

**Mongolia – Capacity Building and Regulatory Support Technical Assistance
Project Document
World Bank**

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8. National Implementing Agency:	Ministry of Energy (MoE), Energy Regulatory Commission (ERC), National Dispatch Center (NDC)/National Transmission Corporation (NTC)		
9. MDB Focal Point and Project/Program Task Team Leader (TTL):	WB - Focal Point: Karan Capoor, Senior Energy Specialist, World Bank (kcapoor@worldbank.org)	WB -TTL: Peter Johansen, Senior Energy Specialist, World Bank (pjohansen@worldbank.org)	

10. Program Description (including objectives and expected outcomes)

Brief Summary of the Program

The proposed Technical Assistance (TA) program is part of the Scaling-up Renewable Energy in Low-income Countries Program Investment Plan (SREP IP) that will support the Government of Mongolia (GoM) in comprehensively addressing the country's renewable energy potential by supporting physical investments and implementing policy actions to create an enabling environment for sustained public and private investments. The objectives of the IP are: (i) to support upscaling of rural renewable energy by demonstrating the application of 25 megawatt (MW) wind and solar photovoltaic (PV) resources in a remote rural area of Mongolia; and (ii) to encourage private sector investment in utility-scale renewable energy by improving aspects of the governing regulations in force in Mongolia. The SREP IP is in turn part of GoM's comprehensive renewable energy action plan which is expected to contribute to the 20% and 30% RE targets by 2023 and 2030, respectively.

The TA program aims to improve certain aspects of the existing market regulations and structure in Mongolia in order to promote sustainable power sector planning and development, with a focus on private sector investment in utility-scale renewable energy. The scope of the proposed TA revolves around two main components: (i) an in-depth diagnostic and options piece, which is expected to provide a more comprehensive picture of the barriers faced by and possible solutions for the power sector with an emphasis on renewable energy integration; and (ii) a set of corrective actions to remove the barriers preliminary identified through the IP as well as a result of the work carried out under the first component. The TA program will be implemented by the World Bank to directly benefit MoE, ERC, and NDC/NTC and favorably impact the

investment climate for renewable energy investment in Mongolia. Lessons learned from the program will be documented and shared through appropriate channels upon completion.

I. Context

Mongolia's energy sector faces multiple, interrelated challenges of reliably meeting fast growing energy demand, energy security and mitigating environmental impacts from heavy reliance on coal. Electricity demand is forecast to increase between 8 - 10.5 percent per annum driven by mining sector-led economic growth. The Central Electricity System (CES), which represents 96 percent of electricity production, is reaching its capacity limits and in critical need for large capacity expansions. System regulation depends heavily on imports from Russia due to lack of flexibility in the generation mix.

The Government of Mongolia (GoM) has taken actions to support energy sector development in the country. Legal frameworks include: *Energy Law* (updated in 2011), *Renewable Energy (RE) Law* of Mongolia in 2007, which stipulates the attractive feed-in-tariff by different renewable sources and *Concession Law* in 2010 to promote the private sector participation. It has also approved a number of development programs such as: Program on *Integrated Energy System of Mongolia*, *National Renewable Energy Program* (renewable energy capacity target: 20% of total generation capacity by 2020), and *Comprehensive Policy on National Development* which contains concrete short-term and long-term strategies for the development of the energy sector.

The Government has also taken several initiatives for renewable energy deployment. Most notably: (i) from 2000 to 2012, the GoM implemented the successful *National 100,000 Solar Ger Electrification Program*, which provided access to modern energy to over half a million nomadic herders through Solar Home Systems; and (ii) the first grid connected mega-watt scale wind farm (50 MW Salkhit wind farm) was put into operation in 2013, which generates about 170 giga-watt hours (GWh) per annum.

Despite GoM's efforts in furthering the country's sustainable power sector development agenda, most of the indigenous RE resources remain untapped, mainly due to difficulties to access long term commercial financing by renewable energy developers, as well as weak institutional and technical capacity of grid companies and regulators. Against this backdrop, Mongolia's regulatory framework would require strengthening to achieve cost recovery, attract adequate levels of private sector participation, and ultimately move towards a more sustainable and inclusive energy sector development path.

II. Program development objective

The development objective of the TA program is to encourage private sector investment in utility-scale renewable energy by improving aspects of the governing regulations in force in Mongolia. The improvement of the regulatory framework will support the achievement of the national targets by ensuring private sector participation in the development of RE in the CES. The long-term target of 30% RE by 2030 will require around 530 MW of RE in CES, a capacity that is likely to be provided by the private sector in the form of wind and solar PV if the regulatory framework provides adequate confidence for investors. The impact of SREP funding will be to introduce transformational change through improved market and financial conditions and encouragement of private sector participation.

III. Barriers/issues to be addressed

The activity builds on the preliminary analysis presented in the SREP IP, which identifies a number of areas of focus. First and foremost, the existing market regulation and structure conceals the fact that fundamental issues with regulatory reform and planning processes that leave investments in energy infrastructure projects and market development prone to failure do exist.

Tariffs are largely set to cover only the short-run marginal cost of electricity and there is evidence of inadequate asset revaluation (latest re-evaluation in the two distribution companies envisaged to be included

in ESP2 took place more than five years ago) and insufficient considerations of real replacement costs in the regulatory depreciation model used. The existing situation is constraining the ability of the power sector to attract private sector participation and commercial financing.

The unbundled electricity market structure operates on a cash settlement system where distribution companies deposit collected electricity sales revenues into a zero balance account from which generation and transmission companies are paid. Distribution companies reduce deposits into the account when there are collection shortfalls. The generation companies have often funded their shortfalls by extending payables to coal mines, placing pressure on their operations as well. This presents a cascading series of contingent liabilities for the Government. Recently, electricity tariffs have been adjusted upward to cover shortfalls in required revenues from district heating tariffs, which are given priority. Because 90% of the installed capacity is CHP providing heating services, it will be necessary to include CHP cost allocation methodology questions in any assessment of electricity tariffs.

In some years the generation, transmission and distribution companies have been unable to cover even their operating costs because of delayed tariff adjustments to match inflation or exchange rate fluctuations. In 2012 for example, aggregate operating losses of CES power companies were 7 percent of total revenues, or about US\$30 million (2012 dollars). The following year the Government compensated the shortfall of the zero-balance account based on losses incurred in the energy sector in the previous year, this translated to government subsidies of US\$36 million (inclusive of coal subsidies) in the 2013 budget.

In addition to issues relating to the existing market regulation and structure, preliminary analysis has shed light onto the need for: (i) a sustainable renewable energy surcharge system; (ii) clear dispatching principles in the Mongolian grid; and (iii) defining a set of criteria for rejecting RE applications for licenses in cases the target levels for RE are exceeded or where technical constraints in the transmission grid do not allow construction of further RE capacity. These and other relevant barriers will be further investigated as part of this TA work in the broader context of identifying key actions to support GoM to move towards a more sustainable, market-based sector.

IV. Program description

The scope of work is built around two main components: (1) an *in-depth diagnostic and options analysis*, which is expected to provide a fuller picture of the barriers faced by and possible solutions for the power sector with an emphasis on renewable energy integration; and (2) based on that, a set of *corrective actions* to be taken in partnership with the relevant government agencies in order to remove the barriers identified.

- **Component 1 – In-depth diagnostic and options analysis:** The *in-depth diagnostic and options piece* will include an analysis of the existing regulatory, planning and institutional environment in the power sector and possible gaps. The categories that the diagnostic will address include: (i) power market evolution; (ii) power system planning; (iii) tariff setting and support for related analytics; (iv) institutional architecture; (v) financial viability of the sector; and (vi) capacity development needs in the ERC. Upon finalization of the diagnostic exercise, options for reform will be further analyzed, designed and prioritized. The technical prioritization will identify short-, medium- and long-term options that will be the most effective in moving towards an enabling and sustainable environment for the power sector. Such options will be vetted against the risks (especially pitfalls that could trap an economy like Mongolia's) and opportunities towards attaining the expected impact, and a set of mitigation measures will be proposed accordingly.

- **Component 2 – Corrective actions:**
 - a. **Capacity building program:** As part of taking *corrective actions* and as a response to the clear need for power market regulation and reform, it is envisioned that a robust capacity building program will be designed and put in place to support MoE, NDC/NTC and ERC around the following key topical areas:

- “System Operations”, which is focused on: (i) RE integration coupled with development of both the policy-making capacity and market development; (ii) co-optimization of the heat and electricity systems; and (iii) distributed generation.
- “Regulatory Core Functions”, which is focused on: (i) better integration and optimization of the electricity tariffs; (ii) embedding EE into the utilities operating roles; (iii) market entry and regulatory structure of the electricity market; and (iv) impacts of the electricity system on air pollution and human health.
- “Energy Modelling, System Planning and Policy Making”, which is focused on building data-based capacity with looking at short, medium and long-term issues such as, energy security, infrastructure capacity expansion, market dispatch and clearing, and power system flows.

b. Other corrective actions: It is expected that further *corrective actions* will be identified based on the joint analysis of the results drawn from the *in-depth* diagnostic and options analysis and preliminary input provided by the SREP IP on key barriers, namely: (i) existing market regulation and structure; (ii) inadequate financing of the FiT; (iii) RE curtailment; and (iv) licensing principle ambiguity. The set of *corrective actions* will be discussed with the relevant government counterparts (including MOE, ERC and NDC/NTC) for endorsement and implementation purposes.

12. Assessment of the Proposed Program with SREP Investment Criteria

Increased installed capacity from renewable energy sources

The total potential of Mongolian renewable energy including wind, solar, geothermal, and hydro resources is estimated by the National Renewable Energy Laboratory (NREL) of the United States Department of Energy to be as high as 2,600 GW – the country’s current installed capacity is about 1 GW by comparison. The proposed TA will help to remove barriers for increased RE development, particularly in the CES area where a number of private sector initiatives are waiting to proceed but are impacted negatively by perceived regulatory risks. The capacity building program will also strengthen the overall capacity of relevant stakeholders in the sector for scaling-up the adoption of renewables in Mongolia.

Increased access to energy through renewable energy sources

The proposed TA aims to unlock investments in utility-scale RE capacity across the country, including the isolated grid of Western Energy System. Previously undertaken pilot projects of electrifying remote soum centers using wind-diesel, solar-diesel and diesel-only systems showed poor operational results. This led the country to grid-electrify all soums, which are now looking to meet their growing energy demand in a reliable and sustainable manner.

Low Emission Development

The proposed TA will support Mongolia’s initiatives toward a low carbon emissions development pathway by harnessing the country’s abundant renewable energy resources, contributing to the national long-term target of 30% RE by 2030. The proposed TA activities will contribute to reduce carbon emissions through its linkage to the investment projects identified under the Mongolia IP. This provides for the installation of 25 MW of new RE capacity, with an electrical output of 40 GWh/year. The breakdown of the clean MWs to be brought on-line through the SREP IP includes two 10 MW solar plants (with an average load factor of 15%) and one 5 MW wind farm (with an average load factor of 30%). This is expected to translate into greenhouse gas emission reductions of over 32,000 tCO₂e/year by 2020, assuming an emission factor of 0.8 tCO₂e/MWh (source: SREP IP for Mongolia).

Affordability and competitiveness of renewable sources

The proposed TA will help address some of the barriers affecting private sector investment in cost competitive utility-scale RE. An enhanced regulatory framework will encourage private sector investments in utility-scale solar PV and wind energy, which are cost competitive with existing thermal generation options provided coal externalities are considered and prevailing subsidies are removed from thermal power. The existing regulatory environment places renewables at a disadvantage because the projected levelized cost of electricity (believed to be in the range of 6-8 USc/kWh) is compared with generation costs of existing fleet of mostly old (fully or partly written-off) coal fired CHP plants in the range of 4-6 USc/kWh. The proposed interventions will facilitate timely and smooth transition towards an improved regulatory framework, which plays an important role in levelling the playing field for RE development vis-à-vis higher polluting alternatives.

Productive use of energy

The proposed TA program will positively affect productive uses of energy given the improved reliability and quality from the potential increase in renewable energy-based power. This TA program will encourage private sector investment in RE projects, which could contribute to meeting Mongolia's growing energy demand. Ensuring an adequate level of capacity additions with an emphasis on bringing on-line clean megawatts is key to mitigating the risk of disruptions in the provision of electricity service by means of brown- and black-outs. Such disruptions -not uncommon in the capital Ulaanbaatar- reduce the potential for productive use of energy. Minimizing their occurrence can reduce overall system costs and improve productivity for businesses.

Economic, social and environmental development impact

The proposed TA program will help unlocking the renewable energy potential of the country, improving the overall quality and reliability of power services in Mongolia. As already pointed out, this TA program will contribute to achieve the development impacts expected from the Mongolia IP implementation, including employment generation and economic development in the remote Western Region of the country. The increased power generation from renewable energy sources will lead to reductions in carbon emissions and urban pollution in major cities. This TA program will also improve the overall capacity of energy sector stakeholders in the areas of system operations, regulatory framework, energy modeling, system planning, and policy making.

Economic and financial viability

The activities supported under this TA program have the potential to enhance the overall economic and financial viability of utility-scale RE investments in Mongolia, contributing toward an enabling and sustainable environment for the power sector. Electricity tariffs have frequently been adjusted in Mongolia, often as a response to inflationary pressure related to currency devaluation. For example, in the period from 2002 to 2009, tariffs increased five times with rate hikes ranging from 4.4% to close to 30%. Despite such rate adjustments, Mongolia's electricity tariffs continue to be low by regional standards. Compared to the Association of Southeast Asian Nations (ASEAN), Mongolia is positioned on the lower end of the residential tariff spectrum. For example, the average CES household tariff of around 5 USc/kWh would rank last vis-à-vis relevant ASEAN data points – lower than two regional laggards such as, Myanmar, where tariffs are below the cost-recovery level, and Brunei Darussalam, where electricity prices are highly subsidized. As tariffs are currently set to recover the short-run marginal cost of electricity, further changes in the regulatory and sectoral structure (now relying on a zero-balance account) are still needed in order to move towards full-cost recovery and a power sector that is fully reflective of market forces.

Leveraging of additional resources

The expected improvements in the regulatory framework, as well as increased overall capacity of energy sector stakeholders, will attract private sector investments in renewable energies. The core objective of this TA program is to encourage private sector investment in utility-scale renewable energy by improving aspects of the governing regulations in force in Mongolia. Below-average electricity prices are the result of the existing tariff regulation methodology, which does not ensure full-cost recovery, but also interference from the

political level into ERC's decision making. Major issues are the insufficient recovery of capex and inability to attract adequate level of private participation. Understanding and removing regulatory barriers for a financially and environmentally sustainable power sector development is key to interrupting the vicious cycle that has kept the whole sector cash starved and unable to finance needed asset upgrades.

Gender

The activities funded through the TA program will seek to encourage women participation based on the universe of stakeholders engaged. For example, a robust capacity building program will be designed and put in place factoring in gender considerations. Ultimately, it is expected that the investments incentivized by the outcome of the activities undertaken through this work will equally benefit women and men in terms of better security, reliability and sustainability of power supply. It is also expected that such investment will open up opportunities for targeted job creation for women (e.g., through the establishment of requirements including that plant operators provide earmarked jobs for women) and, possibly reduce their time from collecting woods and other biomass for fuel use.

Co-benefits of renewable energy scale up

The development impact of this TA will support achieving the following results associated with the SREP IP, including: (i) supporting low-carbon development pathways by increasing energy security; (ii) increasing supply of renewable energy; and (iii) new and additional resources for renewable energy projects/program.

Supporting low-carbon development pathways by increasing energy security is expected to have two main co-benefits: (i) avoided GHG emission; and (ii) employment opportunities. On the former, SREP investments will improve energy security and reduced dependence on imported fossil fuels. They will provide clean and reliable energy sources, and will reduce GHG emissions from the avoided use of fossil fuels. An estimated 32,000 tCO₂e/year by 2020 will be avoided from the implementation of the projects. The capacity building TA could potentially facilitate development of hundreds of megawatts on new RE capacity with huge reducing impact on CO₂ emissions from coal based power generation. In terms of employment opportunities, SREP funding will support job creation and skills development related to the construction/installation, operation and maintenance of renewable technologies. The employment opportunity will extend to the remote Western Region of the country, which is lagging behind in economic development and income as compared to the country's average. Education of the workforce in the deployment of these technologies will be a feature of the Western Energy System RE project. The SREP intervention is expected to encourage private sector participation and create new economic activities and jobs related to these renewable energy technologies.

Increasing the supply of renewable energy is expected to translate into an increased reliability co-benefit. The establishment of RE sources of 25 MW (20 MW solar PV, 5 MW wind) in the Western Energy System could contribute to obtaining around 19% of electricity to the region from the new RE plants where demand is typically met by imports from Russia and other conventional fuels sources. The SREP interventions are expected to contribute to increasing energy security. Solar PV plants will generate electricity during high-demand daytime periods and will similarly enhance supply adequacy and reliability during the hours of the day in which the value of lost load and losses are typically the highest. Wind energy will supplement the supply. The small hydropower plant will replace part of imports from China to three southern soums. Women will equally benefit from better security and reliability of supply.

Finally, new and additional resources for renewable energy projects/program are expected to reduce the cost of RE. SREP investments will facilitate the reduction of electricity imports and promote a higher level of energy independence. The country lacks indigenous natural gas resources, and is landlocked; not only can it be expected that the cost of importing gas will be high but high dependence on neighboring countries for gas supply involves fuel supply risks that may be very costly to mitigate.

13. Stakeholder Engagement

The design of the proposed TA program was informed by two public workshops that were held during the preparation of the SREP IP to solicit feedback from stakeholders, including government, private sector, civil-society representatives, and other development partners. The SREP objectives were presented and the country context and RE development activities were discussed to determine the need and potential uses for concessional finance in RE development. The workshops showed strong support by the stakeholders engaged. Going forward, the feedback received will continue informing the TA work, particularly at the point of analyzing the results of the diagnostic and options piece which may call for further decisions about the design of the overall assistance program.

14. Indicators

Disclaimer: Corrective actions and pertinent indicators will be identified in full and refined following the In-Depth Diagnostic and Options Piece. The areas of focus will be power market evolution; power system planning; tariff setting and support for related analytics; institutional architecture; financial viability of the sector; and capacity development needs in ERC.

Development Objective (DO): to encourage private sector investment in utility-scale renewable energy by improving aspects of the governing regulations in force in Mongolia

DO indicators	✓ Regulatory environment strengthened
Target	<ul style="list-style-type: none"> ✓ Develop methodology for Feed-in-Tariffs for RE IPPs ✓ Recommendations on market reform and structure, and tariff structure and methodology ✓ 1 training on commercial and financial aspects of PPAs ✓ 1 training on licensing for RE IPP generation ✓ Other corrective actions (TBD)

Intermediate Outcome 1: Improved dispatch rules at NDC and NTC

IO1 indicator	✓ Dispatching framework strengthened
Targets	<ul style="list-style-type: none"> ✓ Prepare recommendations on system operations, economic dispatch methodology and planning for system stability ✓ 1 training in short-term system operations, dispatch, and planning for system stability ✓ 1 training in wind prediction software ✓ Other corrective actions (TBD)

Intermediate Outcome 2: Improved sector planning at MoE

IO2 indicator	✓ Planning ability strengthened
Targets	<ul style="list-style-type: none"> ✓ Prepare recommendations on sector planning and policy implementation ✓ 1 training on sector planning and policy implementation ✓ Other corrective actions (TBD)

15. Budget (US\$ million)

Component/Activity	Budget (US\$)
Component 1 – In-depth Diagnostic and Options Piece	400,000
Component 2 – Corrective Actions	600,000
• Capacity Building for NDC and NTC	100,000

- Wind Prediction Software	
- Short-term system operations, dispatch, and planning for system stability	
• Capacity Building for MoE	100,000
- Sector planning and policy implementation	
• Capacity Building for ERC	125,000
- Commercial and financial aspects of PPAs	
- Licensing for RE IPP generation	
• Technical Assistance to NDC	75,000
- Recommendations on system operations, economic dispatch methodology and planning for system stability	
• Technical Assistance to MoE	75,000
- Recommendations on sector planning and policy implementation	
• Technical Assistance to ERC	125,000
- Methodology for Feed-in-Tariffs for RE IPPs	
- Recommendations on market reform and structure, and tariff structure and methodology	
Component 2 – Other Corrective Actions	200,000
- Training and/or recommendations on key topical areas examined through the lens of the In-Depth Diagnostic and Options Piece	
TOTAL	1,200,000

16. Project/Program Timeframe

Program Milestones	Date
Internal review by World Bank	July 2016
SREP Sub-committee approval	August 2016
World Bank Management approval	August 2016
Closing date	October 2020

17. Other

I. Implementation Arrangements

During the discussions leading to the final form of the SREP IP, it was agreed that the proposed activity would be World Bank-executed. MoE and ERC opted an implementation solution that would ensure an adequate level of capacity and technical leadership in managing the funds allocated to “Strengthening Renewable Energy Regulations” component of the IP. In addition, the World Bank-executed nature of this work would provide continuity in the reform process amidst the uncertain political situation of the country. The beneficiaries – MoE, ERC and NDC/NTC – will be closely consulted and involved throughout implementation.

II. Monitoring and Evaluation Arrangements

The proposed TA will be monitored in accordance with the World Bank procedures. At the concept stage, the development objective, outcome targets and output indicators will be defined and included in the Grant Fund Request (GFR). Over the course of program implementation, data will be collected and documented in Grant Reporting and Monitoring (GRM) reports. At the program closing, an assessment will be conducted to take stock of the program achievements. Based on the assessment, a Grant Completion Report (GCR) will be prepared.