

Safeguard Due Diligence Report

Project Number: 47017-003
Grant Number: 0417-TAJ
Period covered: October 2017

Tajikistan: Wholesale Metering and Transmission Reinforcement Project

Prepared by Barqi Tojik/Huawei and TBEA JV Consortium Amendment #2 to
Contract Lot 2
Dushanbe, Republic of Tajikistan

This Safeguard Due Diligence report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.



DUE DILIGENCE REPORT

SOCIAL AND ENVIRONMENTAL ISSUES

**BARQI TOJIK AND TBEA AMENDMENT No 2 TO
CONTRACT
LOT 2**

**Republic of Tajikistan Wholesale Metering and
Transmission Reinforcement Project**
(Financed by the Asian Development Bank)

This report on safeguards compliance is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

Prepared by: AF-Mercados EMI Madrid, Spain
For Open Joint Stock Company Barqi Tojik



Contents

| | |
|---|----|
| 1. INTRODUCTION | 4 |
| 1.1 General information about the Project | 4 |
| 2. Project Works description..... | 6 |
| 3. Need for a Due Diligence | 7 |
| 4. Environmental Baseline Analysis | 7 |
| 5. Institutional arrangement..... | 8 |
| 6. Key Findings | 8 |
| 7. Conclusions and Recommendations | 9 |
| Annex 1: amendment 2 schedules..... | 11 |
| ANNEX 2: 110kv switchyard pictures | 18 |



ABBREVIATIONS

| Abbreviations | Description |
|---------------|--|
| ADB | Asian Development Bank |
| Agric | Agricultural |
| AMI | Advanced Metering Infrastructure |
| BT | Barqi Tojik |
| CEMMP | Contractor's Environmental, Health and Safety Management and Monitoring Plan |
| DP | Displaced Person |
| CBO | Community Based Organization |
| CC | Civil Code |
| DH | Displaced Household |
| DMS | Detailed Measurement Survey |
| DP | Displaced Person |
| ECD | Europe and Central Asia |
| EHS | Environment, Health & Safety |
| EMP | Environmental Management Plan |
| ESD | Barqi Tojik PMU Environment and Social Department(now Monitoring Department) |
| GRC | Grievance Redress Committee |
| IEE | Initial Environmental Examination |
| IOL | Inventory of losses |
| IR | Involuntary Resettlement |
| ha | hectare/s |
| HH | household |
| HVTL | High Voltage Transmission Line |
| kg | Kilogram |
| LA | land Acquisition |
| LARP | Land Acquisition and Resettlement Plan |
| LC | Land Code |
| MEWR | Ministry of Energy and Water Resources |
| NGO | Non-Governmental Organization |
| OGV | Oil Great Volume |
| p.y. | per year |
| p.p. | per person |
| p.m. | per month |
| PMU | Project Management Unit |
| ROW | Right Of Way |
| RT | Republic of Tajikistan |
| SME | Small and Medium-sized Enterprise/s |
| t | Tower |
| TJS | Tajik Somoni |
| TL | Transmission Line |
| USD | United States Dollars |
| ZOI | Zone of Influence |
| | |



1. INTRODUCTION

1.1 General information about the Project

1. The Republic of Tajikistan has received financing (grant) from the Asian Development Bank (ADB) towards the cost of Wholesale Metering and Transmission Reinforcement Project. Parts of this financing is being used for payments under the contract for Rehabilitation of Substation Rudaki, Extension of Substation Ayni and Construction of new 220 kV OHL between SS Ayni 220 kV and SS Rudaki; replacement of electricity meters, several current transformers and several voltage transformers, introduction of an advanced metering infrastructure, and introduction of a settlement system. BT, ADB and the Consultant has agreed on a preliminary alignment of the 50 m wide right-of-way (RoW) of the TL based technical considerations and the need to avoid traversing human settlements and private landholdings.
2. It is expected that the proposed project will improve electricity supply to households and industries in the country by reducing losses through metering entire high and medium voltage transmission grid and expand transmission capacity in Panjakent region presently suffering from load shedding.
3. This Compliance report has been prepared by the social and environmental safeguards monitoring department of the PMU Barqi Tojik to assess whether the implementation of the Addendum to the Land Acquisition and Resettlement Plan of the power transmission line project complied with the stipulations of the approved addendum to LARP and ADB Involuntary Resettlement safeguards requirements. A satisfactory implementation of the LARP is a condition for ADB no objection to the start of physical civil works in the project sections with additional impact on land and income of the local communities.
4. The Projects components include:
 - a) Installation of 1,682 wholesale meters and settlement system including 846 current transformers and 744 voltage transformers (Lot A);
 - b) Construction of approximately 95 km of new single circuit single conductor 220 kV transmission line interconnecting Rudaki and Ayni Substation with rated capacity of 320 MVA (Lot B).
5. The location of the Project component Lot B is presented below in Figure 1 in the scale of the Country.



Figure 1. Location of the Project (Lot B).

6. The report aims to provide information on the social and environmental Due Diligence assessment conducted for the proposed additional works within power distribution switchyard. The purpose of this DDR is to satisfy the social and environmental safeguard requirements of the Government of Tajikistan, BarqiTojik (through PMU) and ADB.
7. Barqi Tojik is the vertically integrated state owned electric power utility in Tajikistan. Barqi Tojik is in the process of organizational restructuring to form three separate business units. The three business units will comprise generation, transmission and distribution. The transmission business unit will operate 500/220/110 kV systems and the distribution unit will be responsible for operating systems at 35 kV and below.



2. Project Works description

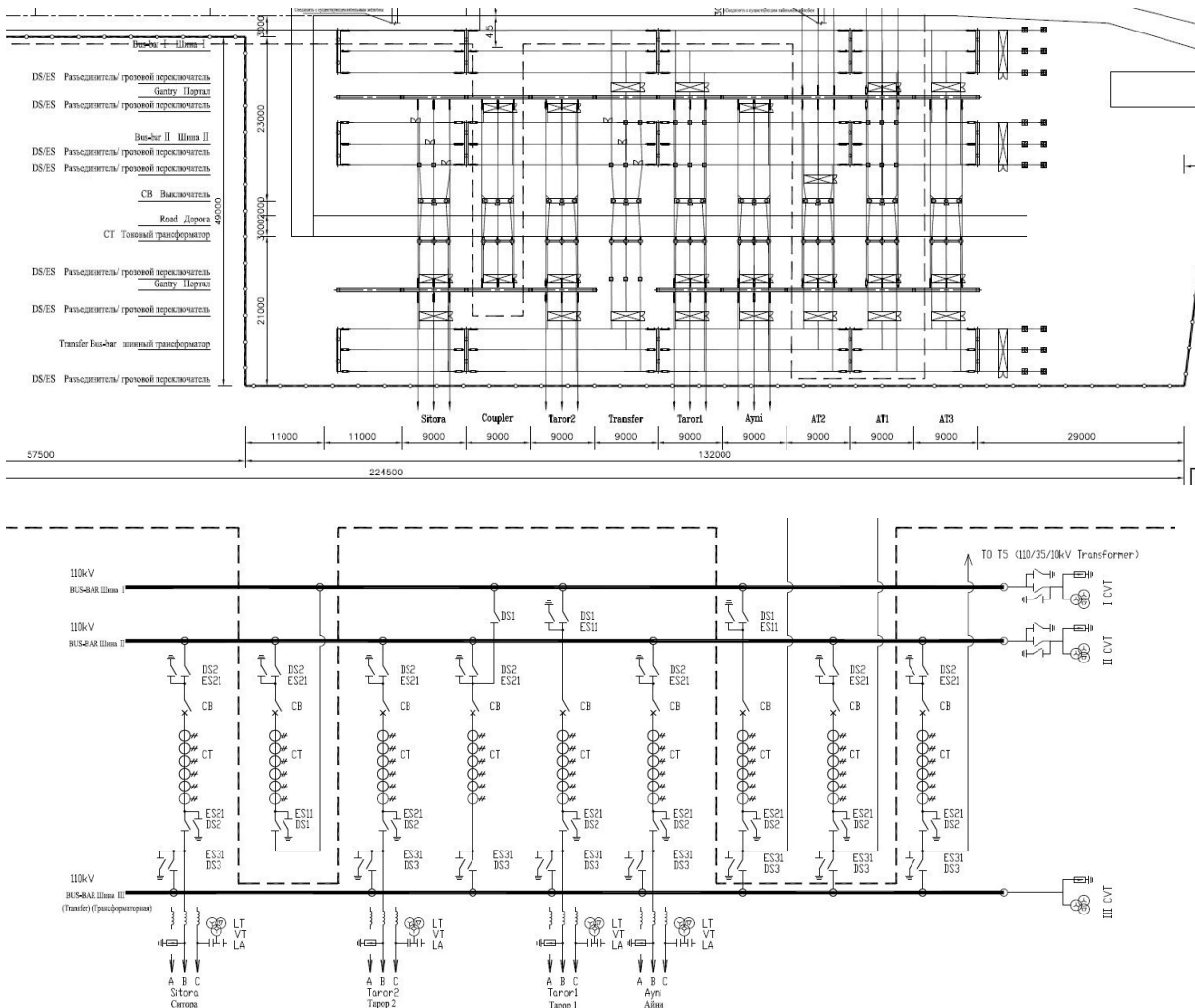


Figure 2 110 kV Rudaki's Switchyard Layout and Single line diagram

8. Currently in October 2017 the works envisaged in Rudaki Substation have progressed up to the assembling and testing of transformer 1, the 220 kV switchyard completely assembled, the control building renovation about to be finished and the commissioning underway, the energization of the line and AT1 is planned for November and the AT2 in 2018 January.
9. BT has proposed to carry out the renovation of the switchyard of 110 KV in Rudaki SS Penjakent Distric. The current switchyard is 32 years old it's technology, great oil volume breakers, is obsolete and unreliable that's why the proposal is to replace all the devices by new devices , SF6 Breakers much lighter, more reliable and less space consuming. Busbar arrangement and basic engineering remain.
10. The control panels and protection relays renovation are included in the Amendment.



11. The renovation will be made one by one, and no long outages will be required, because the triple bus-bar configuration let the energy by pass in every breaker renovation.

All the works, dismantling, civil works, assembling and commissioning will be carried out inside the Substation plot so no disturbance for residents is expected. The result of the study suggests that the proposed rehabilitation activities within the boundaries of Rudaki sub-station will not have impact on people and communities lands, structures and properties as the construction works will be carried out within existing compound of the switchyard. Moreover, planned construction works are only rehabilitation of existing structures. Mitigation measures will be taken following the ADB SPS 2009 for smooth implementation of the project. Refer to Figure 2 above and the pictures attached in Annex 2.

12. The proposed project works will not have any negative impacts and consequences on public facilities (schools, hospitals cemeteries, mosques and other sites of religious, cultural and historical values). All works will be carried out at locations away from the populated areas and the location of these objects within existing facilities.
13. The deadline for the exposed works is planned in August 2018.

3. Need for a Due Diligence

14. In order to capture unexpected impacts, that may result from changes of design and/or proposed additional activities, that may necessitate modifications to safeguards management arrangements, ADB may require the borrower to undertake due diligence. A Due Diligence Report (DDR) will be compiled to review the need for amendments to borrower's/client's social and environmental safeguards assessments and plans; resulting from the proposed changes and describing (if necessary) updating of environmental management or resettlement plans etc., to ensure that safeguard measures are in place and to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts.
15. This DDR presents the proposed rehabilitation works at Rudaki 110 KV switchyard and mitigate social and environmental impacts in the area. The need for any amendments to the environmental management plan and resettlement action plan has to be reviewed, particularly the collection of the old 110 kV switchbreakers, disconnectors, bus-bars and every part to be remove and renovated, specifying all those that are to be reused, kept in a warehouse or disposed in a proper dump in order to avoid any possible pollution.
16. The DDR provides an initial screening of the activities to be carried out under the proposed switchyard rehabilitation works, with the intention of identifying potentially significant social and environmental impacts, determining appropriate mitigation measures, and identifying if any further assessment is required. The basic objective is to ensure that nobody is made worse off as a result of such reconstruction/rehabilitation activities. In order to achieve this objective all negative impacts have to be mitigated for and the costs of doing this included in the financial and economic analysis of the project.

4. Environmental Baseline Analysis

17. The Initial Environment Examination 2014 September and its final update 2016 December apply to this document.



5. Institutional arrangement

18. The construction contractor is obliged to implement the EMP. Doing so, he shall set up a Health, Safety and Environmental Management Plan (HSEMP) and install a Health, Safety and Environmental Management System (HSEMS) during the entire construction period covering all construction sites and all construction activities.
19. The 'Social Sector and Environmental Monitoring Department' within the PMU as a governmental establishment will be responsible for supervising and monitoring the implementation of the EMP and social safeguard requirements by the CC.
20. For that, the PMU shall perform field visits about twice a month. The PMU is supported by the Project Implementation Consultant (PIC). The CC will prepare monthly progress reports about the implementation of the EMP. Based on these reports and own field visits the PMU shall prepare monthly Safeguard Monitoring Reports showing the progress of the implementation of the Environmental Management Plan (EMP). The reports shall contain all discrepancies from the EMP and list all HSE relevant incidents and accidents that occur during the implementation of Project.
21. Based on these reports the Social Sector and Environmental Monitoring Department will prepare semi-annual safeguards performance and monitoring reports and submit them to ADB, to Barqi Tojik and to other relevant national authorities. In doing so, the PMU will be supported by PIC (Project Implementation Consultant).

6. Key Findings

22. Main issues of the environmental safeguards relate to occupational Health and safety, PCB analysis in oil of breakers to be replaced.
23. No disturbance for flora and fauna are expected as all works will be done inside the SS area.
24. There are potential risks for soil and ground water pollution by oil from breakers during the procedure of its releasing, dismantling of breakers. These risks can be mitigated by existing EMP/SSEMP. However updating of SSEMP is needed for the part related to management plan for oil containing and not containing PCB.
25. Pursuant IEE's Chapter 4.3 related to PCBs, oil samples have to be collected from 110kV OGV Breakers to test them. Those analysis must be implemented by a qualified laboratory.
26. Due to the fact that the works will be developed in proximity of live bays and bus-bars as the renovation will be made bay by bay during the works everytime a bay is being renovated the next and the previous ones are working to maintain the switchyard operative safeguard measures will be taken, as sign posting, collective and individual protective equipment and coordination with BT's operation staff, Safety and Work Procedures will be drawn up by the Contractor and reviewed and approved by PMU and given out to the parties before works start.
27. No impact on land and assets of local communities is expected given that the works will be carried out inside the Rudaki sub-station.
28. The result of the study suggests that the proposed rehabilitation activities will not have impact on people



and communities lands, structures and properties as the construction works will be carried out within existing facilities of the sub-station. Moreover, planned construction works are selected for repairing and rehabilitations and not for new constructions. Project does not envisage economic and/or physical relocation impact. Existing territory of the switchyard is wide enough and have not been encroached by hawkers, informal users, etc. Therefore, there will be no foreseen loss of income or assets. Mitigation measures will be taken following the ADB SPS 2009 for smooth implementation of the project.

29. The proposed project works will not have any negative impacts and consequences on public facilities (schools, hospitals cemeteries, mosques and other sites of religious, cultural and historical values). Community properties, trees, crops, and any other income generating activities will not be affected by the project.
30. All the consideration taken in the IEE for the substation works applies to the amendment.

7. Conclusions and Recommendations

31. Workers should receive refreshing trainings on Health and safety issues related to releasing of oil from breakers and training on relevant environmental mitigation measures in order to avoid risks of accidents and soil pollution.
32. It is necessary to update the SSEMP for additional works and include in SSEMP the separate Annex related to the treatment of oil containing and not containing PCB.
33. Update monitoring part of SSEMP on waste items.
34. Hereby based on the above-stated and the results of the social and environmental safeguards assessment, the proposed rehabilitation works at Rudaki sub-station has Not Resettlement Impact considering the following:
 1. Construction activities does not require new camp and or machinery parking area and additional space for heavy machinery movement;
 2. There is no widening of the switchyard (construction of additional infrastructure outside of the boundaries) activities in the proposed rehabilitation works. Construction area is limited within existing facilities.
 3. There no any tenants or persons who use land unofficially, etc.
35. In case any claims or complaints are submitted during the construction period, an effective and efficient Grievance Redress Committee being in place, will enhance provision of timely and sensible hearings and facilitate solutions It will be set up an intermediate depot to temporarily store the devices and parts removed from the existing 110 kV then the parts shall be classified and finally stored and or recycle according to its use.
36. It will be set up an intermediate depot to temporarily store the devices and parts removed from the existing 110 kV then the parts shall be classified and finally stored and or recycle according to its use.
37. It's needed testing the PCBs level of the oil of the OGV Breakers.
38. It's needed making a Parts and Scrap and Disposal Devices Treatment Plan, to avoid uncontrolled piling up of those items forming polluting spots



32. The proposed rehabilitation / reconstruction work is predominantly existing piece of infrastructure that does not create any impacts not already anticipated. During construction or maintenance work, the Contractor will take all measures to mitigate the possible adverse effects (such as noise and dust) and the Consultant in turn will run strict monitoring of the Contractor's activity for timely undertaking of mitigation measures in line with the accepted EMP.
33. The project will not create any additional impact on cultural or heritage sites and neither does it pass through area subject to heavy development. Proposed rehabilitation works will not create conflicts with natural resource allocation.



ANNEX 1: AMENDMENT 2 SCHEDULES

| Wholesale Metering and Transmission Reinforcement | | | | | | |
|--|--|-------------------|--------------|----------|------------|---------------------|
| Asian Development Bank ADB Grant 0417 - TAJ | | | | | | |
| Open Stock Holding Company Barki Tojik | | | | | | |
| Schedule 1: Plant and Mandatory Spare Parts Supplied from Abroad | | | | | | |
| Annex B | | | | | | |
| AF MERCADOS EMI | | | | | | |
| Item | Description | Country of origin | Amendment 02 | | | |
| | | | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP | CIP |
| | | | | | (USD) | (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| | 110 kV HV Equipment | | | | | |
| 1.1.1.14 | supply of Circuit Breaker, 3-ph, with steel support structure | | set | 6 | 23,070 | 138,420 |
| 1.1.1.15 | supply of Current Transformer, 1-ph, with steel support structure | | set | 18 | 5,721 | 102,978 |
| 1.1.1.16 | supply of Surge Arrester, 1-ph, including operation counters (one counter per each set of three arresters), with steel support structure | | set | 6 | 1,015 | 6,090 |
| 1.1.1.19 | supply of Disconnecter, 3-ph, 110 kV, with two (2) Earthing Switches (one on each side), motor operated, with steel support structure | | set | 10 | 13,246 | 132,460 |
| 1.1.1.20 | supply of Disconnecter, 3-ph, 110 kV, with one (1) Earthing Switches (one on each side), motor operated, with steel support structure | | set | 18 | 11,992 | 215,856 |
| 1.1.1.21 | supply of Disconnecter Coupling Capacitor Voltage Transformer, 1ph, with steel support structures | | pcs | 9 | 8,845 | 79,605 |
| 1.1.1.22 | Supply of necessary post insulator 1ph, with steel support structures | | set | 35 | 2,372 | 83,020 |
| 1.1.1.23 | Filter addition for PLC | | pcs | 8 | 4,644 | 37,152 |
| 1.1.1.24 | supply of all necessary Equipment Connections, including all necessary insulators, stranded conductors, clamps, insulator clamps and accessories | | lot | 1 | 26,029 | 26,029 |
| 1.1.1.25 | Supply of earthing materials | | lot | 1 | 28,456 | 28,456 |
| 1.1.1.26 | supply of all necessary Power and Control Cables | | lot | 1 | 171,600 | 171,600 |
| 1.1.1.27 | Terminal box | | set | 12 | 8,221 | 98,652 |
| | Subtotal Item 1.1.1: | | | | | 1,120,318 |
| 2.1.7.5 | Supply of Oil type transformers 10/04 kV 630 kVa | | set | 4 | 19600 | 78400 |
| | Subtotal Item 1.1.8: | | | | | 78400 |
| 1.10 | 110 kV Protection Equipment | | | | | |
| 1.10.1 | protection equipment for 110kV OHL's | | set | 6 | 18,291 | 109,746 |
| 1.10.2 | protection equipment for bypass | | set | 1 | 20,329 | 20,329 |
| 1.10.3 | Additional board for the protection of 110kV lines | | lot | 1 | 12,226 | 12,226 |
| | Subtotal Item 1.1.9: | | | | | 142,301 |
| 1.11 | 110 kV Control and Monitoring Equipment | | | | | |
| 1.11.1 | supply of Control and Monitoring Equipment for 110kV OHL's | | set | 6 | 8,488 | 50,928 |
| | Subtotal Item 1.1.9: | | | | | 50,928 |
| | SUBTOTAL Rudaki SUBSTATION | | | | | 1,391,947.00 |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 - TAJ

Open Stock Holding Company Barki Tojik

Schedule 3: Design services

Annex B

| AF MERCADOS EMI | | | | | |
|---------------------------------|--|------|----------|------------|-------------|
| Amendment 02 | | | | | |
| Item | Description | Unit | Quantity | Unit Price | Total price |
| | | | | CIP | CIP |
| | | | | (USD) | (USD) |
| 1 | 2 | 16 | 17 | 18 | (19=17x18) |
| 1 | As built drawings and documentation | | | | |
| 1A | As built drawings and documentation for 110 kV Switchyard | set | 4 | 15000 | 60000 |
| 2 | Insulation coordination study | | | | |
| 2A | Insulation coordination study for 110 kV Switchyard | set | 1 | 36000 | 36000 |
| 3 | Relay protection study | | | | |
| 3A | Relay protection study for new 110 kV bays | set | 1 | 24000 | 24000 |
| 4 | O & M manuals | | | | |
| 4A | O & M manuals for additional equipment 110 kV | set | 3 | 9000 | 27000 |
| 5 | Provision and maintainance of site facilities (incl. offices) for Employer's Staff | | | | |
| 5A | Provision and maintainance of site facilities (incl. offices) for Employer's Staff, to supervise 110 kV rehabilitation activities | lot | 1 | 15000 | 15000 |
| 6 | Provision of vehicles for Employer's Staff incl. Operation and maintenance costs | | | | |
| 6A | Provision of vehicles for Employer's Staff incl. Operation and maintenance costs with taken into account rehabilitation of 110 kV switchyard | lot | 1 | 10000 | 10000 |
| 7 | Training of Employer's personnel | | | | |
| 7A | Training of Employer's personnel with taken into account rehabilitation of 110 kV switchyard | set | 1 | 5000 | 5000 |
| 8 | Attendance of Employer's staff at Factory Acceptance Testing (FAT) | | | | |
| 9 | Transportation | | | | |
| 10 | Contractor to provide all work safety related equipment and gears (helmets, special closes, shoes, and etc.) | | | | |
| 10A | Contractor to provide all work safety related equipment and gears (helmets, special closes, shoes, and etc.) for 110 kV reahabilitation | lot | 1 | 25000 | 25000 |
| Total Schedule 3: | | | | | 202,000.00 |
| (to schedule 5, Grand Summary) | | | | | |
| Contractor signature and stamp: | | | | | |
| | | | | | |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 TAJ

Open Stock Holding Company Barki Tojik

Schedule 4: Installation, Commissioning and Other Services

Annex B

AF MERCADOS EMI

| Amendment 02 | | | | | | |
|--------------|---|-------------------|------|----------|------------|-------------|
| Item | Description | Country of origin | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP (USD) | CIP (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| 1.0 | Rehabilitation Rudaki 220 kV SUBSTATION | | | | | |
| | 110 kV HV Equipment | | | | | |
| 1.1.1.15 | removal of old existing 110 kV Circuit Breaker, 3-ph and Surge Arrester, 1-ph for AT 1 & AT 2, with steel support structures, foundations, cables, cable canals etc. and transportation to storage area (located in the Substation) and storage | | lot | 6 | 6,549.00 | 39,294.00 |
| 1.1.1.16A | Installation and Commissioning of Circuit Breaker, 3-ph, with steel support structure under operation switchyard | | set | 6 | 7,621.00 | 45,726.00 |
| 1.1.1.16B | Installation and Commissioning of Disconnecter, 3-ph, 110 kV, two columns center-break type, with two (2) Earthing Switches (one on each side), motor operated, with steel support structure in under operation open switchyard | | set | 10 | 4,479.00 | 44,790.00 |
| 1.1.1.16C | Installation and Commissioning of Disconnecter, 3-ph, 110 kV, two columns center-break type, with one (1) Earthing Switches (one on each side), motor operated, with steel support structure in under operation open switchyard | | set | 18 | 4,321.00 | 77,778.00 |
| 1.1.1.17A | Installation and Commissioning of Current Transformer, 1-ph, with steel support structure under operated 110 switchyard | | set | 9 | 844.00 | 7,596.00 |
| 1.1.1.18A | Installation and Commissioning of Surge Arrester, 1-ph, including operation counters (one counter per each set of three arresters), with steel support structure under operation switchyard | | set | 6 | 1,304.00 | 7,824.00 |
| 1.1.1.18B | Installation and Commissioning of Coupling Capacitor Voltage Transformer, 1-ph, with steel support structures in under operation open switchyard | | set | 18 | 1,304.00 | 23,472.00 |
| 1.1.1.18C | Installation of all necessary Post Insulators and Supports, 1-ph, with steel support structures | | lot | 1 | 4557 | 4,557.00 |
| 1.1.1.19A | Instalation of all necessary Zebra condutor connections and clamps and accessories | | lot | 1 | 6,946.00 | 6,946.00 |
| 1.1.1.20 | Installation of all necessary Power and Control Cables | | | | | |
| 1.1.1.20A | Instalation of all necessary Power and Control Cables in under operation swichgear | | lot | 1 | 29,156.00 | 29,156.00 |
| 1.1.1.21 | Remove of old disconnectors | | set | 28 | 896.00 | 25,088.00 |
| | Subtotal Item 1.1.1: | | | | | 312,227.00 |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 TAJ

Open Stock Holding Company Barki Tojik

Schedule 4: Installation, Commissioning and Other Services

Annex B

AF MERCADOS EMI

| Amendment 02 | | | | | | |
|----------------------|---|-------------------|------|----------|------------|-------------|
| Item | Description | Country of origin | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP (USD) | CIP (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| 1.0 | Rehabilitation Rudaki 220 kV SUBSTATION | | | | | |
| | 110 kV HV Equipment | | | | | |
| 1.1.1.15 | removal of old existing 110 kV Circuit Breaker, 3-ph and Surge Arrester, 1-ph for AT 1 & AT 2, with steel support structures, foundations, cables, cable canals etc. and transportation to storage area (located in the Substation) and storage | | lot | 6 | 6,549.00 | 39,294.00 |
| 1.1.1.16A | Installation and Commissioning of Circuit Breaker, 3-ph, with steel support structure under operation switchyard | | set | 6 | 7,621.00 | 45,726.00 |
| 1.1.1.16B | Installation and Commissioning of Disconnecter, 3-ph, 110 kV, two columns center-break type, with two (2) Earthing Switches (one on each side), motor operated, with steel support structure in under operation open switchyard | | set | 10 | 4,479.00 | 44,790.00 |
| 1.1.1.16C | Installation and Commissioning of Disconnecter, 3-ph, 110 kV, two columns center-break type, with one (1) Earthing Switches (one on each side), motor operated, with steel support structure in under operation open switchyard | | set | 18 | 4,321.00 | 77,778.00 |
| 1.1.1.17A | Installation and Commissioning of Current Transformer, 1-ph, with steel support structure under operated 110 switchyard | | set | 9 | 844.00 | 7,596.00 |
| 1.1.1.18A | Installation and Commissioning of Surge Arrester, 1-ph, including operation counters (one counter per each set of three arresters), with steel support structure under operation switchyard | | set | 6 | 1,304.00 | 7,824.00 |
| 1.1.1.18B | Installation and Commissioning of Coupling Capacitor Voltage Transformer, 1-ph, with steel support structures in under operation open switchyard | | set | 18 | 1,304.00 | 23,472.00 |
| 1.1.1.18C | Installation of all necessary Post Insulators and Supports, 1-ph, with steel support structures | | lot | 1 | 4557 | 4,557.00 |
| 1.1.1.19A | Installation of all necessary Zebra condutor connections and clamps and accessories | | lot | 1 | 6,946.00 | 6,946.00 |
| 1.1.1.20 | Installation of all necessary Power and Control Cables | | | | | |
| 1.1.1.20A | Installation of all necessary Power and Control Cables in under operation switchgear | | lot | 1 | 29,156.00 | 29,156.00 |
| 1.1.1.21 | Remove of old disconnectors | | set | 28 | 896.00 | 25,088.00 |
| Subtotal Item 1.1.1: | | | | | | 312,227.00 |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 TAJ

Open Stock Holding Company Barki Tojik

Schedule 4: Installation, Commissioning and Other Services

Annex B

AF MERCADOS EMI

| Amendment 02 | | | | | | |
|------------------------------|--|-------------------|------|----------|------------|-------------------|
| Item | Description | Country of origin | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP (USD) | CIP (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| Subtotal Item 1.1.3: | | | | | | |
| 1.1.3A | 110 kV Protection Equipment | | | | | |
| 1.1.3A.1 | Installation and Commissioning of protection equipment for 110kV | | set | 6 | 8,200.00 | 49,200.00 |
| 1.1.3A.2 | Installation and Commissioning of protection equipment for Busbars | | set | 1 | 6,100.00 | 6,100.00 |
| 1.1.3A.3 | removal of old 110 kV Protection Equipment including related cabling and transportation to the storage area | | lot | 1 | 32,361.00 | 32,361.00 |
| Subtotal Item 1.1.3A: | | | | | | |
| | | | | | | 87,661.00 |
| 1.1.4.5 | removal of old 110 kV Control and Monitoring Equipment including related cabling and transportation to the storage area | | lot | 1 | 9,988.00 | 9,988.00 |
| 1.1.4.6 | Installation and Commissioning of Control and Monitoring Equipment for new auxiliary equipment 110 kV | | set | 6 | 2,010.00 | 12,060.00 |
| 1.1.4.7 | Monitoring equipment access computer monitoring system | | lot | 1 | 4,200.00 | 4,200.00 |
| Subtotal Item 1.1.4: | | | | | | |
| | | | | | | 26,248.00 |
| 1.1.4.A | Telecommunication System transportation and training | | | | | |
| Subtotal Item 1.1.4A: | | | | | | |
| 1.1.5 | AC/DC Installations | | | | | |
| 1.1.5.3 | Installation and Commissioning of new Marshalling Kiosks | | | | | |
| 1.1.5.3A | Installation and Commissioning of new Marshalling Kiosks for additional 110 kV equipment | | lot | 1 | 14,086.00 | 14,086.00 |
| 1.1.5.4 | Installation and Commissioning of new AC cables | | | | | |
| 2.1.4.3A | Installation and Commissioning of new AC cables for 110 kV switchyard | | lot | 1 | 31,586.00 | 31,586.00 |
| Subtotal Item 1.1.5: | | | | | | |
| | | | | | | 45,672.00 |
| 1.1.7 | 220 kV Switchyard Earthing system & lightning protection system | | | | | |
| 1.1.7.1 | removal of old existing Earthing system & lightning protection system in 220 kV Switchyard and Autotransformers and transportation to the storage area | | | | | |
| 1.1.7.1A | removal of old existing Earthing system & lightning protection system in 110 kV Switchyard and transportation to the storage area | | lot | 1 | 23,879.00 | 23,879.00 |
| 1.1.7.2 | Installation / extention and commissioning of new Earthing system & lightning protection system for 110 kV switchyard | | lot | 1 | 85,286.00 | 85,286.00 |
| Subtotal Item 1.1.7: | | | | | | |
| | | | | | | 109,165.00 |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 TAJ

Open Stock Holding Company Barki Tojik

Schedule 4: Installation, Commissioning and Other Services

Annex B

AF MERCADOS EMI

| Amendment 02 | | | | | | |
|--------------|---|-------------------|------|----------|------------|-------------|
| Item | Description | Country of origin | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP (USD) | CIP (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| 1.1.9 | LV Power and Control cables | | | | | |
| 1.1.9.1 | Installation and Commissioning of LV Power and Control cables | | | | | |
| 1.1.9.1A | Installation and Commissioning of LV Power and Control cables for 110 kV Switchyard | | lot | 1 | 143,656.00 | 143,656.00 |
| 1.1.9.2 | Installation and Commissioning of 10 kV Power cables | | | | | |
| | Subtotal Item 1.1.9: | | | | | 143,656.00 |
| | | | | | | |
| | SUBTOTAL Rudaki SUBSTATION | | | | | 724,629.00 |
| | | | | | | |
| 1.2 | Civil Works | | | | | |
| 1.2.1 | Topographical Survey, Geotechnical Investigations, Preparatory works | | | | | |
| 1.2.1A | Topographical Survey, Geotechnical Investigations, Preparatory works in 110 kV switchyard | | lot | 1 | 17,313.48 | 17,313.48 |
| 1.2.2 | Surfacing by gravel / Landscaping | | | | | |
| 1.2.2A | Surfacing by gravel / Landscaping at open switchyard 110 kV | | lot | 1 | 33,354.24 | 33,354.24 |
| 1.2.3 | Arrangement of adequate storages (inside substation) | | | | | |
| 1.2.4 | Dismantling/Removal works and transport to storage (incl. necessary precaution for handling of special materials) | | | | | |
| 1.2.5 | Rehabilitation of existing damaged and construction of new roads | | | | | |
| 1.2.6 | Removal of all existing equipment foundations | | | | | |
| 1.2.7 | Removal of all existing cable trenches and ducts | | | | | |
| 1.2.8 | Removal of all existing gantry foundations | | | | | |
| 1.2.9 | Removal of foundations for Autotransformer 1 & 2 | | | | | |
| 1.2.10 | Installation of new equipment foundations | | | | | |
| 1.2.10A | Installation of new equipment foundations for 110 kV switchyard | | lot | 1 | 215,872.80 | 215,872.80 |
| 1.2.11 | Installation of new cable trenches and ducts | | | | | |
| 1.2.11A | Installation of new cable trenches and ducts for 110 kV | | lot | 1 | 285,641.33 | 285,641.33 |
| 1.2.12 | Installation of new gantry foundations | | | | | |
| 1.2.13 | Installation of new foundations for Autotransformer 1 & 2, 125 MVA including fire separation wall. | | | | | |
| 1.2.14 | Installation of new foundations for 10 kV Current Limiting Reactors | | | | | |
| 1.2.15 | Installation of new foundations for 10/10 kV 25 MVA Regulating Transformers including fire separation wall | | | | | |



Wholesale Metering and Transmission Reinforcement

Asian Development Bank ADB Grant 0417 TAJ

Open Stock Holding Company Barki Tojik

Schedule 4: Installation, Commissioning and Other Services

Annex B

AF MERCADOS EMI

| Amendment 02 | | | | | | |
|---------------------------------|---|-------------------|------|----------|------------|--------------|
| Item | Description | Country of origin | Unit | Quantity | Unit Price | Total price |
| | | | | | CIP (USD) | CIP (USD) |
| 1 | 2 | 3 | 16 | 17 | 18 | (19=17x18) |
| 1.2.16 | Collection of Oil Separator to the existing oil collector system | | | | | |
| 1.2.17 | Rehabilitation of existing control building (replacement of all windows, all doors, painting of walls, installation of cooling and heating system in the building, installation of new light in building) | | | | | |
| 1.2.18 | Installation of (2) two new toilets in the existing control building and renovation of (2) existing toilets in the existing control building | | | | | |
| 1.2.19 | Rehabilitation of existing battery room | | | | | |
| 1.2.20 | Other civil works for S/S Rudaki in order to fulfill the purpose of the project | | | | | |
| 1.2.21 | Construction of an extension to the existing building on the control building SS Rudaki to accommodate the new battery. | | | | | |
| 1.2.22 | The length of the extension fence in SS Rudaki | | | | | |
| 1.2.23 | Dismantling/Removal works and transport to storage (incl. necessary precaution for handling of special materials) | | lot | 1 | 93,600.00 | 93,600.00 |
| 1.2.24 | Removal the old cable trench and ducts | | lot | 1 | 57,619.00 | 57,619.00 |
| Subtotal Item 1.2: | | | | | | 703,400.85 |
| 1.3 | Other Rehabilitation Measures | | | | | |
| 1.3.1 | Mitigation Measures according to Environmental Management Plan | | | | | |
| 1.3.2 | Fire detection and alarm - Fire fighting system for new autotransformers | | | | | |
| 1.3.3 | Fire detection and alarm - Fire fighting system for Control building | | | | | |
| 1.3.4 | Other rehabilitation works for S/S Rudaki in order to fulfill the purpose of the project | | | | | |
| 1.3.5 | Mitigation Measures according to Environmental Management Plan at 110 kV construction site | | lot | 1 | 44,632.00 | 44,632.00 |
| 1.3.6 | Repair of existing fire pipe | | lot | 1 | 35,814.15 | 35,814.15 |
| Subtotal Item 1.3: | | | | | | 80,446.15 |
| SUBTOTAL Rudaki SUBSTATION | | | | | | 1,508,476.00 |
| Total Schedule 4: | | | | | | |
| (to schedule 5, Grand Summary) | | | | | | 1,508,476.00 |
| Contractor signature and stamp: | | | | | | |



ANNEX 2: 110KV SWITCHYARD PICTURES



Panoramic View of 110 kV Switchyard



110 kV Great Oil Volume Switch breakers



110 kV Switchyard view bus-bars and disconnectors



110kV Switchyard busbars from the Substation's main road