ADB ASIAN DEVELOPMENT BANK

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** concessional ordinary capital resources lending / Asian Development Fund — US$ 136.00 million
Strategic Agendas	Inclusive economic growth Regional integration
Drivers of Change	
Sector / Subsector	**Energy** - Large hydropower generation
Gender Equity and Mainstreaming	No gender elements
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 hydro 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 secured 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 2026. 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 islanded grids, 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-generator . 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	Project outcome will be achieved as envisaged. Project progress is satisfactory.
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 HPP generation units rehabilitation contract _ Sinohydro-Hydrochina JV: Site mobilization and preparation of preliminary drawings are ongoing. Lot 2 HPP switchyards rehabilitation units contract. The procurement is ongoing. Contract award is expected in Q2 2017.
Geographical Location	Khatlon Region

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 Staff

Responsible ADB Officer	Chansavat, Bouadokpheng
Responsible ADB Department	Central and West Asia Department
Responsible ADB Division	Tajikistan Resident Mission
Executing Agencies	*Barki Tojik Joint Stock Holding Company* *BARKI_TOJIK@TAJNET.COM* *734026, Dushanbe* *I. Somoni Str., 64*

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	15 Mar 2017

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	-	-

Financing Plan		Grant Utilization			
	Total (Amount in US$ million)	Date	ADB	Others	Net Percentage

Project Cost	170.00	Cumulative Contract Awards			
ADB	136.00	28 Nov 2013	99.17	0.00	73%
Counterpart	34.00	Cumulative Disbursements			
Cofinancing	0.00	28 Nov 2013	28.09	0.00	21%

Project Page	https://www.adb.org/projects/46418-001/main
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Date Generated	06 July 2017