



Technical Assistance Subproject Report

Project Number: 52112-002
Knowledge and Support Technical Assistance (C-KSTA)
January 2019

Regional Cooperation on Increasing Cross-Border Energy Trading within the Central Asian Power System Subproject 1: Modernization of Coordinating Dispatch Center Energiya

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Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
CAPS	–	Central Asian power system
CAREC	–	Central Asia Regional Economic Cooperation
CDC	–	coordinating dispatch center
EDM	–	energy data management
HLT	–	high-level technology
kV	–	kilovolt
kWh	–	kilowatt-hour
TA	–	technical assistance

NOTE

In this report, "\$" refers to United States dollars.

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KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data		Project Number: 52112-002	
Project Name	Regional Cooperation on Increasing Cross-Border Energy Trading within the Central Asian Power System - Modernization of Coordinating Dispatch Center Energiya (Subproject 1)	Department/Division	CWRD/CWEN
Nature of Activity Modality	Capacity Development Subproject	Executing Agency	Asian Development Bank
Country	REG (KAZ, KGZ, TAJ, UZB)		
2. Sector		ADB Financing (\$ million)	
✓ Energy	Energy sector development and institutional reform		0.50
		Total	0.50
3. Strategic Agenda		Climate Change Information	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	CO ₂ reduction (tons per annum)	5,587,560
Environmentally sustainable growth (ESG)	Natural resources conservation	Climate Change impact on the Project	High
Regional integration (RCI)	Pillar 1: Cross-border infrastructure Pillar 2: Trade and investment		
4. Drivers of Change		Gender Equity and Mainstreaming	
Governance and capacity development (GCD)	Institutional development	Some gender elements (SGE)	✓
Knowledge solutions (KNS)	Application and use of new knowledge solutions in key operational areas Knowledge sharing activities		
Partnerships (PAR)	Implementation Official cofinancing Regional organizations South-South partner		
5. Poverty and SDG Targeting		Location Impact	
Geographic Targeting	No	Regional	High
Household Targeting	No		
SDG Targeting	Yes		
SDG Goals	SDG7, SDG13, SDG17		
6. Risk Categorization		Low	
7. Safeguard Categorization		Safeguard Policy Statement does not apply	
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		0.50	
Knowledge and Support technical assistance: Technical Assistance Special Fund		0.50	
Cofinancing		2.00	
Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility (Full ADB Administration)		1.00	
High Level Technology Fund (Full ADB Administration)		1.00	
Counterpart		0.00	
None		0.00	
Total		2.50	
Currency of ADB Financing: USD			

I. THE TECHNICAL ASSISTANCE SUBPROJECT

A. Overall Progress of the Technical Assistance Cluster

1. The cluster knowledge sharing technical assistance was approved on 29 November 2018. This is the first subproject.

B. Subproject Outcome

2. The technical assistance (TA) subproject will have the following outcome: cross-border clean energy trade increased using high-level technology (HLT) by coordinating dispatch center (CDC) Energiya located in Tashkent, Uzbekistan. The HLT will replace manual processes to allow CDC to operate in a real-time regime. Specifically, the subproject 1 outcome will contribute to the cluster TA outcome indicator (c) CDC Energiya uses high-level technology to replace manual processes and operate in real-time regime.

C. Subproject Outputs, Methods, and Activities

3. Subproject 1 output will directly contribute to the cluster TA output 1 CDC Energiya modernized, capacitated, and engendered.

4. **Output 1: CDC Energiya modernized, capacitated and engendered.** This output will be delivered by analyzing the installed supervisory control and data acquisition (SCADA) energy management systems in Kazakhstan, the Kyrgyz Republic, and Tajikistan; and by introducing an energy data management (EDM) system for CDC while ensuring compatibility with the already installed systems. The EDM system will be procured and integrated into CDC. Measures to incentivize women to join CDC workforce will be explored.

5. The EDM system, which is a HLT, will be deployed to replace all Soviet-era equipment and processes at CDC. CDC still relies on outdated technologies to perform its functions, among others: (i) coordination of operations of power systems and energy entities within CAPS; (ii) determination of conditions for the parallel operation of CAPS; (iii) coordination of operation personnel's actions during intersystem emergencies and elimination of intersystem accidents; (iv) coordination of relay protection and automation of circuits and settings; (v) coordination of operation of dispatch data acquisition and transmission systems; and (vi) provision of control over measurements and metering of international power flows within CAPS.

6. Examples of constraints on the regional power trade due to technological limitations of CDC are: (i) the forecasting of power flows within CAPS is performed six months in advance using historical data and cannot be adjusted using real time figures – accordingly the power flow planning is unoptimized due to unnecessarily high factors of safety¹; (ii) in the event of the accident on the grid, the site of the fault takes up to a day (or even longer) to locate; (iii) the settlement of power flows between countries is unnecessarily long as the actual metered flows and reported flows do not match up due to the quality of the CDC's telemetry; and (iv) newly constructed assets cannot be included into the monitoring without taking out something else; thus CDC does not have a full picture of all important sites at the same time.

¹ With the new generation and transmission equipment introduced recently in the CAPS grid, the dynamic analysis task and calculation of emergency automation settings became an increasingly complex task that cannot be handled by CDC's existing capacity and equipment.

7. The aim will be to maximize the utilization of the CAPS transmission capacity by enabling operation of the regional grid in real time without the need of previously used unnecessarily high factors of safety. Introduction of modern systems with greatly increased volumes of telemetry information collected by CDC will also allow centralization of CAPS emergency automation.

8. **Methods and Activities.** The consultant firm will be engaged to assess and update the needs of CDC based on the work already performed by other development partners such as the United States Agency for International Development and the World Bank. Based on the installed equipment at the national dispatch centers in Kazakhstan, Kyrgyz Republic, and Tajikistan, the consultant will design the energy data management system to correspond to the state-of-the-art practice at international dispatch centers and prepare the list of necessary hardware and software for procurement. The consultant will prepare a modular modernization plan to enable prioritization based on the urgency for a particular system and the funding availability. The consultant will then manage the procurement of the prioritized equipment.

9. The TA will organize a regional workshop in one of the CAPS countries with participants from Kazakhstan, the Kyrgyz Republic, Tajikistan, Uzbekistan, and CDC. The workshop will present experiences of other countries with advanced transmission systems and share their experience in system planning, electricity dispatch between regions, and policy setting. Japan's experience in dealing with abrupt power changes caused by natural calamities is of interest and importance as many of the CAPS countries also experience power intermittency. ADB will closely work with Japan International Cooperation Agency (JICA) for organizing the Japanese knowledge sharing for the regional workshop. Europe's experience in dealing with large cross border electricity trade is also of interest and will be presented at this workshop. At least four persons from Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan, as well as CDC, will be invited with at least half being women. The composition of each delegation should contain one person in charge of technical policy making and one from strategic planning.

10. A national consultant will be engaged to conduct surveys and explore opportunities to engage more women students in universities by creating incentive mechanisms and an enabling environment for women employment.

D. Subproject Cost and Financing

11. The TA subproject is estimated to cost \$2.5 million, of which (i) \$500,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-6); (ii) \$1million will be financed on a grant basis by the Asian Clean Energy Fund² under the Clean Energy Financing Partnership Facility and administered by ADB; and (iii) \$1 million will be financed on a grant basis by the High-Level Technology Fund³ (HLTF) and administered by ADB. The key expenditure items are listed in Appendix 2.

12. The governments will provide counterpart support in the form of staff, office space and supplies, secretarial assistance, domestic transportation, and other in-kind contributions. Uzbek government's counterpart support will include tax exemption for the EDM system.

13. The grant funds from ACEF will be used to finance the consulting services, while the funds from TASF-6 and HLTF will be used to finance the procurement of EDM system. HLTF funds will be utilized first then TASF-6.

² Financing partner: the Government of Japan.

³ Financing partner: the Government of Japan.

14. With regards to ACEF, the following are the ineligible expenses: study tours, foreign training, car purchase, public officials' salaries, scholarship, detailed designs, or engineering works. Also, ACEF proceeds cannot be used to address or mitigate safeguard issues or risks caused by or related to other ADB projects.

15. The eligible expenditures of HLTF include, but are not limited to consulting services, goods, works, and plants, for project identification and development, project preparation, project implementation and operation (including activities such as survey, conference, seminars, workshops, travel, per diem, remuneration, resource person, report, communication, publications, pilot activities, capacity development, and research and policy advice activities, related to HLT projects). The eligibility of knowledge transfer activities in a country outside of the recipient DMC is subject to consultation with the donors committee and will be determined on a case-by-case basis.

E. Subproject Implementation Arrangements

16. ADB will administer the TA subproject. The Energy Division of ADB's Central and West Asia Department will be the executing agency (EA) in close coordination with ADB resident missions. The EA will select, supervise and evaluate consultants and organize the regional workshop.

17. The implementation arrangements are summarized in the table.

Subproject Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	January 2019 – December 2021		
Executing agency	ADB (Focal point: Energy Division, Central and West Asia Department)		
Implementing agencies	Coordinating dispatch center Energiya, national utilities, and national dispatch centers.		
Consultants	To be selected and engaged by ADB		
	Firm: Energy data management system design and integration	QCBS (90:10)	\$2,360,000*
	Specialized Agency: Capacity Building – management of intermittency (Japan Experience)	Direct Selection	\$100,000.00
	Individual: individual selection	National TA coordinator (12 person-months)	\$25,000.00
	Individual: individual selection	National gender specialist (3 person-months)	\$15,000.00
Disbursement	<p>The TA resources will be disbursed following ADB's <i>Technical Assistance Disbursement Handbook</i> (2010, as amended from time to time).</p> <p>HLTF and TASF will finance procurement of EDM system, which will be part of the non-competitive portion of the consultancy contract</p>		

Aspects	Arrangements
	<p>“Energy data management system design and integration”. HLTF will be front-loaded.</p> <p>ACEF will fund the consulting services.</p>
Asset turnover or disposal arrangement upon TA completion	The procured EDM system will be handed over to CDC Energiya upon subproject completion.

* includes \$1,500,000 procurement of EDM system which will be financed from the consultant’s provisional sum (noncompetitive item) and procured in accordance with ADB Procurement Policy and the Procurement Regulations for ADB Borrowers (2017, as amended from time to time).

ADB = Asian Development Bank, CDC = coordinating dispatch center, QCBS = quality- and cost-based selection, SCADA = supervisory control and data acquisition.

Sources: Asian Development Bank

18. **Consulting services.** International and national consultants will be recruited individually through framework agreements wherein short-listed consultants may be hired as needed for the duration of the agreement to provide technical expertise and logistical support to ADB and the implementing agencies. Firms will also be recruited using the quality- and cost-based selection with a 90:10 quality-to-cost ratio. The consultants will be engaged in accordance with the ADB Procurement Policy (2017, as amended from time to time) and the associated project administration instructions and/or staff instructions.

19. JICA will be single sourced to organize a regional workshop in Tashkent, Uzbekistan to showcase experiences of Japan power sector especially in dealing with abrupt power changes due to natural calamities. Japan’s experience in dealing with abrupt power changes due to natural calamities is importance as many of the CAPS countries experience power intermittency as well. JICA will organize presenters from Agency for Natural Resources and Energy under Ministry of Economy and Industry (ANRE) to share experience in policy setting regarding energy and natural resources; Japan Organization for Cross Regional Coordination of Transmission Operations (OCCTO) to share experience of cross-regional management of electrical businesses; Electricity and Gas Market Surveillance Commission (EGC) to share experience of monitoring of the electricity, gas and heat power trading market for the deregulation of energy market; Japan Electric Power Exchange (JEPX) to share experience in short and forward transactions and facilitation of the conflict mitigation; and TEPCO Power Grid to share dispatch center experience.

20. Procurement by the consultant will follow the ADB Procurement Policy (2017, as amended from time to time).

21. **Cofinancier requirements.** TA subproject implementation will follow the additional monitoring and reporting requirements specific to the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility and the High-Level Technology Fund.

SUBPROJECT DESIGN AND MONITORING FRAMEWORK

Impacts the TA is Aligned with: CAREC 2030 Program Results Framework¹			
Countries' emissions reductions target achieved, ^a regional cooperation framework accomplished, ^b and energy security in selected CAREC countries enhanced			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Cross-border clean energy trade increased using high-level technology by CDC Energiya	By 2021: a. At least 11,000 million kilowatt-hours trade within CAPS annually (2017 baseline: 3,109 million kilowatt-hours) b. At least additional 5,587,560 tCO ₂ reduction in emission achieved (2017 baseline: 0) c. CDC Energiya uses high-level technology to replace manual processes and operate in real-time regime	a.–c. CDC and national dispatch report	Change in the geopolitical climate in the region Change in water availability because of climate change Shutdown of 57% efficiency CCGT plants instead of 30% open cycle thermal plants in Uzbekistan in summer
Outputs 1. CDC Energiya modernized, capacitated, and engendered	By 2020: 1a. EDM system installed at CDC Energiya in Uzbekistan to enable CDC's communication with modernized dispatch centers in Kazakhstan, Kyrgyz republic, and Tajikistan (2017 baseline: 0) 1b. Number of women employees in CDC Energiya increased by 10% (2017 baseline: 48 women)	1a, b. TA Consultant's completion report	Price volatility for equipment
Key Activities with Milestones 1. CDC Energiya modernized, capacitated, and engendered 1.1 Recruit consultant to assess the need and design a state-of-the-art system (Q2 2019) 1.2 Organize regional workshop (with at least of 50% women's participation) (Q2 2019) 1.3 Procure EDM system (Q1 2020) 1.4 Consultant installs EDM system (Q3 2020) 1.5 Train CDC staff (with at least 50% women) in the use of the system (Q4 2020) 1.6 Engage consultant to conduct survey and explore opportunities to engage more women students in relevant universities by creating incentive mechanisms and an enabling environment for women employment (Q4 2019)			

¹ CAREC. 2015. Strategy and Work Plan (2016-2020) for Regional Cooperation in the Energy Sector of CAREC Countries

<p>Inputs</p> <p>Asian Development Bank:</p> <p> Technical Assistance Special Fund (TASF-6): \$500,000</p> <p>High-Level Technology Fund: \$1,000,000</p> <p>Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility: \$1,000,000</p> <p>Note: The government will provide counterpart support in the form of staff, office space and supplies, secretarial assistance, domestic transportation, and other in-kind contributions.</p> <hr/> <p>Assumptions for Partner Financing</p> <p>Not Applicable</p>

CAPS = Central Asian power system, CAREC = Central Asia Regional Economic Cooperation, CCGT = combined cycle gas turbines, CDC = coordinating dispatch center, EDM = energy data management, Q = quarter, TA = technical assistance, tCO₂ = tons of carbon dioxide.

^a United Nations Framework Convention on Climate Change. 2016. Paris Agreement–Status of Ratification. Paris.

^b CAREC. 2015. Strategy and Work Plan (2016–2020) for Regional Cooperation in the Energy Sector of CAREC Countries. Ulaanbaatar.

Source: Asian Development Bank.

SUBPROJECT COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Amount		
	TASF-6 ^a	HLTF ^b	ACEF ^b
A. Consultants			
1. Remuneration and per diem			
a. International consultants	0.0	0.0	750.0
b. National consultants	0.0	0.0	100.0
2. Out-of-pocket expenditures			
a. International and local travel	0.0	0.0	40.0
b. Training, seminars, and conferences	0.0	0.0	105.0
c. Reports and communications	0.0	0.0	5.0
B. Goods (EDM System) ^c	500.0	1,000.0	0.0
Total	500.0	1,000.0	1,000.0

ADB = Asian Development Bank, ACEF = Asia Clean Energy Fund under the Clean Energy Financing Partnership Facility, EDM = energy data management HLTF = high level technology fund, TA = technical assistance.

Note: The TA is estimated to cost \$2,500,000, of which contributions from ADB and ACEF and HLTF are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office and office supplies, secretarial assistance, domestic transportation, and other in-kind contributions.

^a Financed by ADB's Technical Assistance Special Fund TASF-6.

^b the Government of Japan. Administered by ADB.

^c Hardware and software including installation and licenses, which will be turned over to CDC upon TA completion.

Source: Asian Development Bank estimates.

TERMS OF REFERENCE FOR CONSULTANTS

I. FIRM

A. BACKGROUND

1. Power trade between the Central Asian countries has been declining since the collapse of the Union of Soviet Socialist Republic (USSR) in 1991. In 1990, 25,413 million kilowatt hour (kWh) was traded between Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. In 2010, the energy trade decreased to 2,256 million kWh following disconnection of Tajikistan from CAPS in 2009 and bottomed out in 2016 at 2,080 million kWh. Lack of energy trade caused widespread power outages in Tajikistan in winters and increased fossil fuel use by Turkmenistan, Uzbekistan, and Kazakhstan in summers. While the hydropower export from the Kyrgyz Republic continued, absence of Tajikistan hydropower in summer forced fossil fuel rich countries to generate electricity using gas and oil, instead of exporting them on the international market. Meanwhile, Tajikistan had to embark on substantial investments in generating capacities to produce electricity in winter, while being unable to export hydropower in summer. Tajikistan spills around five to seven billion kWh worth of water annually. The lack of electricity trading opportunities within CAPS also necessitated the Kyrgyz Republic to search for additional trading partners such as the People Republic of China and Pakistan.

B. COORDINATING DISPATCH CENTER “ENERGIYA”

2. During the Soviet Union time, the Central Asian energy flow between south of Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan electricity grids was regulated by United Dispatch Administration of Central Asia (based in Tashkent, Uzbekistan) subordinated to the central dispatch and planning institution (Central Dispatch Administration) in Moscow, USSR. Following the collapse of USSR, the function of overseeing the energy flows between the electricity grids was transferred to the newly established non-government organization Coordinating Dispatching Center (CDC) Energiya in 1993. The governance was assigned to Central Asia United Power System Council comprising the heads of the national power systems and responsible for administration and coordination of parallel operations of the CAPS. In 2004, an intergovernmental agreement related to coordination of relations in the sphere of electricity grids of Central Asia was concluded by Uzbekistan, the Kyrgyz Republic, Tajikistan, and Kazakhstan with the CDC given a status of international organization working under the guidance of the Central Asia United Power System Council. Turkmenistan withdrew from CAPS in 2003 and switched to parallel operations with Iran. The financing for CDC is provided by the signatories.

3. Unlike the national dispatch centers in the Kyrgyz Republic,¹ Tajikistan² and Kazakhstan, no significant technological modernizations were made at CDC since its establishment³ more than half a century ago. CDC still relies on outdated technologies to perform its functions, among others: (i) coordination of operations of power systems and energy entities within CAPS; (ii) determination of conditions for the parallel operation of CAPS; (iii) coordination of operation personnel’s actions during intersystem emergencies and elimination of intersystem accidents; (iv) coordination of relay protection and automation of circuits and settings; (v) coordination of operation of dispatch

¹ G0218-KGZ - Power Sector Improvement Project financed installation of SCADA for National Electric Grid of Kyrgyzstan.

² G0213-TAJ - Regional Power Transmission Project financed installation of SCADA for the Tajik energy utility “Barki Tojik”.

³ CDC originally was established as United Dispatch Administration of Central Asia in 1960s in the then-USSR

data acquisition and transmission systems; and (vi) provision of control over measurements and metering of international power flows within CAPS.

C. OBJECTIVE

4. Subproject-1 of the cluster TA aims to support the increase in power trade within CAPS by introducing the energy data management (EDM) system to CDC to enable a safe increase of energy flow within CAPS. EDM System, which is a high-level technology, will be deployed to replace all Soviet era equipment and processes at CDC to increase its effectiveness. Introduction of modern systems with greatly increased volumes of telemetry information collected by CDC will allow centralization of CAPS emergency automation.

5. The main instrument for performing functional duties for the personnel of the CDC "Energy" is the operational information complex, which collects and processes information from the objects of Central Asia Power System (CAPS).

6. At present, CDC "Energia" does not have a modern SCADA system and instead is operating an in-house automated dispatch control system (ADCS) operational and information solution (OIS), which is constantly being improved by the staff of CCC.

7. However, since the main algorithms incorporated in the current software were developed in the 70-90-ies of the last century, a radical transformation of the ADCS solution and bringing it into line with modern SCADA systems is impossible.

8. Examples of the bottlenecks of the current system include:

- Impossibility of direct reception / transmission of tele-information (TI) using modern protocols and increasing the TI volume because of outdated transceiver devices and communication channels (manufactured in the 70-s of the last century);
- Telemetry servers must use the MS DOS operating system, because they use algorithms developed for MS DOS, the modernization of which is irrational;
- OIS is only a means of displaying telemetry information and is used by a dispatcher for visual control of the current and / or retrospective mode;
- There is not possibility to use current and/or historical data of the OIS for online calculations or simulation of the power system modes in view of the weak accuracy of measurements and the lack of software that would assess the condition of the energy system needed for the calculations in the process;
- There is no interoperability between the ADCS OIS and automatic systems for commercial accounting of power consumption;
- Mosaic control board (manufactured in 1977) can display only a static mimic diagram of the power system and remote signaling.

9. The personnel of the units responsible for the calculations of operating regimes are compelled to use outdated, highly labor-intensive ways of modeling power systems to approximate the modes close to current modes. The same applies to the dispatching personnel, who are not able to increase their capacity on dispatching simulators, which are supplied as part of modern SCADA systems.

10. CDC's own resources, both intellectual (programmers) and financial are enough to only maintain the operation of the existing ADCS solution.

11. At present:

- all power systems of the Central Asian Interconnected Power System have already implemented or are working on the implementation and/or improvement of SCADA;
- further joint operation of modern SCADA systems installed in power systems with the outdated ADCS OIS will be accompanied by difficulties and slow down further integration of other power systems in the Central Asian Interconnected Power System;
- in connection with the expansion of the Central Asian Interconnected Power System and the volume of regional electricity trade (Tajikistan, Afghanistan, Pakistan), the requirements for the coordination of joint operation of power systems in the coming years will increase;
- Poorly equipped CDC is the bottleneck for the development of regional trade

D. SCOPE OF WORK AND DETAILED TASKS

12. The consultant firm will be engaged to

- Assess and update the needs of CDC Energiya based on the work already performed by other donors such as USAID and the World Bank [attachment 1]
- Based on the already installed equipment at Tajik, Kyrgyz and Kazakh national dispatch centers, the consultant will design the EDM system to correspond to the state-of-the-art practice at international dispatch centers and prepare the list of necessary hardware and software procurement. During the design the consultant shall ensure that EDM system output will provide the information and data which is required by CDC to execute their function as described in their function [attachment 2, 3 and 4]. The consultant will provide suggestions for improvements as necessary.
- The consultant will prepare modular modernization plan to enable prioritization of procurement based on the urgency need for a particular system and the funding availability, after consultation with the Client.
- The consultant firm will also procure the selected priority equipment and manage the necessary works to integrate them into CDC Energiya in accordance with the ADB Procurement Policy (2017, as amended from time to time) and the Procurement Regulations for ADB Borrowers (2017, as amended from time to time).
- The consultant firm will be responsible to train the CDC staff in operation of the newly installed equipment.

13. Note that the final design of CDC's equipment will also provide the requirements which will be given to Joint Stock Company Uzbekenergo for the design of their SCADA/EMS on Uzbekistan territory.

14. As part of the scope of works, the consultant shall propose capacity development activities for CDC and national utilities in order to maximize the benefits of the installed EDM system for regional power trade. A regional workshop is envisaged to be organized in Tashkent, Uzbekistan, to build capacity of CDC and NDCs on how to maximize regional power trade based on other international examples such as Europe.

E. INSTITUTIONAL ARRANGEMENT

15. ADB will be the executing agency working closely with the CDC Energiya (IA).

16 CDC Energiya will provide data, office space with utilities and telecommunication connection, and technical staff, and assist in additional data collection, logistics, meeting arrangements and other arrangements needed to accomplish the tasks.

F. REPORTING AND OUTPUT REQUIREMENTS

17. The TA consultant will submit the following reports and project documents in English with a draft and final reports translated into Russian.

	Report	Submission
1	Inception Report	NTP + 1 month
2	Updated Needs Assessment Report for CDC	NTP + 2 months
3	Proposal for regional workshop	NTP + 2 months
4	Draft EDM System Design Basis Memorandum ¹	NTP + 3 months
5	Final EDM System Design Basis Memorandum	NTP + 3.5 months
6	Draft EDM System Design ²	NTP + 5.5 months
7	Final EDM System Design	NTP + 6 months
8	Proposed Modular Procurement Plan ³	NTP + 6 months
9	Final Procurement Plan	NTP + 6.5 months
10	Draft Bid Documents ⁴	NTP + 6.5 month
11	Final Bid Documents and Request for Bids	NTP + 7 months
12	Bid Evaluation Report	NTP + 11 months
13	Completion Report	NTP + 23 months
14	Training Report	NTP + 26 months
15	Design requirements for Uzbekenergo's SCADA/EMS outbound signal to CDC	NTP + 26 months
16	Additional reporting required by the Trust Funds ⁵	Periodically

¹ Design basis memorandum (DBM) shall include the proposed methodology for the design, design parameters and assumptions as well as proposed international standards and design assumptions

² The EDM system design shall be based on the final DBM and will include all calculations, drawings and specifications of the required equipment. The EDM design shall be in performed in modular manner to enable each module to be procured and executed separately.

³ Modular procurement plan shall prioritize the equipment to be procured based on the fund availability and the urgency of the required module.

⁴ The bidding document shall follow ADB standard bid document for 1 stage 2 envelope <https://www.adb.org/site/business-opportunities/operational-procurement/goods-services/documents#plant>

⁵ Reporting requirements of HLTF and ACEF.

G. QUALIFICATION OF FIRM

18. The consulting firm lead shall have at least 15 years operational experience in designing and operating a dispatch center or a high voltage transmission network of min. 500 kV voltage which handles at least 25,000 million kWh annually and includes at least 1,500 km of at least 500kV high voltage transmission lines. The consulting firm must demonstrate at least one experience in designing EDM systems in accordance with the state-of-the-art industry practice. The consulting firms must be able to demonstrate experience in working overseas.

19. A consulting firm will be recruited using the quality- and cost-based selection method (quality: cost weighting of 90:10), using full technical proposals, following ADB's Procurement

Policy (2017, as amended from time to time). The consulting team shall work closely with CDC Energiya and ADB to efficiently and effectively perform the tasks. The assignment is expected to be carried out in Tashkent, Uzbekistan where CDC Energiya is based. Significant field days will be required from the team during TA implementation.

20. The consulting firm shall propose and maintain a team of experts, who shall be committed for the duration of the assignment. The team of experts shall contain as a minimum the following expertise to be evaluated against the submitted CVs:

Project Team Leader: (12 person months) demonstrate at least 10 years of team leadership and experience in designing and operating electricity dispatch center or high voltage transmission network. The PTL will manage the TA consultant team and will be responsible for the overall administration of the TA assignment.

SCADA/EMS: (4 person months) demonstrate at least 8 years of work experience in design and implementing SCADA/EMS for an electric utility or a dispatch center. Must have successfully completed at least one SCADA/EMS contract for an electricity utility or a dispatch center.

EDM: (4 person months) demonstrate at least 8 years of work experience in design, implementing and commissioning EDM system for an electric utility or a dispatch center. Must have successfully completed at least one EDM contract for an electricity utility or a dispatch center.

Relay Protection: (4 person months) demonstrate at least 8 years of work experience in design and implementing relay protection for an electric utility or a transmission company. Must have successfully completed at least one relay protection contract for an electricity utility or a transmission company.

Procurement: (4 person months) demonstrate at least 8 years of work experience in procurement based on international competitive bidding (ICB). Must have successfully led at least 3 procurement processes based on ICB. Previous work experience of ADB financed project, in ADB developing member countries (DMCs), is desirable.

Telecommunication: (4 person months) demonstrate at least 8 years of work experience in design and implementing telecommunication system for an electric utility or a transmission company. Must have successfully completed at least one telecommunication contract for an electricity utility or a transmission company.

Training: (2 person months) demonstrate at least 8 years of work experience in design and implementing training program related to EDM system for an electric utility or a transmission company.

21. Note that the person months are provided as a guide for the expected level of effort input. The contract will be on delivery based the lump sum basis.

22. The consulting firm will propose national expertise as required for performing the task, which may include logistical support, local design expertise, office management.

- Firm TOR Attachments:
1. USAID Report
 2. CDC Charter
 3. Agreement between Power Utilities
 4. Inter-Governmental Agreement Forming CDC

II. NATIONAL CONSULTANTS

A. TA Coordinator

Objective and Purpose of the Assignment

The purpose of the assignment is to provide administrative support during the implementation of the loan and TA subproject.

Scope of Work

The consultant will provide administrative support in administration and implementation of the division's loan and TA subproject.

Detailed Tasks and/or Expected Output

- Provide assistance in the overall administration and implementation of the assigned energy sector loans and technical assistance (TA) subprojects;
- Coordinate and follow up with other TA consultants, EAs and IAs on required submissions and documents;
- Participates in CWEN review missions;
- Supports reporting officers in meeting with Uzbekistan Government, JVC Uzbekenergo, JVC Uzbekhydroenergo by coordinating meetings and performing responsibilities of translator if required;
- Translates correspondence between reporting officers of CWEN and Uzbekistan Government, JVC Uzbekenergo, JVC Uzbekhydroenergo, as and when required;
- Coordinates meetings of CWEN and consultants with relevant Government departments.
- Assists in handling the day to day routine functions in support of CWEN/URM tasks and responsibilities.

Minimum Qualification Requirements

Qualified consultant preferably with master degree in energy, engineering, business administration or related field. The consultant will have administrative experience in projects financed by international financial institutions such as ADB and World Bank in Uzbekistan. The consultant should have excellent oral and written communication skills (English and Russian) and should be able to work well in teams, with executing agencies, and with government officials.

Minimum General Experience 7 Years

Minimum Specific Experience (relevant to assignment) 5 Years

Regional/Country Experience Required

B. Gender and Development Expert (national, 3 person-month)

Scope of Work

The consultant will provide support to ensure that the project embodies commitment to achieving gender equality and women's empowerment.

Detailed Tasks and/or Expected Output

Specific tasks will include but not be limited to the following:

- To prepare sector overview from the gender perspective and identify gender specific issues including gender representative opportunities for employment and empowerment in decision making;
- review CDC HR Policy/practices and propose appropriate gender fair and women-friendly policies/activities/measures;
- develop and assist gender awareness-raising program and conduct gender awareness training to key staff at CDC;
- gather information on percentage of women taking energy-related courses, such as engineering, math, science etc., in both TVET and university, as well as overview of the universities and TVET institutions (potential partners);
- review existing reports, information/data provided by CDC Energiya from a gender perspective;
- assess all potential positive and negative impacts of the proposed project on consumer groups and employees of CDC Energiya and NDC of Uzbekenergo in Uzbekistan, from a gender perspective;
- prepare socioeconomic profiles of the project-affected communities in the Project areas (if any) in accordance with relevant ADB guidelines and publications and the requirements of the Governments;
- propose a set of recommendations to engender the National Program (if any) based of the gender analyses conducted;
- identify opportunities for employment of local populations in the Project, and any skills training that may assist in improving the capital base of the local populations (if applicable);
- prepare a set of gender action/activities to meet SGE requirements such as to conduct surveys and explore opportunities to engage more women students in universities by creating incentive mechanisms and an enabling environment for women employment at CDC;
- Collect sex-disaggregated baseline data and contribute to the development of socio-economic surveys of project preparation team (if applicable);
- assess executing and implementing agency's gender capacity for gender-sensitive planning and implementation, as well as those of potential institutional partners and stakeholder groups, including relevant NGOs and CBOs.

Minimum Qualification Requirements

The national gender and development expert will have a master's degree in social science, economics, or other related fields, or its equivalent and at least 5 years of relevant experience in carrying out gender analysis, preferably of companies and of consumer behavior. Previous experience in undertaking social studies and analysis in the power sector in Uzbekistan and English skills are desirable.