



Technical Assistance Report

Project Number: 43549
Research and Development Technical Assistance (RDТА)
June 2010

Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan

(Cofinanced by the Regional Cooperation and Integration Fund
under the Regional Cooperation and Integration Financing
Partnership Facility)

ABBREVIATIONS

ADB	–	Asian Development Bank
CAPS	–	Central Asian power system
CARs	–	Central Asian republics
CAREC	–	Central Asia Regional Economic Cooperation
CDC	–	Coordinating Dispatch Center
ESCC	–	Energy Sector Coordinating Committee
GWh	–	gigawatt-hour (1 million kilowatt-hours)
kV	–	kilovolt (1,000 volts)
TA	–	technical assistance
TWh	–	terawatt-hour (1 trillion kilowatt-hours)

TECHNICAL ASSISTANCE CLASSIFICATION

Type	–	Research and development technical assistance (RDTA)
Targeting classification	–	General intervention
Sector (subsectors)	–	Energy (conventional energy, large hydropower, renewable energy, electricity transmission and distribution, energy efficiency and conservation, energy sector development)
Themes (subthemes)	–	Economic growth (widening access to markets and economic opportunities), environmental sustainability (natural resources conservation, global and regional transboundary environmental concerns), regional cooperation and integration (trade and investments)
Climate change	–	Climate change mitigation (increasing energy efficiency and optimizing use of thermal and hydro generation resources, thereby reducing emissions of greenhouse gases)
Location impact	–	Rural (medium), urban (medium), national (high), regional (high)
Partnerships	–	World Bank and United States Agency for International Development

NOTE

In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. The Central Asia Regional Economic Cooperation (CAREC) program is a partnership of eight countries and six multilateral institutions to promote development through cooperation. The program focuses on energy, transport, trade facilitation, and trade policy, with work in each area led by a sector committee comprising country and multilateral institution representatives. The proposed research and development technical assistance (TA) resulted from a series of dialogues in 2009 between the CAREC Energy Sector Coordinating Committee (ESCC), the Asian Development Bank (ADB), and other multilateral institutions.¹

2. The TA was developed to identify national power sector deficiencies and resolve them by promoting interregional and intraregional electricity trade, improving energy security and energy efficiency, and reducing emissions of greenhouse gases through optimized, integrated transmission and generation expansion. The TA concept was endorsed at the CAREC Ministerial Conference in October 2009, and initial concept clearance was approved by ADB in November 2009. The TA is part of the CAREC 2010 Energy Sector Action Plan.²

3. At the March 2010 ESCC meeting, the country representatives reached, on behalf of their governments, agreement on TA impact, outcome, outputs, implementation arrangements, cost, and financing arrangements, as well as the consultant's terms of reference. They requested financing from ADB. This report reflects the agreements reached. The TA has been reviewed by ADB support departments and sector experts. The agreed design and monitoring framework is in Appendix 1.

II. ISSUES

4. The Central Asian republics (CARs) of Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan enjoy abundant energy resources. However, the resources are not distributed evenly, with Kazakhstan having large oil and coal reserves, Uzbekistan and Turkmenistan sizeable gas reserves, and the Kyrgyz Republic and Tajikistan significant hydropower resources. This uneven distribution of resources means that regional cooperation is advantageous, as each country can import and export the most appropriate energy form at the appropriate time to mutual advantage.

5. During the Soviet era, the CARs energy system was designed to take advantage of regional variations. The CARs were connected to some extent by gas pipelines and to a lesser extent by oil pipelines. Through the 500 kilovolt (kV) power system, the thermal electrical power systems of Kazakhstan, Turkmenistan, and Uzbekistan were connected with the hydropower systems of Tajikistan and the Kyrgyz Republic, allowing Tajikistan and the Kyrgyz Republic to export power during the summer, when their hydropower generation was at a maximum, and import power during the winter, when they were in energy deficit. Water releases in Tajikistan and the Kyrgyz Republic were coordinated with the overriding goal of meeting the irrigation needs of downstream countries.

6. Since 1990, the CARs have largely pursued energy self-sufficiency, with regional electric trade plunging from 25 gigawatt-hours (GWh) in 1990 to 4 GWh in 2008. This has resulted in

¹ The TA first appeared in the business opportunities section of ADB's website on 28 April 2010.

² CAREC. 2009. *CAREC Energy Action Plan Framework*. Endorsed by the 8th Ministerial Conference on Central Asia Regional Economic Cooperation. <http://www.carecinstitute.org/uploads/events/2009/8th-MC/Energy-Action-Plan-Framework.pdf>.

occasional summer spillage in Tajikistan due to water storage limitations and winter energy deficits in Tajikistan and the Kyrgyz Republic. Low precipitation has caused winter energy deficits to be more pronounced in recent years, especially in 2007 and 2008. That hydropower is required mainly in the winter and irrigation mainly in summer poses difficulties for optimum reservoir management and exchange of hydropower with fossil fuel power. The result is that some countries generate electricity using fossil fuels rather than import from neighboring countries with surplus electricity generated from renewable resources.

7. The December 2004 World Bank Regional Electricity Export Potential Study³ assessed options for meeting future electricity demand in the CARs and the potential scope and location of export markets outside the region. The key findings of the Regional Electricity Export Potential Study were that (i) annual domestic demand in the CARs can be met in the medium term through loss reduction, rehabilitation of existing generation capacity, and strategic investment in new generation and transmission projects; and (ii) efforts should focus first on developing intraregional trade, with interregional trade to follow.

8. ADB's energy sector lending in the CARs initially focused on Tajikistan but is now expanding to include the Kyrgyz Republic and Uzbekistan. Existing and planned projects include generation and transmission rehabilitation in Tajikistan, new generation in Uzbekistan, and commercial metering in the Kyrgyz Republic. In Afghanistan, ADB is financing new generation, transmission, and distribution projects, with new connections between Afghanistan and Uzbekistan now allowing 100 megawatts of power to be delivered to Kabul with export capacity to be increased to 300 megawatts in 2011. ADB is also financing the 300-megawatt Tajikistan–Afghanistan connection project whereby surplus energy from Tajikistan will be exported to Afghanistan during the summer. Past regional initiatives have included the 2002 Uzbekistan–Tajikistan transmission modernization project and the Central Asia South Asia (CASA) Regional Electricity Market initiative including the CASA-1000 Transmission Project to link Kyrgyz Republic and Tajikistan to Afghanistan and Pakistan. The transmission modernization project did not proceed when the countries failed to conclude power purchase agreements. ADB's involvement in CASA-1000 was suspended following the 2009 financial crisis, when the countries prioritized alternative emergency assistance. Development partners active in the region include the World Bank, United States Agency for International Development, Islamic Development Bank, and European Union.

9. Today, Kazakhstan, Kyrgyz Republic, and Uzbekistan continue to operate an interconnected power system with system operation and planning managed by the Coordinating Dispatch Center (CDC) in Tashkent. Turkmenistan withdrew from the interconnected system in 2003, but continues to export to CARs from islanded power plants. Afghanistan is in the process of joining the system and wishes to meet a portion of its demand with imports from CARs. Currently, Tajikistan is disconnected from the system and operates in island mode. Trade is generally conducted bilaterally and is restricted by transmission constraints, low generation capacity, and seasonal variation in demand.

10. Regional energy trade can bring financial and economic benefits to participating countries. However, countries must also address the competing need for energy security, which the CARs have largely focused on over the past decade. As this is being addressed, the CARs are now considering the advantages of intraregional and interregional trade. Meanwhile, Afghanistan is actively developing regional import projects to help solve its severe generation deficit. As reflected in the CAREC action plan, the four CARs of the Central Asian power system

³ World Bank. 2004. *Regional Electricity Export Potential Study*. Europe and Central Asia Region. Washington, D.C.

(Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan) and Afghanistan have now confirmed their wish to study the benefits from adopting a regional energy approach.

11. The Energy Sector Action Plan agreed at the CAREC 2009 Ministerial Conference is structured around three strategic issues:

- (i) **Energy demand and supply balance and infrastructure.** This pillar addresses the most efficient use of energy resources across the region to meet the needs of its people in a reliable, affordable, financially sustainable, and environmentally-sound manner. This approach considers factors such as climate change, the use of renewable energy resources, energy efficiency and demand-side management, intraregional and extra-regional trade opportunities, and least-cost planning. The strategy takes into consideration seasonal supply–demand balances and transmission constraints. This theme focuses on infrastructure investments.
- (ii) **Regional dispatch and regulatory development.** This pillar addresses sector restructuring, regulation, and contractual arrangements. It covers the policy and institutional needs to facilitate energy security, trade, and efficient transit across the region.
- (iii) **Energy–water linkages.** Hydropower brings a valuable dimension to the region’s energy assets. The particular distribution of hydropower resources in Central Asia raises complexities of transboundary water management. This pillar calls for a strong analytical base to support the coordinated management of energy and water resources.

12. It was agreed that ADB would provide assistance in the infrastructure pillar, with other development partners providing assistance in the dispatch and energy–water pillars.

III. THE PROPOSED TECHNICAL ASSISTANCE

A. Impact and Outcome

13. The impact will be increased energy security and regional electricity trade to support economic growth. Specific performance targets are being developed by the CAREC ESCC but will include

- (i) increased interregional and intraregional trade,
- (ii) reduced winter electric deficits in the Kyrgyz Republic and Tajikistan, and
- (iii) increased exports from CARs to Afghanistan.

14. The outcome will be to identify a series of regional investment projects justified on economic, financial, safeguard, and technical grounds to provide long-term solutions to balance electricity demand and supply in the region.

B. Methodology and Key Activities

15. The TA shall be executed over 12 months during which (i) a regional master plan will be produced, and (ii) an analysis of the technical requirements for connecting Afghanistan with the CAR power system will be prepared. The two activities will be conducted in parallel. TA

consultants will review the extensive series of related reports carried out over the past decade and assess the studies and investment projects currently planned or under execution. It will field missions to the five countries to obtain data and meet with utility and government bodies. It will assess appropriate planning software and hardware to be procured. The planning software will be installed, populated, and used to produce the master plan, with appropriate training provided. Interim and draft final reports will be presented to the working group. Regarding Afghanistan's connection with the CAR power system, the consultants will work with the CDC, which will define the requirements for synchronous operation. The key activities are as follows:

- (i) Identify existing demand and 20-year growth projections for each country.
- (ii) Assess the condition of existing generation and transmission assets.
- (iii) Review and assess construction and rehabilitation projects currently planned.
- (iv) Identify alternatives including renewable energy options and the efficient use of power including load management and other demand-side management measures. Investigate alternative generation scenarios with the objective of reducing greenhouse gas emissions. Define energy efficiency and renewable energy priorities.
- (v) Assess the adequacy of existing regional generation and transmission planning software. Propose new software and hardware as appropriate. Identify, procure, install, and populate the new planning software. Train staff in its application.
- (vi) Conduct optimization regionally, considering environmental, social, economic, financial, technical, and security issues.
- (vii) Assess the technical design of existing CAR system and analyze the technical and economic impacts caused by member(s) joining or withdrawing.
- (viii) Analyze system technical requirements for Afghanistan's connection to the CAR system.
- (ix) Identify the benefits of regionally optimized approach compared with planning on a national basis. Quantify economic, financial, environmental, and social benefits, including those that reduce emissions of greenhouse gases.
- (x) Assess the adequacy of existing regional energy trading arrangements. Identify deficiencies and propose remedies.

C. Cost and Financing

16. The cost of the TA is estimated at \$2.5 million equivalent. It is proposed that ADB provide \$2 million on a grant basis, \$1.5 million will be provided from the Regional Cooperation and Integration Fund (RCIF)⁴ under the Regional Cooperation and Integration Financing Partnership Facility and \$500,000 will be provided from ADB's Technical Assistance Special Fund (TASF-IV). The governments will finance the remaining \$500,000 equivalent through in-kind contributions from the government-owned utilities and the CDC. The TA cost estimates are in Appendix 2.

D. Implementation Arrangements

17. ADB will be the executing agency. An ESCC subcommittee will be created to oversee the project. The subcommittee and ADB will direct, assist, and supervise the TA consultants. The subcommittee and ADB will meet with the consultants as required during project implementation but not fewer than 3 times to review inception, interim, and final reports.

⁴ Established by ADB.

18. In each country, the consultants will work primarily with utilities and government bodies responsible for planning.

19. Utilities will provide office space and counterpart staff and make available appropriate data and reports. The consultants will work with the CDC, which will also provide counterpart staff and make available appropriate data and reports.

20. ADB will engage a firm of consultants or a consortium in accordance with its Guidelines on the Use of Consultants (2007, as amended from time to time) using quality- and cost-based selection with weighted 80:20 technical:financial and requiring a full technical proposal. Disbursements under the TA will be done in accordance with ADB's *Technical Assistance Disbursement Handbook*.⁵ Major equipment and software will be purchased in accordance with ADB Procurement Guidelines (2007, as amended from time to time).

21. The TA will require eight international consultants for 42 person-months, and eight national consultants for 60 person-months in the specialties of energy economics, financial analysis, system planning, power generation, power transmission, environment, social analysis and energy efficiency. The TA is expected to be completed by end of December 2011.

22. The TA will be administered and monitored by ADB as part of the ongoing CAREC program. The consultants will design a project performance monitoring system and submit quarterly progress reports measuring performance against the project performance monitoring system. Interim and final reports will be presented at ESCC meetings to ensure compliance with the terms of reference and the needs of participating countries. The TA will be evaluated through ADB's TA completion report procedures.

23. The outputs of the TA will be a regional master plan and a technical study on connecting Afghanistan to the Central Asian power system. The master plan will include a set of investment projects that will be an input into further developments of the Energy Sector Action Plan. The proposed investments will be endorsed by the ESCC as projects for financing and implementation through the CAREC program.

IV. THE PRESIDENT'S RECOMMENDATION

24. The President recommends that the Board approve the provision of technical assistance not exceeding the equivalent of \$2,000,000 on a grant basis for the Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan.

⁵ ADB. 2008. *Technical Assistance Disbursement Handbook*. Manila.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>Increased energy security and regional trade in Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan</p>	<p>Regional electric energy trade restored from 3 TWh in 2009 to >10 TWhr per year by 2015</p> <p>Winter electric deficits in Tajikistan and the Kyrgyz Republic (over 3,000 GWh in 2009) eliminated by 2015</p> <p>Electric energy exports from CARs to Afghanistan increase from 300 GWh in 2009 to 1,000 GWh per year by 2013</p> <p>Note: Specific performance targets are being developed by the ESCC.</p>	<p>Energy data from national utility companies, ministries of energy, and national statistics</p> <p>Power trade data from the Coordinating Dispatch Center</p> <p>ESCC meetings and CAREC Ministerial Conference proceedings 2010–2011</p>	<p>Assumption</p> <p>Participating countries continue to implement a regional energy strategy including financial support to implement projects</p> <p>Risk</p> <p>Persistent disputes among riparian countries on developing hydropower generation projects</p>
<p>Outcome</p> <p>A series of regional investment projects identified</p>	<p>Participating governments endorse the identified regional investment projects at the CAREC Ministerial Conference in 2012</p>	<p>ESCC meetings and CAREC Ministerial Conference proceedings</p>	<p>Assumption</p> <p>Prompt decision making by participating governments</p> <p>Risk</p> <p>Individual countries may view energy security risks as overriding regional benefits.</p>
<p>Outputs</p> <p>1. A regional master plan</p> <p>2. A technical study on connecting Afghanistan to CAPS</p>	<p>By end of 2011 an ESCC-endorsed master plan report containing</p> <ul style="list-style-type: none"> (i) 20-year demand projections, (ii) an assessment of existing assets and planned new projects, (iii) a study of alternative options, and (iv) an optimized regional investment plan. <p>By end of 2011, define Afghanistan CAPS connection parameters</p>	<p>Consultants' report and ESCC proceedings</p>	<p>Assumptions</p> <p>The data necessary to conduct the study exists and will be made available.</p> <p>Effective consultation between TA consultants, governments, and stakeholders</p>

Activities with Milestones		Inputs
1	ADB recruits consultants	8 international consultants (42 person-months) and 8 national consultants (60 person-months) ADB: \$2,000,000 (TASF-IV: \$500,000 RCIF: \$1,500,000) Governments and CDC: \$500,000
2	Consultants mobilized in the field	
3	Consultants study existing reports, finalizes project plan, and submit inception report	
4	ADB, ESCC, and consultants meet to review inception report	
5	Consultants visit each country for about 1 month, gather data, assess demand and the condition of assets, review existing plans, and draw up optimized regional plan.	
6	Consultants submit interim report	
7	ADB, ESCC, and consultants meet to review interim report.	
8	Consultants incorporate ESCC comments and prepare draft final report.	
9	Consultants submit draft final report.	
10	ADB, ESCC, and consultants meet to review draft final report.	
11	Consultants submit final report to include (i) a Regional Master Plan and (ii) a technical study on connecting Afghanistan to CAPS.	

ADB = Asian Development Bank, CAPS = Central Asian power system, CAR = Central Asian republic, CAREC = Central Asia Regional Economic Cooperation, CDC = Coordinating Dispatch Center, ESCC = Energy Sector Coordinating Committee, Q = quarter, RCIF = Regional Cooperation and Integration Fund under the Regional Cooperation and Integration Financing Partnership Facility, TA = technical assistance, TASF = Technical Assistance Special Fund, TWh = terawatt hour.

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Total Cost
A. Asian Development Bank Financing^a	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	1,100.0
ii. National consultants	400.0
b. International and local travel	170.0
2. Equipment (hardware and software) ^b	100.0
3. Workshops, seminars, and tripartite meetings ^c	50.0
4. Contingencies	180.0
Subtotal (A)	2,000.0
B. Government Financing	
1. Office accommodation in five countries ^d	200.0
2. Counterpart staff in five countries ^d	300.0
Subtotal (B)	500.0
Total	2,500.0

^a Financed by the Regional Cooperation and Integration Fund under the Regional Cooperation and Integration Financing Partnership Facility (established by the Asian Development Bank [ADB]) for \$1,500,000 and ADB's Technical Assistance Special Fund (TASF-IV) for \$500,000.

^b The hardware and software to be purchased, if any, will be computers and specialized software to be used for power system planning. Users or such tools will be government ministries or government owned, utilities or multi-government owned CDC depending on planning responsibilities and needs in each country. Such hardware and software will be handed over to government ministries or government owned entities responsible for planning on completion of the project.

^c To cover expenses of working group members attending project meetings.

^d To be provided as contribution in kind by utilities in each country.

Source: ADB estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Background

1. The Central Asia Regional Economic Cooperation (CAREC) Energy Sector Action Plan agreed at the 2009 Ministerial Conference is structured around three strategic issues:

- (i) **Energy demand–supply balance and infrastructure.** This pillar addresses the most efficient use of energy resources across the region to meet the needs of its people in a reliable, affordable, financially sustainable, and environmentally sound manner. This approach considers factors such as climate change, the use of renewable energy resources, energy efficiency and demand-side management, intraregional and extra-regional trade opportunities, and least-cost planning. The strategy takes into consideration seasonal supply–demand balances and transmission constraints. This theme focuses on infrastructure investments.
- (ii) **Regional dispatch and regulatory development.** This pillar addresses sector restructuring, regulation, and contractual arrangements. It covers the policy and institutional needs to facilitate energy security, trade, and efficient transit across the region.
- (iii) **Energy–water linkages.** Hydropower brings a valuable dimension to the region’s energy assets. The particular distribution of hydropower resources in Central Asia raises complexities of transboundary water management. This pillar calls for a strong analytical base to support the coordinated management of energy and water resources.

2. These terms of reference relate to the energy demand–supply balance and infrastructure pillar, as other technical assistance (TA) projects address the dispatch and energy–water pillars.

B. Overview of the Study

3. The projects identified under the master plan will increase energy security, energy efficiency and trade by optimizing integrated transmission and generation expansion between Afghanistan and the four Central Asian republics (CARs) of Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. The study will address export opportunities from the five countries to neighboring regions. The master plan will study the integrated development of the regional power system and identify long-term solutions to balancing demand and supply, taking into account current assets, demand projections, and trade opportunities. The study will address policy measures to promote security and efficiency. It will also analyze technical requirements for connecting Afghanistan with Central Asian power system (CAPS).

4. The study will be executed by the Asian Development Bank (ADB) with Coordinating Dispatch Center (CDC) as a counterpart agency. The study has been approved by the CAREC regional organization and endorsed by the ministers at the CAREC Ministerial Conference in October 2009. The Energy Sector Coordinating Committee of CAREC will review interim and final study outputs together with ADB.

C. Consultants Tasks

5. ADB will recruit an international consulting firm or consortium of firms in line with its Guidelines on the Use of Consultants (2007, as amended from time to time).

6. Since the 1900s a number of TA studies have been conducted on the performance of the power sector in the five countries. The studies will be made available to the consultants in electronic format for study and review. A number of these studies are available on the CAREC website.

7. It is planned that a separate Afghanistan power sector master plan study will be conducted during 2011. The consultants conducting this Afghanistan study will forecast demand; assess the condition of existing plants; and assess alternatives to meet forecast demand including new domestic generation and transmission plants, new import projects, and the possibility of export projects. The outputs of the Afghanistan master plan study will be an input to the regional master plan study. The consultants for the regional master plan will be required to coordinate with the consultants for the Afghanistan master plan.

8. The consultants will be required to perform the following tasks:

- (i) Identify existing demand, including unmet demand, and produce 20-year growth country projections for high, low, and base case growth scenarios.
- (ii) Assess the condition of existing generation and transmission assets. Identify when they will reach the end of their economic life and need to be rehabilitated or retired.
- (iii) Review and assess construction and rehabilitation projects planned for individual countries and regionally. Confirm the need for these projects and their justification on technical, financial, economic, and safeguard grounds while considering current and planned electric imports and exports.
- (iv) Identify alternatives including renewable energy options and the efficient use of power including load management and other demand-side management measures. Investigate alternative generation scenarios with the objective of reducing greenhouse gas emissions. Define energy efficiency and renewable energy priorities.
- (v) Assess the adequacy of existing CDC regional generation and transmission planning software. Propose new software and hardware as appropriate. Identify, procure, install, and populate the new planning software. Train CDC staff in its application. Run regional planning scenarios.
- (vi) Review and assess planned country and regional projects. Propose new projects as appropriate. Prepare a regional power sector master plan considering environmental, social, economic, financial, technical, and country security issues.
- (vii) Identify the benefits of a regional power sector plan compared with planning on a national basis. Quantify economic, financial, environmental, and social benefits, including those resulting in reduced emission of greenhouse gases. Prepare a 10-year investment plan for justified projects.
- (viii) Assess the adequacy of existing regional energy trading arrangements. Identify deficiencies and propose remedies.
- (ix) Assess the technical design of existing CAPS system. Analyze the technical and economic impact caused by member(s) joining or withdrawing.
- (x) Analyze system technical requirements for connecting Afghanistan to CAPS. Consider that Uzbekistan currently supplies islanded portions of the Afghanistan system but that by 2012 the Tajikistan connection with Afghanistan will be completed, thereby potentially completing a parallel 220 kilovolt (kV) connection between Uzbekistan and Tajikistan through Afghanistan. Define technical actions required for Afghanistan to operate synchronously with CAPS.

D. Consultant Team

9. A team of eight international consultants is envisaged providing 42 person-months of services. It will be assisted by eight national consultants providing 60 person-months. National consultants will assist the international consultants in (i) collecting data and information from national and local sources; (ii) reviewing existing documentation, studies, and reports; (iii) organizing consultations with stakeholders; and (iv) undertaking field surveys. The team of national consultants shall include one expert from each country. The team composition of the international and national consultants and their estimated inputs are in Table A3.

Table A3: Consultants Team Composition

Position	International Consultants			National Consultants		
	P-M per Expert	No. of Expert	Total PM	P-M per Expert	No. of Expert	Total PM
Team leader / power system planning	8	1	8	10	1	10
Energy economist	6	1	6	10	1	10
Power generation engineer	6	1	6	10	1	10
Transmission engineer	6	1	6	10	1	10
Energy efficiency specialist	4	1	4	5	1	5
Social specialist	4	1	4	5	1	5
Environment specialist	4	1	4	5	1	5
Financial analyst	4	1	4	5	1	5
		8	42		8	60

No. = number, p-m = person-month.

Source: Asian Development Bank estimates.

E. Implementation Arrangements

10. ADB will be the implementing agency. A working group of members from each country will be created to oversee the project. The working group and the ADB project officer will direct, assist, and supervise the TA consultants. The working group and ADB project officer will meet with the consultants as required during project implementation but no fewer than three times to review inception, interim, and final reports.

11. In each country the consultants will work primarily with the government ministry responsible for planning. The consultants will also work with the appropriate power utilities. The transmission utilities (where unbundling has occurred) and vertically integrated utilities are in Afghanistan by Da Afghanistan Breshna Sherkat, Kazakhstan by Kazakhstan Electricity Grid Operating Company, Kyrgyz Republic by National Electric Grid of Kyrgyzstan, Tajikistan by Barki Tajik and Uzbekistan by Uzbekenergo.

12. The utility will provide office space and counterpart staff, as well as make available appropriate data and reports. The consultants will also work with the CDC, which will provide counterpart staff and make available appropriate data and reports.

13. The consulting team will procure equipment to be financed under the TA in accordance with ADB Procurement Guidelines (2007, as amended from time to time). Disbursements under the TA will be made in accordance with ADB's *Technical Assistance Disbursement Handbook*.¹ All equipment purchased under the TA will be turned over to the CDC at the end of the TA.

F. Reports

14. The consultants will prepare an inception report within 2 months, quarterly progress reports, an interim report within 6 months, draft final within 10 months, and final report within 12 months. The reports will be presented at the Energy Sector Coordinating Committee of CAREC. The report on Afghanistan connection with CAPS will be prepared within 4 months after mobilization.

15. All reports will be in English and Russian. All documents and reports will be made available in an electronic format to ADB.

¹ ADB. 2008. *Technical Assistance Disbursement Handbook*. Manila.