Study on Cost of Electricity Service and Tariffs in Tajikistan
Terms of Reference

I. Electricity Sector Background

Electricity sector structure. The electricity sector is comprised of two state-owned electricity generation companies, two independent power producers (IPPs)[1], electricity transmission and distribution companies, and a concession in Gorno-Badakhshan Autonomous Oblast (GBAO) combining electricity generation and distribution. Barqi Tojik Open Joint Stock Company (BT) is the state-owned generation company which owns and operates all utility-scale generation plants in the country except for GBAO. Rogun Joint Stock Company (JSC) is the majority state-owned[2] company responsible for construction and operation of the 3,780 MW Rogun HPP Project. Two of the IPPs – Sangtuda-1 and Sangtuda-2 HPPs – were commissioned in 2006 and 2011 respectively to help the country address the issue of electricity supply shortages. Sangtuda-1 and Sangtuda-2 IPPs have 20-year PPAs with BT. Rogun JSC has a PPA with BT which is renewed each year. In June of 2019, the Government established the new state-owned electricity transmission and distribution companies - Shabakahoi Intiqoli Barq (SIB) Open Joint-Stock Company (OJSC) and Shabakahoi Taqsimoti Barq (STB) OJSC respectively. Pamir Energy Company (PEC) generates and supplies electricity to around 245,000 people as well as public and commercial sector consumers in GBAO under a 25-year concession agreement, which expires in 2027.

Electricity supply mix is dominated by hydropower. The total installed generation capacity in BT service area is 6,060 MW[3] and HPPs account for 88 percent. The 3,000 MW Nurek HPP, with a seasonal reservoir, is the largest generating plant. It generates 50 percent of the total annual energy requirements and is also the balancing plant in the system. It should be noted that available operational capacity is lower considering that several HPPs and some of the CHPs, such as Dushanbe-1 and Yavan, have technical issues. The thermal power plants are primarily operated in winter to supply electricity and heat given: (a) high winter electricity demand, which accounts for 60 percent of annual demand; and (b) limited generation by HPPs due to reduced winter flows. The bulk of thermal energy-based generation comes from the 400 MW coal-fired Dushanbe-2 combined heat and power plant (CHP), which was completed in 2017. BT also operates about 50 MW of capacity, from 200 MW, at Dushanbe-1 CHP, which is fueled by natural gas imported from Uzbekistan. The utilization rate is low because the power plant has very low fuel efficiency and hence a high variable cost of electricity and/or heat.

Tajikistan electricity demand and supply profile. In 2016-2022, electricity demand increased by an annual average rate of about 1 percent and winter[4] electricity shortages were largely eliminated. Electricity generation reached 21,000 GWh in 2022, which is an increase of 24 percent over 2016 due to a rebound of economic activity and increase in electricity exports. Electricity demand is seasonal, with a winter peak driven by reliance on electricity-based heating. BT has historically struggled to fully meet winter electricity demand given reliance on hydro and unfavorable hydrology conditions in winter, which was leading to electricity outages. On the contrary, there has been significant electricity surplus in the summer given the abundant hydropower resource. The winter electricity shortages have substantially reduced after: (a) 400 MW Dushanbe-2 CHP commenced operations in 2015 and, in addition to electricity, started supplying district heating (DH) to some parts of the capital city of Dushanbe; and (b) Rogun HPP started early generation using two of the units.

Electricity exports have been increasing, and regional connectivity is improving. Electricity exports

[1] Ownership structure of IPPs is the following: Sangtuda-1: Rosatom (Russia) – 62 percent, Republic of Tajikistan – 25 percent, and InterRAO (Russia) – 13 percent; Sangtuda-2: Farad company (Iran) is the sole owner. Sangtuda-2 is a Build-Own-Operate-Transfer (BOOT) project.

[2] Republic of Tajikistan – 97 percent; various local legal entities and individuals – 3 percent.

[3] Excludes Pamir Energy Company service area.

[4] For the purposes of analysis, winter season is assumed to include the months of November-March when hydrology conditions are least favorable.

increased from 1,350 GWh in 2016 to almost 2,500 GWh in 2022 due to resumption of exports to Uzbekistan. The electricity exports are expected to increase further after: (a) synchronization of Tajik electricity network with Central Asian Power System (CAPS) in 2024, which would allow to supply electricity to all countries of Central Asia without network management and other operational challenges, and (b) commissioning of 1,300 MW Central Asia South Asia (CASA-1000) Interconnection (expected in 2027).

Institutional and regulatory framework. Ministry of Electricity and Water Resources (MEWR) is responsible for electricity sector policy development and strategic planning. Anti-Monopoly Service under the Government of Republic of Tajikistan (AMS) is responsible for review of electricity tariffs for: (a) electricity generation, transmission, and distribution; and (b) all categories of end-users. Based on the review, AMS makes a recommendation to the Government regarding recommended level of tariffs. Under the existing tariff structure, categories of consumers are differentiated by type of economic activity with some very large industrial consumers having designated tariff. The main categories include: (1) industrial and non-industrial consumers; (2) budget organizations, communal enterprises, and sports facilities; (3) electric transport; (4) pumps and pump stations (April-September); (5) pumps and pump stations (Oct-March); (6) vertical irrigation wells and irrigation pumping stations; (7) population; (8) electricity use for heating and supply of hot water (not-budget financed consumers); (9) electricity use for heating and supply of hot water (budget-financed consumers); (10) "Metallurgical plant of Tajikistan" LLC summer and winter tariffs; (12) Tajikistan Aluminum Company (TALCO) summer and winter tariffs; and (13) others.

Applicable Tariff Methodology

The current tariff methodology was approved in 2019 as a temporary methodology for the purposes of the transitional period of sector unbundling. It follows a financial cost based tariff approach, considering the financial costs of providing the service. The government is in the process updating the methodology to an economic cost-based approach. The process is expected to be completed by the time this study is launched. The Consultant should conduct this study in in accordance with the approved methodology.

II. Objective

The objective of this study is to (i) develop a detailed cost of electricity service estimate for the period 2024-2030 which will be used as the reference point for sector stakeholders as the sector transitions to cost-reflective tariffs; (ii) provide recommendations on the tariff structure including practical tools for stakeholders to use; and (iii) develop an Electricity Tariff Paper which will provide a trajectory of electricity tariffs as the sector transitions to cost-reflective tariffs (including company level tariffs, customer category level tariffs, and estimated weighted average end-user tariffs based on expected consumption profiles).

III. Scope of Work

Task 1: Evaluate the cost of electricity service. This should include the following main activities over the period 2024-2030: (a) evaluation of the cost of service for electricity and separation of these costs amongst generation, transmission, distribution and supply; (b) assessment of the cost of providing electricity to various categories of customers, including high voltage (separated by export and domestic sales, as needed), medium voltage, and low voltage, based on cost allocation analysis; and (c) weighted average tariff. The valuation should be carried out taking into account the following:

- ***Costs related to existing assets***. The existing costs of BT, SIB, and STB related to: (a) cost of energy purchases from IPPs; (b) O&M, capital repair and asset upgrade costs; (c) depreciation on existing assets which were self-financed; (d) debt service costs related to assets that were financed with loans and credits under various projects financed by development partners; (e) commercial debt service costs for working capital needs; and (f) other relevant costs, taking into account expected inflationary impacts over the period 2024-30. This description corresponds to a

financial-cost based approach. It should be adjusted according to the tariff methodology approved.

- ***Costs related to new assets to be constructed***. Existing Generation Expansion Plan (GEP), adopted by the MEWR in 2023, covering the period of 2022-2040. The consultant should use the GEP base case with an assumed two-year delay. The GEP contains the following inputs required for the assessment of the electricity service cost: (i) domestic electricity demand projections under Base Case scenario; (ii) new capital investments required for meeting the projected electricity demand under Base Case; (iii) incremental operating and maintenance (O&M costs), and (iv) evaluated exports of electricity.
- ***Incremental capital and O&M costs in transmission network***. The transmission masterplan is under preparation and outputs would be provided to the Consultant regarding the planned transmission investments in each year covering the period of 2023-2040.
- ***Incremental capital and O&M costs in distribution network***. The Consultant should make certain assumptions on annual level of distribution network investments, in consultation with STB based on latest network investment plans.

As part of the scope of Task 1, the Consultant will also develop a template for submission of cost data from each of three unbundled companies to AMS for the tariff setting procedure with a detailed explanation of the content of each cost component.

Task 2: Development of recommendations for electricity tariff structure optimization. Based on the findings of Task 1, the Consultant should assess the generation and power purchase costs, transmission costs, distribution and retail cost, and other relevant costs to estimate the revenue requirement over the period of 2024-2030 period. As part of this task, the Consultant will also carry out the following activities.

- Estimate the total efficient costs (broken down by main cost category) for the main activities (generation, transmission and distribution).
- Estimate the total efficient costs for each of the main activities and present how these costs will be used for final cost-recovery tariff determination.
- Assess whether the existing customer categories are efficient through use of specific criteria and propose further optimization. The Consultant should propose consumer categories that may be different from current structure if this modification may lead to a more adequate or efficient tariff structure.
- Develop criteria to assign generation, transmission, distribution, supply, and other costs to each category, separating them into fixed and variable costs. The Consultant will propose the tariff structure based on criteria such as voltage levels, time zones (as feasible with current and planned metering and billing systems), connected load, reactive power, fixed and capacity/energy charges, consumer types (in particular vulnerable consumers with affordability considerations) and other factors. Then, the aggregated profile for the load for each time zone, consumer type and voltage level will be estimated. Working in consultation with the MEWR and AMS, the Consultant will propose a transition path from the existing tariff groups to the new proposed structure.
- **Develop a tariff model covering 2024-2030**. The Consultant will review existing tariff models used by the AMS and develop a new model that will be subsequently handed to the AMS and other stakeholders in the sector. The new tariff model will: (a) allow for the determination of a cost-recovery tariff and include the option to simulate alternative tariff structures and measure the impact of different scenarios on the cost-recovery tariff; (b) include the possibility to parameterize different scenarios of operational, financial and commercial efficiency; (c) allow for the parameterization of the tariff revision period and the implementation of the tariff changes over a specific period of time; (d) include, but not limited to the following inputs and variables that can be modified to run various cost-recovery scenarios: (i) macroeconomic indicators such as GDP,

FX rates, fuel prices; (ii) electricity demand; (iii) transmission and distribution losses; (iv) generation capacity and electricity supply (under various scenarios); (v) O&M expenditures; (vi) capital expenditures; (vii) revenues from domestic market and exports; (viii) short and long-term debt; and (iv) cost of energy from IPPs.

- Propose a design of lifeline tariff structure. The Consultant should review the available data on consumption structure for residential customers and recommend lifeline tariff structure taking into account the country-level consumption patterns. The lifeline tariff structure should be designed based on the most recent available consumption data to be provided by STB and latest household survey electricity data. The Consultant should review the data to ensure the sum of all consumption blocks is equal to the total reported distribution-level consumption data reported by STB. The proposed lifeline tariff structure should also take into account the cost of electricity supply to ensure proposed structure is consistent with the principle of efficient consumption.
- Prepare a summary of international successful experience with implementation of similar block/lifeline tariff mechanisms used to cross-subsidize the consumption of vulnerable consumers. The review should include a summary of key factors that are critical for successful implementation of lifeline tariff mechanism.

Task 3: Update of the Electricity Sector Tariff Paper. The Electricity Tariff Paper (adopted by MEWR in Dec. 2022) estimates the required increase of average annual tariff to allow the electricity system to reach cost recovery by 2030. The evaluation of the cost recovery level of tariff for the purposes of the 2022 Electricity Tariff Paper was carried out based on BT financial model. SIB and STB became legally independent in 2021 and the audited financial statements of SIB is completed and of STB is expected to be generated by end of 2023. Based on the outputs from Tasks 1 and 2, the update of the Electricity Tariff Paper should evaluate the level of annual tariff increases required for BT, SIB, and STB so to reach cost recovery by 2027; provide a trajectory of tariffs by customer category, and weighted average end-user tariffs based on expected consumption profiles. The updated ETP will be subject to review by stakeholders in the energy sector (Government and Development Partners) and is expected to be published on the MEWR and AMS websites.

IV. Deliverables and Time Schedule

The estimate duration of assignment is 5 months. All draft reports shall be provided electronically. All reports shall be prepared in the English language to be accompanied by Russian translation. The deliverables, submission schedule and payment schedule are shown in the following Table.

Deliverable	Timeline	Payment (% of contract price)
Final Task 1 Report	Contract signing + two months	30%
Final Task 2 Report	Contract signing + three months	30%
Final Task 3 Report	Contract signing + four months	30%
Final Report summarizing key financing and results from three Tasks.	Contract signing + five months	10%

V. Oversight and Implementation Arrangements

The Client: The Consultant will report to Rogun PMG, which will be responsible for review and approval of the deliverables. All contractual matters shall be channeled through the Rogun PMG. The Consultant is expected to participate in discussions/events/conferences to be organized by Rogun PMG to discuss critical issues and present the findings. Therefore, the Consultant should plan accordingly for its staff time. The Consultant's key experts are expected to travel to Tajikistan during the implementation of this assignment for at least three missions.

Consultant's management: The Consultant shall provide overall management on all aspects of the consulting services. The Consultant shall nominate a Project Manager and a Deputy Manager (to be available during all times of unavailability of the former) to liaise with the designated representatives of the Rogun PMG.

Quality Control: The Consultant shall also provide the necessary level of quality assurance and control of the work. The Consultant shall implement its internal quality control and assurance procedures during the execution of the Contract, and shall demonstrate that they are being applied to the work.

VI. Confidentiality

All outputs, reports or any other deliverables under this assignment would be confidential and shall not be disclosed under any circumstances to the parties unrelated to this assignment without written consent of the other party.

VII. Team Composition and Qualification Requirements for Key Experts

The Consultant should propose a team comprised of the following key experts. The Consultant should also make arrangements to hire local non-key experts knowledgeable about local regulations and legislation as well as overall tariff-setting. Those experts should also help with collection of data and information.

KEY EXPERT	QUALIFICATION AND EXPERIENCE REQUIREMENTS
Project Manager / Regulatory Specialist	At least Master's degree in economics, finance or another related field. At least 15 years of relevant international experience in power sector regulation, energy-tariff setting, and similar relevant activities. Excellent knowledge of English language.
Energy Economist	At least Master's degree in engineering or economics. At least 10 years of relevant international experience in economic evaluation of transmission interconnection projects, including valuation of economic costs and benefits of OFC. Excellent knowledge of English language.
Financial Analyst	At least Master's degree in finance, business administration or economics. At least 10 years of relevant international experience in corporate finance models for energy companies. Excellent knowledge of English language.
Legal Specialist	At least Master's degree in law. At least 10 years of relevant international experience in legal and regulatory issues in the electricity sector including contractual relations among companies, development and review of electricity sector legislation, etc. Excellent knowledge of English language.