Tajikistan: Golovnaya 240-Megawatt Hydropower Plant Rehabilitation Project

**Project Name**: Golovnaya 240-Megawatt Hydropower Plant Rehabilitation Project  
**Project Number**: 46418-001  
**Country**: Tajikistan  
**Project Status**: Active  
**Project Type / Modality of Assistance**: Grant  
**Source of Funding / Amount**: Grant 0376-TAJ: Golovnaya 240-Megawatt Hydropower Plant Rehabilitation Project, US$ 136.00 million

### Description

The proposed Project will increase supply of renewable energy to national and regional power systems. The Project will refurbish electric and mechanical equipment for power generation at Golovnaya Hydropower Plant (HPP) in Tajikistan. This will increase availability of year-round clean power for domestic sales and for export to Afghanistan. The Project will increase the generation capacity and operational efficiency of the power plant. The total installed generation capacity of Tajikistan is 5,055 MW. A large share of hydropower generation (98%) is impacted by hydrology fluctuation and results in summer surplus and winter deficit. The power assets in Tajikistan have aged beyond their economic life. The maintenance has been kept at insufficient level due to non availability of spare parts and lack of funding at the vertically integrated state power utility Barki Tojik. The power sector regional master plan, prepared in 2012 under the Central Asian Regional Economic Cooperation (CAREC), identified that nearly 80% of all generation and transmission assets in the country need to be replaced in order to meet the demand and eliminate winter deficit. The master plan identified rehabilitation of Golovnaya HPP as a priority generation project. ADB Country Partnership Strategy 2010-2014 defines the rehabilitation of existing hydro power plants as one of the key areas for intervention. The reliable and secure operation of the large generation plant and high voltage transmission network is equally important for reliability of interconnected neighboring grid and is a prerequisite for power trade. The impact of the Project will be increased supply of renewable energy to national and regional power systems from 743 GWh in 2012 to 1,130 GWh in 2021. The Project outcome will be increased weighted average generation efficiency of the power plant from maximum 83% to 89%. The Project output will be rehabilitated Golovnaya HPP with generation capacity increased from 240 MW to 252 MW.

### Project Rationale and Linkage to Country/Regional Strategy

Golovnaya HPP is situated 80 kilometers south of Dushanbe. Its installed generation capacity is 240 MW, which makes it the fourth largest hydropower plant in Tajikistan after Nurek (3,000 MW), Sangtuda 1 (670 MW) and Baipaza (600 MW). The construction of Golovnaya HPP started in 1956 and the first unit was commissioned in 1962. Since then, no major improvement and modernization were done to the HPP throughout its service life to maintain the original performance in terms of efficiency, reliability and safety and to reduce operation and maintenance costs except for one unit. Time has therefore taken its toll and the condition of the plant is now very poor for most of the main electro-mechanical and hydro-mechanical pieces of equipment. In 1993 and 1994, Unit 2 was partially flooded due to non-functioning system of hydraulic operation of main spillway gate and six sediment sluice gates, which have flood discharge capability. In case of emergency water spill in upstream HPPs, Golovnaya will be flooded. Separately, there is a risk of an environmental disaster. Due to original design deficiency fifty tons of transformer oil might be spilled to the Vakhsh river due to absence of oil containment facilities. In 2005-2012 years Golovnaya at average generated around 840 GWH per annum. In the last decade, the average annual generation has been decreasing due to more frequent emergency breakdowns of the units. In 2011 out of 52,560 totally available annual working hours for six units, they operated only 24,720 hours and were under repair/emergency shut down for 27,135 hours. For remaining 705 hours the units were on standby. Unit # 4 has already failed and was rehabilitated in 2012. It is expected that remaining units will fail in five or fewer years if major rehabilitation works are not undertaken urgently. Golovnaya HPP rehabilitation Project is also important for the neighboring countries. In 1987 the first power transmission interconnection was established between Geran substation in Tajikistan and Kunduz in Afghanistan. Up until now Geran-Kunduz 110 kV line is the only source of power for Kunduz. Export from Tajikistan through this line is year-round and in the last four years is increasing by average 30% a year reaching 106 GWh in 2011. Golovnaya switchyard is the only source of power for Geran substation, and thus further export to Kunduz. The demand in northern Afghanistan is expected to grow as the Government of Afghanistan intends to expand the distribution network in the region. A new 220 kV substation in Kunduz is under construction, which will be supplied by power from newly constructed 220 kV overhead transmission line from Tajikistan. However, due to compatibility issues, the network in Kunduz will be split into two islands, one supplied by old Geran-Kunduz 110kV line and another by new 220 kV line. The rehabilitation of the HPP envisages full replacement of units 1, 2 and 5 and is expected to bring substantial improvements in power generation, including during the winter power deficit season. The capacity of the power plant will reach at least 252 MW and average annual generation is expected to be 1,130 GWh in 2021 based on average hydrology of last two decades. Such increase in the amount of electricity is contributed by higher efficiency turbines and generators. Currently, old units reach maximum efficiency of 84% discharging 180 m3/s of water per turbine. After the rehabilitation the efficiency of the new units will increase to 92% while discharging only 120 m3/s of water per turbine due to higher efficiency curve of new turbine-generators. Thus, the replacement of turbines and generators enables in increase the efficiency by 8% while reducing the water discharge by 33%. The rehabilitation will also include the installation of oil spill containment facilities to avoid environmental disaster in case of emergency. The financing of the Project was requested by the Government of Tajikistan. The proposed Project is in line with the ADB Country Strategy and Program 2010-2014. The Project is included in the Country Operations Business Plan 2013-2014 and Medium Term Priority Projects List of CAREC Energy Sector Coordinating Committee.

### Impact

Increased supply of renewable energy to national and regional power systems

### Project Outcome

**Description of Outcome**

Increased operational efficiency of Golovnaya hydropower plant
Progress Toward Outcome

The project outcome is envisaged to be achieved as planned.

Implementation Progress

Description of Project Outputs

Rehabilitated electric power generation and transmission equipment of the Golovnaya hydropower plant

Status of Implementation Progress (Outputs, Activities, and Issues)

Lot 1: Turnkey contract was signed between Barki Tojik and Sinohydro - Hydrochina Joint Venture on 25 October 2016 and became effective on 16 December 2016. Minor change in scope approved in June 2018 for full replacement of turbines and generators of units 3 and 6 instead of refurbishment, which will increase total generation capacity of the Golovnaya HPP to 270 MW.

Works are ongoing as scheduled: (i) installation works for Unit 5 are mostly completed and energizing is planned in November 2018; (ii) installation works for Unit 6 are ongoing and for Units 2 and 3 are expected to start in Q1 2019 (after energizing Unit 5); and (iii) civil works for the protection of riverbank on the switchyard is completed.

Lot 2: Turnkey contract was signed between Barki Tojik and Genser A.S. & Grid Solutions A.S. Consortium on 20 April 2017 which became effective on 12 June 2017.

Works are ongoing as scheduled: (i) dismantling works at 110kV and 220kV switchyards are ongoing; (ii) construction of control rooms for two switchyards is completed; and (iii) delivery of 220kV equipment is expected in November 2018.

Geographical Location

Golovnaya Power Plant

Safeguard Categories

Environment

B

Involuntary Resettlement

C

Indigenous Peoples

C

Summary of Environmental and Social Aspects

Environmental Aspects

Anticipated adverse environmental impacts of the Project are related to temporary shortages of electricity supplies due to replacement of generating units, solid waste utilization, as well as health and safety issues. Adequate mitigation measures will be incorporated into the Project design and will be implemented through an environmental management plan (EMP).

Involuntary Resettlement

No involuntary resettlement involved in the project.

Indigenous Peoples

No adverse impact is expected since no people defined by ADB as indigenous peoples are present in project areas.

Stakeholder Communication, Participation, and Consultation

During Project Design

Information sharing with stakeholders. Potential stakeholders are households, businesses, community-based organization (Makhala), local governments, social institutions such as schools and hospitals, and the national Government (Ministry of Finance, Energy, Economy).

During Project Implementation

Information sharing with stakeholders. Potential stakeholders are households, businesses, community-based organization (Makhala), local governments, social institutions such as schools and hospitals, and the national Government (Ministry of Finance, Energy, Economy).

Business Opportunities

Consulting Services

The consultant recruitment will follow ADB’s Guidelines on the Use of Consultants (2013, as amended from time to time). The quality- and cost-based selection method with a quality:cost ratio of 90:10 will be applied to the selection of project implementation consultants due to technical complexity associated with hydropower plant rehabilitation projects.

Procurement

Two turnkey engineering, procurement, and construction (EPC) contracts covering the entire project will be procured by Barki Tojik. Procurement will follow international competitive bidding (ICB) procedures using standard bidding documents for plant design, supply, and install contracts. The EPC contract for rehabilitation of generation units will use a two-stage bidding procedure without prequalification due to the technical complexity typical for hydropower plant rehabilitation projects. The EPC contract for rehabilitation of switchyards will use a single-stage two-envelope bidding procedure without prequalification.

Responsible ADB Officer

Shukhrat Khojaev

Responsible ADB Department

Central and West Asia Department

Responsible ADB Division

Tajikistan Resident Mission

Executing Agencies

Open Stock Holding Company “Barqi Tojik”

BARKI_TOJIK@TAJNET.COM

64 Ismolili Somini Avenue, Dushanbe

Tajikistan, Postal Code 734026

Timetable

Concept Clearance

30 Jul 2013

Fact Finding

26 Aug 2013 to 06 Sep 2013

MRM

24 Sep 2013

Approval

28 Nov 2013

Last Review Mission

-

Last PDS Update

27 Sep 2018

Grant 0376-TAJ

Milestones

Approval

Signing Date

Effectivity Date

Closing

Original

Revised

Actual

28 Nov 2013

23 Dec 2013

31 Mar 2014

31 Jan 2021

01 Oct 2022

Financing Plan

Grant Utilization

Total (Amount in US$ million)

Date

ADB

Others

Net Percentage
<table>
<thead>
<tr>
<th></th>
<th>Project Cost</th>
<th>Cumulative Contract Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADB</td>
<td>170.00</td>
<td>136.00</td>
</tr>
<tr>
<td>Counterpart</td>
<td>34.00</td>
<td>28 Nov 2013 119.59 0.00 88%</td>
</tr>
<tr>
<td>Cofinancing</td>
<td>0.00</td>
<td>28 Nov 2013 67.01 0.00 49%</td>
</tr>
</tbody>
</table>

Project Page: https://www.adb.org/projects/46418-001/main
Request for Information: http://www.adb.org/forms/request-information-form?subject=46418-001
Date Generated: 29 July 2019

ADB provides the information contained in this project data sheet (PDS) solely as a resource for its users without any form of assurance. Whilst ADB tries to provide high quality content, the information are provided "as is" without warranty of any kind, either express or implied, including without limitation warranties of merchantability, fitness for a particular purpose, and non-infringement. ADB specifically does not make any warranties or representations as to the accuracy or completeness of any such information.