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| 1. Country/Region: | Tajikistan | 2. CIF Project ID#: | PPCRTJ038A |
| 3. Project/Program Title: | <i>Tajikistan: Enhancing the Climate Resilience of the Energy Sector</i> | | |
| 4. Date of Endorsement of the Investment Plan: | 10 November 2010 | | |
| 5. Funding Request (in million USD equivalent): | Grant: N/A | Non-Grant (loan, equity, guarantee, etc.): USD 10,000,000 | |
| 6. Implementing MDB(s): | EBRD | <input checked="" type="checkbox"/> Private sector arm <input type="checkbox"/> Public sector arm | |
| 7. Executing Agency: | Barki Tojik (Tajik electricity company) | | |
| 8. MDB Focal Point and Project/Program Task Team Leader (TTL): | <i>Headquarters- Focal Point: Craig Davies, Senior Manager – Climate Change Adaptation, EBRD</i> | | <i>TTL: Ramses Ruziev, Associate Banker – Power & Energy Utilities, EBRD</i> |

I. Project/Program Description: Provide a summary description of the project, objectives, and expected outcomes. Which sectors would be targeted?

The request is for a contribution of USD 10 million (concessional finance) from the PPCR competitive set-aside towards the project “*Tajikistan: Enhancing the Climate Resilience of the Energy Sector*”. The overall project aims to improve the climate resilience of Tajikistan’s hydropower-dominated energy sector in Tajikistan through an integrated programme of activities designed to i) improve the enabling environment for climate-resilient energy security, ii) strengthen institutional capacities for climate-resilient hydropower operations, and iii) implement the climate-resilient upgrade of a major hydropower plant facility as a ground-breaking demonstration project. This project adopts a highly innovative approach in which PPCR resources are used to have a catalytic and transformative effect on a larger volume of investment. It also provides a replicable investment model for climate-resilient upgrades of other hydropower systems in Tajikistan, and which could also be transferred to other countries. This project aims to enhance the climate resilience of Tajikistan’s energy sector through a multi-layered approach, with a specific focus on Sugd province. This will facilitate targeted interventions that will generate lessons and experience that could subsequently be transferred elsewhere in Tajikistan and beyond. The project scope will go far beyond current practice in the Tajik energy sector by enabling climate change impacts on energy infrastructure and energy security to be better understood and managed. The intention is to help Tajikistan move towards current best available practices in such as those used in OECD countries where climate resilience is being mainstreamed into energy sector planning and investment, including hydropower operations. This approach is entirely in line with the objectives of the SPCR and supports the Government of Tajikistan’s strategic objectives of upgrading the country’s energy infrastructure, especially hydropower facilities. It addresses some of the most significant barriers to improving the climate resilience of the energy sector by supporting improved policy making and investment planning, building capacity and expertise in key institutions, and introducing best-practice

approaches. There is a need for demonstration and initial market transformation in order to ensure the uptake of best practice technology and practices and to raise the capacity of responsible institutions and the energy industry more broadly to be able to implement modern regulations. This Project will pursue this by combination of investment, technical assistance and policy dialogue, building on EBRD existing engagement in energy sector upgrades and reforms and in close collaboration with other PPCR activities and IFI initiatives. The key partner in this project will be Barki Tojik, a sub-sovereign electricity company that owns and manages most of Tajikistan's hydropower facilities.

- II. Rationale:** Provide the rationale behind the idea in the national context, and from a local market perspective. Also, provide an explanation as to why it should receive the funding and how it would further advance the objectives of the endorsed investment plan.

Tajikistan's Strategic Programme for Climate Resilience (SPCR) acknowledges the high vulnerability of Tajikistan's energy sector to climate change, and identifies this as a crucial dimension of the country's overall vulnerability to climate change, and as a critical threat to the economic well-being, livelihoods and energy security of the Tajik population. As made clear in Tajikistan's Second National Communication to the UNFCCC, Tajikistan's hydropower plants are highly vulnerable to the projected impacts of climate change as they depend upon river basins fed by glacial melt water and snowmelt. Most climate models predict significant changes in the dynamics of Tajik glaciers, snowmelt and precipitation as the climate warms. The International Commission on Large Dams (ICOLD) has already emphasized the urgent need to adapt older dams to cope with the impacts of climate change. At the same time, Tajikistan's Poverty Reduction Strategy emphasizes the importance of increasing the availability of affordable energy and using Tajikistan's abundant hydropower resources to promote economic growth and development. Hydropower provides around 98% of Tajikistan's electricity, while to date only about 10% of the total hydropower potential of 40 GW is being utilized. There is a significant energy deficit, especially in winter, due to the unreliable electricity supply. In line with these challenges, Tajikistan's SPCR argues that in order to safeguard Tajikistan's development, there is an overwhelming case to improve the climate resilience of the hydropower sector by building the technical and institutional capacities of hydropower operators and investing in climate-resilient upgrades of hydropower facilities. Specifically, the additional contribution from the PPCR competitive set-aside will enable the project to optimise the energy generation capacity of Kairakkum hydropower plant in the face of projected increases in climatic and hydrological variability as a consequence of climate change. Building on the PPCR Phase I study, the Feasibility Study for Kairakkum hydropower plant rehabilitation has studied nine different hydrological scenarios (developed using a range of climate change scenarios based on three GHG emissions scenarios and the IPCC suite of global climate models) and simulated the energy generation over the next 70 years to identify an optimal design for the type and number of turbines for the rehabilitation and upgrade of the Kairakkum power plant. This analysis has identified a turbine upgrade scenario that is able to optimise energy generation across the projected range climate change and hydrological scenarios, leading to an eventual capacity increase from current 126MW to 174MW. The additional finance will also be the first phase of this upgrade (two out of a total of six turbines) to be carried out. As the investment needs of the turbine upgrade have turned out to be greater than was originally envisaged at SPCR stage, there is a case for seeking additional PPCR resources. However, as the new turbines will be revenue generating and will increase the output of Kairakkum hydropower plant, it is appropriate for them to be financed using concessional finance from the PPCR competitive set-aside, and the revenue stream will enable Barki

Tojik to repay the loan element of the concessional finance. Grant resources can then be reserved for essential, non-revenue generating upgrade activities.

III. Consistency with Investment Criteria: Provide information how the proposed project meets the investment criteria for the Pilot Program for Climate Resilience, including:

Pilot and demonstrate approaches for integration of climate risk and resilience into development policies and planning: This project will elaborate a highly innovative approach to integrating climate resilience considerations into energy sector investment planning. This will have an extremely powerful demonstration impact that will illustrate how climate resilience can be optimised in a practical manner that delivers direct benefits to the Tajik energy sector and to the population more broadly. It would also set a powerful example that could be repeated in subsequent hydropower upgrades in Tajikistan (and elsewhere), thus creating a replicable investment model for climate-resilient hydropower upgrades and significantly building the capacity of Tajik institutions to plan, organise and finance climate-resilient upgrades of hydropower plants.

Strengthen capacities at the national levels to integrate climate resilience into development planning: The project will provide an extremely powerful demonstration impact that would illustrate how climate resilience can be optimised in a practical manner that delivers direct benefits to the Tajik energy sector and to the population more broadly. Specifically, the project will:

- Demonstrate how climate change analysis can inform project design and investment decisions in the hydropower sector to optimise climate resilience;
- Provide concrete benefits in the form of a more reliable, sustainable and climate-resilient power supply that will improve energy security in the face of a changing and more variable climate;
- Pilot a replicable approach that can provide valuable lessons for subsequent investments in hydropower plant rehabilitation and construction that are expected to be financed in the coming years (and which may also provide useful lessons to other countries facing similar challenges); and
- Build the capacity of Barki Tojik and relevant national authorities to incorporate climate change analysis into hydropower plant investment planning and operations.

Scale-up and leverage climate resilient investment, building on other on-going initiatives: This project will enable the PPCR to leverage a significant amount of co-financing (more than double the amount of the requested PPCR finance). The project preparation and design were enabled by a relatively modest amount of PPCR grant financing (including the USD 300,000 Phase I resources that were allocated towards the energy sector) to have a transformative impact on a large-scale investment programme by incorporating climate change considerations and corresponding climate resilience measures into the fundamental design of the investment. Consequently, USD 21,000,000 of PPCR finance (not counting PPCR Phase I) will leverage at least a further USD 47,600,000 additional co-financing from EBRD.

Enable learning-by-doing and sharing of lessons at country, regional and global levels: The project will set a powerful example that could be repeated in subsequent hydropower upgrades in Tajikistan (and elsewhere), thus creating a replicable investment model for climate-resilient hydropower upgrades and significantly building the capacity of Tajik institutions to plan, organise and finance climate-resilient upgrades of hydropower plants.

IV. Type of Private Sector Engagement: Provide information whether this will be a solely private sector project, a PPP, or a public sector project financing private sector entities.

This is a project revolves around supporting a sub-sovereign electricity company (Barki Tojik) to adopt best practice in integrating climate resilience into its hydropower operations. While the Government of Tajikistan is a majority shareholder in Barki Tojik, the company operates on quasi-commercial terms. EBRD and PPCR finance will be channelled directly to Barki Tojik and will not flow through the government. In this way, EBRD will operate according to its standard business model of providing project finance directly to its sub-sovereign or non-sovereign clients.

V. Innovation: Explain how the project is innovative in terms of technology, business model, financial instruments or structure, and how the innovation will add value to the project.

This Project will elaborate a highly innovative approach to integrating climate resilience considerations into energy sector investment planning. This will have an extremely powerful demonstration impact that will illustrate how climate resilience can be optimised in a practical manner that delivers direct benefits to the Tajik energy sector and to the population more broadly. It would also set a powerful example that could be repeated in subsequent hydropower upgrades in Tajikistan (and elsewhere), thus creating a replicable investment model for climate-resilient hydropower upgrades and significantly building the capacity of Tajik institutions to plan, organise and finance climate-resilient upgrades of hydropower plants. The project scope will go far beyond current practice in the Tajik energy sector by enabling climate change impacts on energy infrastructure and energy security to be better understood and managed. The intention is to help Tajikistan move towards current best available practices in such as those used in OECD countries where climate resilience is being mainstreamed into energy sector planning and investment, especially hydropower operations. This approach is entirely in line with the objectives of the SPCR and supports the Government of Tajikistan's strategic objectives of upgrading the country's energy infrastructure, especially hydropower facilities. It addresses some of the most significant barriers to improving the climate resilience of the energy sector by supporting improved policy making and investment planning, building capacity and expertise in key institutions, and introducing best-practice approaches. There is a need for demonstration and initial market transformation in order to ensure the uptake of best practice technology and practices and to raise the capacity of responsible institutions and the energy industry more broadly to be able to implement modern regulations. The proposed Project will pursue this by combining investment, technical assistance and policy dialogue, building on EBRD's existing engagement in energy sector upgrades and reforms.

VI. Technology, Product, and/or Business Model: Provide description of the technology, the technology provider if identified, whether it has been tested, commercialized and viable commercially. If the project does not involve a technology, provide a description of the business model and its structure.

The intention is to contribute towards the initial phase of the upgrade of Kairakkum hydropower plant in financing turbine upgrades in order to optimise the productivity of the hydropower plant in the face of projected climatic and hydrological variability. The expected results will include additional electricity supply for northern Tajikistan, which is currently experiencing chronic electricity shortages, especially during the winter season, causing human hardship and economic losses. Building on the work carried out

during PPCR Phase I, climate change scenarios were used to inform hydrological modelling and to determine the most appropriate specifications of the upgrade of the hydropower plant, including the selection technologies such as turbine capacity. The IPCC suite of global climate change models, together with three representative GHG emissions scenarios (A1B, A2, B1) were used to generate nine hydrological scenarios for the Syr Darya river basin in which Kairakkum hydropower plant is located. These climatic/hydrological scenarios were then used to model energy production across a range of turbine upgrade scenarios. Based on this analysis, the turbine upgrade showing the optimal performance over the range of projected climate/hydrological conditions was selected for incorporation into the design of the rehabilitation investment using the Max/Min Regret Analysis methodology developed by the Swiss Department of Energy. In this way, a highly innovative approach has been developed and used to identify a turbine upgrade scenario that is most able to cope with the projected variability in hydrological conditions that is anticipated to occur as a consequence of climate change.

- VII. Market:** Provide an overview of the market, product nature, supply and demand status, prices, and competition. In the absence of other comparable products, provide a brief explanation on how the proposed product will substitute for existing products and the benefits from a climate standpoint, and the prospects of commercial viability. Also, provide an overview of current market barriers and how will they be reversed by the proposed project.

In order to safeguard Tajikistan's development, there is an overwhelming case to improve the climate resilience of its energy sector. Tajikistan is one of the world's most vulnerable countries to climate change, which is directly affecting its hydropower capacities. As explained in Tajikistan's Second National Communication to the UNFCCC, the country's hydropower plants are highly vulnerable to the projected impacts of climate change as they depend upon river basins fed by glacial melt water and snowmelt. Most climate models predict significant changes in the dynamics of Tajik glaciers, snowmelt and precipitation as the climate warms. The International Commission on Large Dams (ICOLD) has already emphasized the urgent need to adapt older dams to cope with the new climate conditions.

As hydropower provides 98% of Tajikistan's electricity supply, the entire energy sector is highly sensitive to climatic variability and climate change (for further details see the energy sector section of the SPCR). The vulnerability of Tajikistan's energy system to climate change is compounded by prolonged underinvestment, over-reliance on aging hydropower assets, policy failures and weak corporate governance. This situation has grave economic and social consequences. Most power generation facilities have been in operation well beyond their useful economic life. Upgrades are needed urgently to avoid the risk of major technical failure that would jeopardize the supply of electricity to all customers and cause enormous damage to Tajikistan's economy. Large parts of the population and the economy already suffer from an unreliable power supply and from severe power outages during the winter season. This leads to further social costs such as the health impacts of indoor air pollution caused by burning wood and coal in homes, as well as the health impacts of inadequate winters heating, both of which are impacts with important gender considerations.

The project scope will go far beyond current practice in the Tajik energy sector by enabling climate change impacts on energy infrastructure and energy security to be better understood and managed. The intention is to help Tajikistan move towards current best available practices in such as those used in OECD countries where climate resilience is being mainstreamed into energy sector planning and investment, especially hydropower operations. This approach is entirely in line with the objectives of the SPCR and supports the Government of Tajikistan's strategic objectives of upgrading the country's energy infrastructure, especially hydropower facilities. It addresses some of the most significant barriers to improving the climate resilience of the energy sector by supporting improved policy making and investment planning, building capacity and expertise in key institutions, and introducing best-practice approaches. There is a need for demonstration and initial market transformation in order to ensure the

uptake of best practice technology and practices and to raise the capacity of responsible institutions and the energy industry more broadly to be able to implement modern regulations. The proposed Project will pursue this by combining investment, technical assistance and policy dialogue, building on EBRD's existing engagement in energy sector upgrades and reforms.

VIII. Financial Plan:

| Source of Funding (by type of instrument, equity, debt, guarantee, grants, credit lines, etc.) | Amount (USD million equivalent) | Percentage (%) |
|---|--|---------------------------|
| EBRD loan finance | 46.6 | 69 |
| PPCR | 11 (grant) | 16 |
| | 10 (concessional finance) | 15 |
| TOTAL | | 100 |

EBRD loans will have maturities and pricing and fees to be determined based on internal analysis of borrower creditworthiness with a tenor of 15 years.

Tajikistan is a low-income country, and Barki Tojik faces severe revenue flow challenges due to the limited ability of its customers to pay energy tariffs at levels that approach cost recovery. As the PPCR concessional finance will be accompanied by a much larger EBRD loan priced on commercial terms, it is intended that the PPCR concessional finance will be made available on the same terms as public sector projects¹ in order to make the overall financing package affordable given the severe affordability constraints that affect the Tajik energy sector. Therefore, the PPCR concessional finance is expected to have a maturity of up to 40 years, with grace on the principal up to 10 years, followed by semi-annual repayments as detailed in the below table. Pricing and terms are in line with the principles laid down in EBRD Document *Multilateral Climate Investment Funds (CIF) – Rules of the Special Fund* (BDS09-201), which established CIF operations at the EBRD.

| | PPCR concessional finance terms |
|--|--|
| Last availability date | 5 years after loan effectiveness |
| Terms of loan | Up to 40 years |
| 1st principal repayment date | Up to 10 years after signing the loan agreement |
| Amortisation | Semi-annual instalments over up to 40 years <ul style="list-style-type: none"> • Years 11-20: 2% of the loan (per year) • Years 21 – 40: 4% of the loan (per year) |
| Other financial terms | Service charge of 0.10% (FY 10-11) <ul style="list-style-type: none"> • To be charged on the disbursed and outstanding loan balance and paid semi-annually |

¹ Pilot Programme for Climate Resilience (PPCR): Financing Modalities
(https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR_Financing_Modalties_final.pdf)

IX. Expected Results and Indicators

| Results | Indicators |
|---|---|
| A1.3 (core): Numbers of people supported by the PPCR to cope with effects of climate change | Households and businesses in Sugd Provinceã experience 25% fewer power outages |
| A2.1 (core): Degree of integration of climate change in national, including sector planning - e.g., national communications to UNFCCC, national strategies, PRSPs, core sector strategies, annual development plans and budgets, and NAPs | Climate resilience issues integrated into energy sector policymaking and investment planning, and also fed into relevant government-wide polices and strategies |
| B1 (core): Extent to which vulnerable households, communities, businesses and public sector services use improved PPCR supported tools, instruments, strategies, activities to respond to Climate Variability and Climate Change. | Kairakkum hydropower plant generation to be more resilient to climatic variation and extreme climate events. |
| B2 (core): Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience | Institutional capacity at Kairakkum hydropower plant to manage climate risks |
| | Capacity developed within Barki Tojik and Tajikhydromet to build climate resilience into hydropower investment planning and management |
| B3 (optional): Evidence showing that climate information products/services are used in decision making in climate sensitive sectors | Improved hydro-meteorological data and forecasts that take into account climate change projections to be used to inform hydropower facility operations (e.g. dam operator rules, flood response procedures) |
| B5 (core): Quality of and extent to which climate responsive instruments/ investment models are developed and tested | Integration of climate change resilience features into Kairakkum hydropower plant rehabilitation |
| | Replicable model for planning, developing and implementing climate-resilient upgrades of hydropower facilities developed and tested |
| | Adoption of best practices as used by hydropower operators in OECD countries by Barki Tojik and other relevant Tajik institutions |

- X. Implementation Feasibility and Arrangements:** Provide information on the implementation feasibility of the proposed project and a timeline by when the project can start implementation on the ground and when the project will be completed. Also, to provide:
- Expected PPCR Sub-Committee approval date:
 - Expected MDB Approval date:

The expected PPCR Sub-Committee approval date is autumn 2013. The expected MDB Board approval date is 29 November 2013 (subject to PPCR Subcommittee approval of the PPCR contribution).

XI. Potential Risks and Mitigation Measures: What are the risks that might prevent the project development outcome(s) from being realized, including but not limited to, political, policy-related, social/stakeholder-related, macro-economic, or financial?

| Risk | Mitigating actions |
|---|---|
| <p><i>Financial sustainability of Barki Tojik.</i> The financial situation of Barki Tojik is precarious constraining its possibilities to address the energy sector challenges from its own means. Low tariffs, poor collection rates and weak corporate governance and financial management have brought Barki Tojik to a point where it has a negative cash-flow and is forced to borrow short-term for working capital purposes. Scope for tariff increases, although essential, is constrained by low affordability and the absence of a social safety net.</p> | <p>Following extensive policy dialogue, the Government is fully aware of the action required to turn around Barki Tojik, and has adopted policy decisions to start the process. Comprehensive support from the IFIs and international donors will help the Government design and implement the reform agenda, and jointly agreed upfront conditionalities will ensure demonstration of political commitment and address the most critical points. To this end condition precedent for making the EBRD/EIB/PPCR financing available will be: Prior increase of the average tariff from 2.25 USD cents in June 2013 to 3.5 USD cents before the first disbursement, plus agreement with the Government of Tajikistan to continue tariff adjustments to full cost recovery.</p> <p>Presentation of unqualified audit report as an essential step to increase the transparency of Barki Tojik.</p> <p>Approval by the Government of Tajikistan of the Reform Plan for Barki Tojik. The Reform Plan contains a set of measurable benchmarks for a phased restructuring based on the work of the ADB consultant.</p> <p>The weak corporate governance will be addressed through a series of technical assistance (ADB financed restructuring of Barki Tojik, EBRD financed support to modernise energy regulation and institutional strengthening) and extensive policy dialogue. The World Bank is considering providing support to improve the social safety net. The IFCA grant co-financing is essential to keep the need for tariff increases within affordability levels.</p> |
| <p><i>Implementation risk</i> Risks include cost overruns, delays in procurement and failure to achieve expected technical outcomes.</p> | <p>EBRD has experience in other early transition countries similar to Tajikistan and have put in place close supervision of implementation by international consulting firms. Barki Tojik will assign a dedicated embedded Project Implementation Unit (PIU) within its own structures to manage the physical investment under EBRD's procurement rules. This PIU will be assisted by the international</p> |

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| | consultant, which is included in the overall budget. |
| <p><i>Progress with policy reform</i> Turning around the energy sector is dependent on a series of policy decisions to be taken by the government. This includes a differentiated tariff policy, relations to TALCO and the Ministry of Water Resources (irrigation), policy of government agencies towards paying utility fees, sector regulation and public information and consultations.</p> | Several fora exist for high-level policy dialogue between the Government and the IFIs and international donors, initial progress has been achieved. These include the Development Coordination Council (DCC) and its working groups, which conducts regular discussions with the Government on a wide array of issues, the energy sector being one of the most important. Specifically for the reform of the energy sector, the Government has established an inter-ministerial working group and a Steering Committee under the First Deputy Prime Minister. The Government’s international commitments through WTO require reform of state utilities. Lastly, the IFIs and international donors will continue to provide technical assistance and set conditionalities as appropriate. |
| <p><i>Environmental and social risks</i> This project has been categorised by EBRD’s Environment & Sustainability Department as Category B as defined by EBRD’s Environmental & Social Policy, which means that the project entails some environmental and social risks, but that these are readily assessed and managed. As the project is limited to the rehabilitation of existing hydropower facilities (not the construction of new ones) environmental and social impacts will be limited and location-specific.</p> | The project includes a full environmental and social analysis, in line with EBRD’s Environmental and Social Policy, which will be carried out before loan signing and before the detailed project design is finalised. This entails the development of a Stakeholder Engagement Plan, which will set out how communities and other stakeholders within the projects’ zone of influence will be consulted and involved in project development. This will include a gender component to ensure that women are enabled to equally benefit from the project and that their specific needs and constraints are taken into consideration, along with those of other community views and are then fed in to the analysis. |