-term solution, the government plans to promote medium size pumped storage hydropower schemes as a proven large-scale battery technology. To demonstrate such a new type of power generation in the country, one project at Kherlen-Choir (50 MW) was identified as a pilot case among several schemes. While the pre-feasibility studies were conducted, further reviews and studies are required. The loan project is expected to support detailed engineering design works, including geological and hydrological investigation (including boring tests) and safeguard assessments. Output 3: Pilot geothermal heat and power generation assessed for detailed engineering studies. The Swiss Agency for Development and Cooperation has helped investigate geophysical and geochemical surveys in the Khangai mountain area across five provinces. The result has demonstrated geothermal heat and power production potential up to 30 MW with the evidence of adequate reservoir temperatures. Unlike other renewable energy sources such as solar and wind power, geothermal power generation is stable and controllable. It can also provide heating to the surrounding areas. As a new source of renewable energy, geothermal heating and power generation will be designed as a pilot power plant. For this purpose, the loan project is expected to support detailed engineering studies including drilling works and safeguard assessments. Output 4: Advance heating technologies deployed. To reduce the use of coal for heating purposes, clean technologies for heat storage are required. Popularity of using renewable heat of the ground or air is rapidly increasing worldwide. ADB has studied and implemented district heating in Ulaanbaatar and rural areas and is installing heat pumps in public buildings in the western region. Other international development parties also implemented some similar projects. Heat pumps were assessed as an efficient and clean solution to replace polluting coal stoves with renewable and electric heating systems. Based on the lessons learned from the past projects and ongoing programs, suitable clean heating technologies can be deployed to gers (Mongolian traditional dwelling), residential buildings, apartment buildings, public buildings, and/or town districts in urban areas of the capital and other secondary cites. ADB programmatic support. In 2018, ADB provided a loan and grants to promote solar and wind power subprojects with battery storage technology in remote areas and heat pumps in public buildings. In 2019, ADB also approved a solar power plant as a private sector loan. An ADB knowledge and support TA has provided to study energy battery storage options, on which the government requested for the ADB loan project in 2020 to install large-scale battery storage systems to respond to the peak demand. Another knowledge and support TA is to study and promote smart grid operations at the national load dispatch center. A policy-based loan aims to tackle Ulaanbaatar's air pollution through clean heating solutions to ger area households. As collective purposes, these ongoing interventions aim to increase both electricity and heat supplies in the form of clean energy while strengthening and stabilizing the energy systems. The new project will move this thrust forward by helping realize grid stability, energy battery storage, clean electricity and heat, and energy mix. For demonstration purposes, it will promote a new initiative of pumped storage hydropower and geothermal power schemes, which can be a game changer for the clean energy diversification. Also, advanced clean heating technologies will be scaled up and applied to each building structure type based on appropriate technical standards. These comprehensive approaches including technological and knowledge sharing will help Mongolia improve the country's energy security and efficiency, and incentivize development of vast renewable energy resources, which can contribute to improving air quality and mitigating climate change.

Project Rationale and Linkage to Country/Regional Strategy	Mongolia has promising vast potential of clean and cost-effective renewable energy. It is estimated at 2,600 gigawatts (GW), including 1,500 GW solar power and 1,100 GW wind power. The electricity output combined from these resources goes far beyond domestic electricity demand to 3 million population. This significant capacity is much more than make up for the 2018 whole generation size of the People's Republic of China (PRC). Since the Government of Mongolia introduced policy incentives for investments in renewable energy, 10 solar and wind power stations have been commissioned, and several ones are under construction or preparation by private parties. Nevertheless, a tangible size of Mongolia's renewable energy production remains small up to 260 megawatts (MW), which represents only 0.01% of the potential. While hydropower potential was also assessed as good enough to be 1.2 GW to 3.8 GW in 3,800 small and big streams and rivers within the country, there are only two hydropower stations totaling 23 MW. As a result, Mongolia's use of these clean energy resources is quite limited. Instead, the country depends on 93% of total electricity production for coal-fired thermal power plants. This coal dominant energy structure is based on a large quantity of coal available in Mongolia, which occupied 10% of the world's known coal reserves. However, coal burning has generated air pollutants including sulphur dioxide (SO_2), nitrogen oxides (NO_2), and particulate matter less than 2.5 micrometer in diameter ($PM_{2.5}$). Ulaanbaatar has been one of the most air-polluted cities in the world. The air pollution level in Ulaanbaatar has become worse than that in cities such as Beijing and New Delhi. The United Nations Children Fund (UNICEF) warned the public on the health crisis that is caused by indoor and outdoor air pollution. In Mongolia, the energy sector has thus become the major contributor to serious air pollution as well as large greenhouse gas emissions. Nevertheless, the use of coal cannot be reduced in the energy sector. One reason is that coal has been used as the primary source of space heating during the winter period. All the coal-fired thermal plants in Mongolia are designed as combined heat and power (CHP) systems to supply both heat and electricity to consumers. Other reason is that the power demand and supply control has been reaching to a critical level. During the peak time in winter, actual electricity output has already exceeded 90% of the maximum generation capacity and the shortfall has been overcome through more expensive power import from Russia. Considering growing electricity demand and unmatching supply capacity addition, the domestic capacity reserve is likely to be gone in 2020. This power shortage risk stems from multiple bottlenecks. First, many CHP plants are aged and inefficient so that the actual generation output cannot avoid being reduced significantly. Given the overdependence on coal, it was undervalued to develop other alternative generation from renewable energy and hydropower. Second, four regional transmission grid systems are not integrated in operations and sufficed in the power transfer and supply capacity so that the power flow control is inflexible in the overall systems. This technical constraint has already curtailed renewable energy output, which is fluctuating due to the weather conditions and long distance transmission from remote areas to the demand center. Third, as a collective result from these physical restrictions, actual investments to exploit renewable energy have not been very attractive and active. The private investments have also been hampered due to insufficient system planning and regulatory frameworks.
Impact	Renewable energy capacity increased to 30% by 2030
Outcome	Clean energy supply schemes increased and diversified.
Outputs	Transmission strengthened to help evacuate more renewable energy to grid. Pilot pumped storage hydropower generation assessed for detailed engineering studies. Pilot geothermal heat and power generation assessed for detailed engineering studies. Advance heating technologies deployed.
Geographical Location	Nation-wide

Safeguard Categories	
Environment	B
Involuntary Resettlement	B
Indigenous Peoples	C

Summary of Environmental and Social Aspects
Environmental Aspects
Involuntary Resettlement
Indigenous Peoples
Stakeholder Communication, Participation, and Consultation
During Project Design
During Project Implementation

Responsible ADB Officer	Kaoru Ogino
Responsible ADB Department	East Asia Department
Responsible ADB Division	EASI
Executing Agencies	Ministry of Energy Government Building 14, Khan-Uul District Chinggis Avenue, 3-r khoroo Ulaanbaatar, 17060 Mongolia

Timetable	
Concept Clearance	17 Jan 2020
Fact Finding	19 Apr 2020 to 23 Apr 2020
MRM	29 Jun 2020
Approval	-
Last Review Mission	-
Last PDS Update	17 Jan 2020

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