Technical Assistance Report

Project Number: 47266-001
Capacity Development Technical Assistance (CDTA)
December 2014

Islamic Republic of Afghanistan: Renewable Energy Development

(Financed by the Clean Energy Fund under the Clean Energy Financing Partnership Facility)

Asian Development Bank

CURRENCY EQUIVALENTS
(as of 2 December 2014)

Currency unit	–	afghani/s (AF)
AF1.00	=	$0.0172
$1.00	=	AF57.9513

ABBREVIATIONS

ADB	–	Asian Development Bank
GW	–	gigawatt
ICE	–	Inter-Ministerial Commission for Energy
MEW	–	Ministry of Energy and Water
MW	–	megawatt
TA	–	technical assistance

NOTE

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

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CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 47266-001

Project Name	Renewable Energy Development	**Department /Division**	CWRD/CWEN
Country	Afghanistan, Islamic Republic of	**Executing Agency**	Ministry of Energy and Water
Borrower	Afghanistan, Islamic Republic of		

2. Sector	**Subsector(s)**	**Financing ($ million)**
✓ Energy	Energy sector development and institutional reform	1.00
	Total	**1.00**

3. Strategic Agenda	**Subcomponents**	**Climate Change Information**	
Inclusive economic growth (IEG)	Pillar 1: Economic opportunities, including jobs, created and expanded	Climate Change impact on the Project	Low
Regional integration (RCI)	Pillar 1: Cross-border infrastructure		

4. Drivers of Change	**Components**	**Gender Equity and Mainstreaming**	
Governance and capacity development (GCD)	Institutional development Institutional systems and political economy Organizational development	No gender elements (NGE)	✓
Partnerships (PAR)	Official cofinancing Regional organizations		

5. Poverty Targeting		**Location Impact**
Project directly targets poverty	No	Not Applicable

6. TA Category: B

7. Safeguard Categorization Not Applicable

8. Financing

Modality and Sources	**Amount ($ million)**
ADB	**0.00**
None	0.00
Cofinancing	**1.00**
Clean Energy Fund - Multi-Donor	1.00
Counterpart	**0.00**
None	0.00
Total	**1.00**

9. Effective Development Cooperation

Use of country procurement systems	No
Use of country public financial management systems	No

I. INTRODUCTION

1. The technical assistance (TA) is a continuation of the successful engagement of the Asian Development Bank (ADB) in Afghanistan's energy sector. The TA is included in the country operations business plan, 2014–2015[1] and is fully aligned with the National Priority Program and the Power Sector Master Plan of the Government of Afghanistan, approved in 2013, which call for the development of the energy sector through expansion of the electricity network to reduce poverty to one-third of the total population by 2015. The TA also complements the objective of ADB's interim country partnership strategy, 2014–2015 for inclusive economic growth through the development of physical infrastructure such as power transmission, distribution, and rural electrification.[2] The project is coherent with ADB's Energy Sector Assessment, Strategy and Roadmap for Afghanistan, which identifies ADB's focus in the sector as (i) legal, regulatory, and institutional reform; (ii) rural grid-electricity supply infrastructure; and (iii) greater coordination with development partners.[3]

2. The TA aims to strengthen capacity of Renewable Energy Department under the Ministry of Energy and Water (MEW) and enhance knowledge management for increasing the share of renewable energy in Afghanistan. It will support the development of a renewable energy road map and renewable energy projects, and increase the institutional capacity to plan and implement renewable energy projects in the country. The TA builds on outputs of previous TA projects,[4] and complements other ongoing activities in Afghanistan with the assistance of ADB and other development partners.[5] The government, through the MEW, requested support to prepare projects for financing under the proposed Energy Investment Program in 2016–2017. In addition, presentations were made at the meetings of the Inter-Ministerial Commission for Energy (ICE). Consultations with government agencies and development partners were undertaken in March 2014 on the proposed scope and implementation timelines of the TA, and received government concurrence. The design and monitoring framework is in Appendix 1.

II. ISSUES

3. Afghanistan is a mountainous landlocked country at the crossroads of Central and South Asia. More than 70% of the country's 27.5 million people live in rural areas.[6] Decades of instability and conflict have constrained development, particularly with regard to energy infrastructure. In the last 5–10 years, development progress has been substantial but significant challenges remain. Afghanistan is also vulnerable to climate change and variability. Hydropower—an important domestic source of energy—is sensitive to the impacts of climate change, and the country's power infrastructure is at risk from extreme climatic events such as floods and storms.[7]

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1 ADB. 2013. *Country Operations Business Plan: Afghanistan, 2014–2015*. Manila.
2 ADB. 2014. *Country Partnership Strategy: Afghanistan, 2014–2015.* Manila.
3 ADB. 2013. *Energy Sector Assessment, Strategy and Roadmap for Afghanistan.* Manila.
4 ADB. 2010. *Technical Assistance to the Islamic Republic of Afghanistan for the Power Sector Master Plan.* Manila (TA 7637-AFG, for $1.5 million, approved on 6 November); ADB. 2012. *Technical Assistance for Empowering the Poor through Increasing Access to Energy.* Manila (TA 7512-REG, for $2 million, approved on 18 June); and ADB. 2009. *Technical Assistance for Enabling Climate Change Interventions in Central and West Asia*. Manila (TA 7274-REG, for $5.5 million, approved on 23 April).
5 The TA first appeared in the business opportunities section of ADB's website on 10 November 2014.
6 ADB. 2014. *Key Indicators for Asia and the Pacific*. Manila.
7 Islamic Republic of Afghanistan, National Environmental Protection Agency. 2013. *Initial National Communications to the United Nations Framework Convention on Climate Change*. Kabul. http://unfccc.int/resource/docs/natc/afgnc1.pdf

4. Afghanistan is a net energy and electricity importer. While the country has renewable energy and fossil fuel resources, it is only beginning to exploit them. Electricity makes up a growing portion of total energy consumption; connection rates increased from 7% in 2003 to 28% in 2011, with a peak demand of 670 megawatts (MW). Domestic installed generation capacity is 240 MW for hydropower and 220 MW for thermal power, with energy production in the range of 800–1,000 gigawatt-hours per year (mainly from hydropower in summer). The growing demand is met by electricity imports, which represented 78% of total supply in 2013. By 2032, demand is forecast to reach 3,500 MW and electricity consumption is projected to rise to 18,400 gigawatt-hours.[8] Only about 28% of the population has access to electricity; and average annual per-capita use, at 195 kilowatt-hours per person, is among the lowest in the world.[9] Even this low per-capita level of electricity access masks significant urban–rural disparities, as it is estimated that less than 10% of supplied electricity reaches rural areas.[10] Meeting this demand requires all viable import and domestic sources to be developed and corresponding transmission lines and distribution systems to be expanded, together with mini grids and off-grid systems where grids cannot be extended in the near future.

5. Afghanistan is rebuilding its energy sector with a focus on sustainable energy for its population. Energy access is a high development priority for Afghanistan and is the second priority after rule of law. Since 2001, the major focus of efforts has been on reconstruction and expansion of the national electricity grid that would also afford the possibility of power trade with Central and South Asia. However, given that the national grid is being developed almost from scratch, it is accepted that there are swathes of the country that the national grid will not be able to serve by 2020. It is also possible that supply constraints will mean that some grid-connected areas are unlikely to receive a sufficient and reliable supply.

6. Fortunately, much of the country—especially provinces that are unlikely to be served by a centralized grid—has significant renewable energy potential. Based on preliminary estimates by the National Renewable Energy Laboratory of the United States, Afghanistan's technical solar potential is more than 220 gigawatts (GW) and technical wind potential exceeds 66 GW. Given a projected 2020 peak electricity demand in the country of only 1.8 GW, harnessing just 1% of the renewable energy potential would provide significant benefits. In addition to wind and solar, Afghanistan is endowed with hydroelectric, biomass, and geothermal potential. Hydropower potential alone is estimated at 23 GW. Indigenous generation capacity is currently dominated by large hydropower projects, but there are about 2,600 micro and mini hydropower plants that could be further developed. It may be more viable for some areas to be served by local renewable energy generation than to provide grid-connected supply at subsidized tariffs that do not cover the costs of service. Afghanistan has made significant progress in renewable energy development, with more than 5,000 projects (with a total capacity of 50 MW) either completed or ongoing, mostly micro hydropower and solar.

7. The development of an enabling environment for private sector participation in the energy sector is the top priority. The country's national development strategy enshrines private sector participation—both domestic and foreign—and, accordingly, Parliament has passed a Private Investment Law in 2005. The rural electrification policy similarly encourages private sector involvement, particularly in areas that are likely to be unserved by the grid, to provide

[8] ADB. 2010. *Technical Assistance to the Islamic Republic of Afghanistan for the Power Sector Master Plan.* Manila.
[9] World Bank Fact Sheet. http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,contentMDK:21935594~pagePK:146736~piPK:146830~theSitePK:258644,00.html
[10] World Bank. 2013. *Afghanistan Partnership: Country Program Snapshot*. Washington DC (29 August).

energy to support commercial activity. The Electricity Law, which is expected to be submitted to Parliament in 2015 explicitly allows for private sector involvement in generation and the provision of electricity services. The formation of an independent electricity regulator is underway, as are guidelines for private sector electricity operators. ADB is also helping the government improve the coordination in the energy sector through secretariat support for the ICE.

8. Key renewable energy development issues in Afghanistan include (i) an absence of long-term planning, which results in a lack of policy clarity and consistency over the long term, hampering investment in and development of renewable energy; (ii) lack of coordination between authorities, resulting in long lead times and delays in project approval that affect projects' financial viability; (iii) inexperience among decision makers in the renewable energy industry who are not fully aware of the characteristics, intricacies, and benefits of renewable energy, leading to significant delays in the development and expansion of renewable projects; (iv) insufficient grid infrastructure, presenting a current and future barrier to increased generation, particularly in the areas where renewable resources are most abundant; and (v) risks associated with climate change and variability. The proposed TA interventions will help remove these barriers and catalyze the widespread adoption of renewable energy systems, building of successful experience to date.

III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

A. Impact and Outcome

9. The impact will be increased access to renewable energy in Afghanistan. The outcome will be increased readiness for renewable energy development investments, both public and private, in Afghanistan.

B. Methodology and Key Activities

10. The TA will have the following outputs:

- (i) Renewable energy road map for Afghanistan developed:
  - (a) Afghanistan-specific renewable energy framework (decision analytical tool) to assess and prioritize renewable energy opportunities (projects and technologies in specific geographic areas) established.
  - (b) Renewable energy road map developed (through application of framework) recommending how deployment may evolve by 2020 and 2035, together with estimates of the market's view of potential, and actions and resources (including land, labor, and water) required to set Afghanistan on path to achieving the deployment levels anticipated in the analysis. The road map will focus on selected renewable energy technologies and applications that have either the greatest potential to help the country meet the 2020 target in a cost-effective and sustainable way, or offer great potential for subsequent decades.
  - (c) Process for updating road map and list of opportunities documented.
  - (d) Assessment of barriers (technical, institutional, commercial, policy, regulatory, human capital, and climate) faced by public and private sectors in the renewable energy sector undertaken.
  - (e) Project development action plan, recommendations to remove barriers, and attract future interventions formulated.

(ii) Report on renewable energy resource and technology assessment in identified areas completed:
  (a) Criteria identified for selecting sites for renewable resources assessment (solar, wind, or hybrid power systems) and micro-siting criteria for mini grids or grid connected systems developed.
  (b) Site-specific resource assessments undertaken in identified priority and potential off-grid provinces where ADB financing under a proposed energy project (in 2017) could develop viable projects.[11]
  (c) Sequence of recommended tasks to be completed in diagnostic and decision-making processes compiled.
  (d) By 2016, prioritization of potential sites (off-grid provinces) and technologies (wind, solar, and diesel hybrid thereof) for grid-connected and mini-grid opportunities completed.
  (e) Prefeasibility study of three or four projects prepared for investment by development partners, including ADB.

(iii) Capacity to plan and implement renewable energy projects improved:
  (a) Focused training organized to strengthen capacities of government agencies and other stakeholders on renewable energy projects planning and implementation.
  (b) Government process for sustaining TA activities (e.g., refreshing road map and opportunity lists) institutionalized.
  (c) Workshops conducted and knowledge disseminated to private companies and the finance sector.
  (d) Workshops held on deployment of key renewable energy technology projects in Afghanistan.
  (e) Inventory undertaken of capacity needs that could be financed by an ADB project and/or by other development partners.

11. Provinces and project sites will be selected from a list developed by the government and other key development partners. The criteria for selection of final sites will comprise (i) capitals of three or four off-grid provinces with sufficient solar or wind resources potential, (ii) secure, compact locations with adequate demand, and (iii) partial availability of a mini grid. TA consultants will help develop detailed criteria, and will work closely with the United Nations security agencies and the ADB security team to identify provincial capitals that are less volatile.

12. The main assumptions are (i) the government will continue to support renewable energy development despite changes in political landscape, and (ii) the MEW does not extend the grid in the near term to the off-grid areas selected by the TA. The main risk to the project is political instability and insecurity.

C. Cost and Financing

13. The TA is estimated to cost $1,100,000, of which $1,000,000 will be financed on a grant basis by the Clean Energy Fund[12] under the Clean Energy Financing Partnership Facility and administered by ADB. The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, domestic transportation, and other in-kind contributions.

[11] ADB, KfW, German development cooperation through GIZ, the United States Agency for International Development, and the National Renewable Energy Laboratory have conducted initial renewable energy resource assessment (in solar, wind, micro hydro, and biomass). The TA will build upon these efforts.

[12] The financing partners are the governments of Australia, Norway, Spain, and Sweden.

D. Implementation Arrangements

14. The MEW will be the executing agency responsible for providing overall strategic guidance, and the Renewable Energy Department in the MEW will be the implementing agency. The project will be managed by the Energy Division of ADB's Central and West Asia Department in coordination with ADB's Afghanistan Resident Mission and with support from the Energy for All Program administered by ADB's Regional and Sustainable Development Department. Representatives from the MEW and ADB's Energy Division and Regional and Sustainable Development Department, will oversee TA design and work plan implementation, and will jointly review and endorse the TA outputs. The TA will be implemented over 2.5 years from date of TA effectiveness and is expected to be implemented from 1 January 2015 until 30 June 2017.

15. A total of about 80 person-months of consulting services (18 person-months of international consultants and 62 person-months of national consultants) will be engaged through a firm, with the possible addition of a few individual experts as needed during implementation. The consultants will have expertise in renewable energy technologies, capacity development and institutional strengthening, and renewable energy economics. They will provide hands-on training to government agencies on technical matters and will submit inception, midterm, and final reports incorporating barriers analysis, the renewable energy road map, and project feasibility studies. Lump-sum payments or output-based contracts will be considered for consulting services under the TA where possible and appropriate. The experts will be engaged using ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). The procurement of equipment will be in accordance with ADB's Procurement Guidelines (2013, as amended from time to time). Disbursements under the TA will be made in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). The outline terms of reference for consultants and outputs are in Appendix 3.

16. The TA will be monitored through regular reporting and soliciting of feedback from key stakeholders. The progress of the TA will be presented at the ICE meetings, and deliberated by the ICE working group on renewable energy on a regular basis. An inception workshop will be held within 1 month after the consultants have been mobilized to hold the brainstorming session on key sector issues and status of work undertaken by other development partners, as well as pinpoint policy gaps that need to be addressed to formulate a renewable energy road map, identify projects and technologies, and prepare documentation. Regular discussions will be held on the progress of TA with all stakeholders and development partners involved in renewable energy programs such as German development cooperation through KfW and German development cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the United States Agency for International Development, and the World Bank. The TA outputs will be disseminated to the stakeholders through workshops, reports, and public outreach.

IV. THE PRESIDENT'S DECISION

17. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of $1,000,000 to the Government of Afghanistan to be financed on a grant basis by the Clean Energy Fund under the Clean Energy Financing Partnership Facility for Renewable Energy Development, and hereby reports this action to the Board.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Increased access to renewable energy in Afghanistan	Increased electrification rate in Afghanistan from 28% in 2011 to 83% in 2032	Government statistical and census reports Country economic reports of the government, ADB, the United States Agency for International Development, and the World Bank ICE quarterly reports	**Assumption** Government will continue to support renewable electricity development despite changes in political landscape **Risk** Political instability and insecurity
Outcome Increased readiness for renewable energy development investments, both public and private, in Afghanistan	Improved capacity to mobilize investment for three or four renewable energy projects in 2015–2019	Afghanistan Energy Information Center publications MEW progress reports ICE quarterly reports	**Assumption** MEW does not carry out grid extension in the near term for the chosen off-grid areas
Outputs 1. Renewable energy road map for Afghanistan developed 2. Report on renewable energy resource and technology assessment in identified areas completed 3. Capacity to plan and implement renewable energy projects improved	By 2017, MEW endorsed the road map for adoption. By 2017, MEW endorsed the report and its recommendations. By 2017, at least 25% of staff in MEW, Renewable Energy Department, and provincial governments completed the training, of which 20% are female.	ICE quarterly reports starting May 2015 Highlights of stakeholder's consultation MEW TA progress reports ADB back-to-office reports Workshop documentation Duly filled out training and development feedback forms	**Assumption** There is strong participation by various stakeholders and/or private sector in the development of renewable energy road map and projects **Risk** Implementation may take longer than planned due to security reasons

Activities with Milestones	Inputs
1. Renewable energy road map for Afghanistan developed 1.1 Literature review, stakeholder consultation, and development of prioritization and assessment framework by April 2015 1.2 First draft of framework and process by May 2015 1.3 First draft of renewable energy road map by December 2015 1.4 Consultations and final draft of renewable energy road map by June 2016 **2. Report on renewable energy resources and technology assessment in identified areas completed** 2.1 Complete literature review by April 2015 2.2 Develop country-specific siting criteria for renewable energy installations for both grid-connected renewables and mini grids by May 2015 2.3 Design solar and/or wind resources assessment plan, procure equipment, and start measurement by June 2015 2.4 Submit draft report to ADB on renewable energy resource assessment by July 2016 2.5 Develop criteria for selection of sites by April 2015 2.6 Review potential information on projects, and prioritize and submit prefeasibility study reports for three or four projects for investment by August 2016 **3. Capacity to plan and implement renewable energy projects improved** 3.1 Assess barriers (technical, commercial, regulatory, and human capital) faced by private sector entrants in the renewable energy sector by April 2015 3.2 Complete capacity needs assessment by June 2015 3.3 Organize capacity-building workshops, seminars, and trainings by June 2016 3.4 Conduct knowledge dissemination and workshops on TA outcomes by August 2016	**Clean Energy Fund under the Clean Energy Financing Partnership Facility: $1 million** Note: The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, domestic transportation, and other in-kind contributions.

ADB = Asian Development Bank, ICE = Inter-Ministerial Commission for Energy, MEW = Ministry of Energy and Water, TA = technical assistance.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
Clean Energy Fund[a] under the Clean Energy Financing Partnership Facility	
1. Consultants	
a. Remuneration and per diem	
i. International consultants (18 person-months)	400.0
ii. National consultants (62 person-months)	250.0
b. International and local travel	50.0
c. Reports and communications[b]	25.0
2. Equipment[c]	150.0
3. Training, conferences, and workshops	25.0
4. Contingencies	100.0
Total	**1,000.0**

Note: The technical assistance (TA) is estimated to cost $1,100,000, of which contributions from the Clean Energy Fund under the Clean Energy Financing Partnership Facility are presented in the table above. The government will provide counterpart support in the form of counterpart staff, office and housing accommodation, office supplies, secretarial assistance, domestic transportation, and other in-kind contributions. The value of government contribution is estimated to account for 9% of the total TA cost.

[a] Financing partners: the governments of Australia, Norway, Spain, and Sweden. Administered by the Asian Development Bank.

[b] Includes all costs related to printing and translation from English to local language.

[c] Includes computers, other office equipment, software, equipment required for renewable energy resources assessment. The turnover or disposal will be according to Asian Development Bank guidelines.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Introduction

1. The technical assistance (TA) will require about 80 person-months of consulting services: 18 person-months of international consultant inputs and 62 person-months of national consultant services. The consultants will be hired through an international consulting firm using quality- and cost-based selection (90:10) on the basis of a full technical proposal following the consultant selection process of the Asian Development Bank (ADB). Some individual consultants will also be engaged as needed. The inputs may be provided intermittently, based on agreement between the consultants and ADB.

2. Overall, the consultants should have extensive experience and knowledge of (i) design, development, and deployment of renewable energy-based energy access projects, and energy access planning; (ii) institutional, financial, commercial, social (including gender dimensions), and climate aspects of small-scale renewable energy development in rural and remote areas, especially in mini-grid applications; (iii) renewable energy development in Afghanistan; and (iv) ADB operations, including policies, guidelines, and operational frameworks. The consultants will be expected to have extensive consultations with (i) government representatives at central, regional, and local levels; (ii) ADB's Environment, Natural Resources, and Agriculture Division of the Central and West Asia Department, and Regional and Sustainable Development Department; and (iii) other development partners, civil society, nongovernment organizations, and communities. The consultants are expected to spend a significant portion of their time conducting fieldwork. The consultants will be responsible for procuring the equipment for the TA following ADB guidelines. They will also be responsible for overseeing the detailed engineering and civil works.

B. Proposed Consultants

3. **Renewable energy specialist and team leader** (international, 10 person-months, intermittent). The team leader will be responsible for (i) overall supervision of the consulting team; (ii) timely and successful implementation of the TA, including managing the overall quality of the outputs; and (iii) coordination with the Ministry of Energy and Water (MEW), regional governments, and other counterparts including civil society and nongovernment organizations for the preparation of the renewable energy road map. The team leader should have demonstrated expertise in renewable energy planning, and a deep knowledge of renewable energy systems deployment in various countries in Asia. In the capacity of renewable energy specialist, the consultant will be responsible for (i) preparing the renewable energy road map, (ii) conducting the resource assessment of solar and wind in targeted areas, (iii) reviewing available solar and wind current reports and surveys and identifying the best technology and design for the application of mini grids, and (iv) preparing a priority list of locations for renewable energy projects. This will involve designing and supervising energy demand and supply surveys, reviewing alternate financing models and possible community-led energy access models, reviewing investment plans and engineering cost estimates, and supporting due diligence on all renewable energy projects being considered for development under the TA. The specialist should have demonstrated expertise in mini-grid energy planning, energy demand and supply estimation, least-cost and low-carbon energy deployment, and other relevant aspects of energy planning in developing countries, preferably in Afghanistan and/or other developing countries in Asia. An advanced academic qualification in engineering is preferred, as well as with regional experience in the design, erection, and commissioning of small-scale photovoltaic systems.

4. **Renewable energy economist** (international, 5 person-months; national 12 person-months). The tasks of the renewable energy economist will include preparing the renewable energy road map, identifying barriers to renewable energy investments, and conducting feasibility studies. The economist will (i) conduct financial and economic analyses (including analyses of cash flow and internal rate of return, and due diligence on the project proponents) for renewable energy generation and distribution systems identified; (ii) liaise with local and national banks, government agencies, and private sector independent power producers to evaluate the viability of local financing and/or cofinancing of future renewable energy-based rural electrification in Afghanistan in collaboration with other agencies; (iii) based on these surveys, propose suitable financing initiatives that can be deployed in the future to expand renewable energy-based rural electrification in Afghanistan; (iv) work closely with the MEW to identify barriers and policy, regulatory, and technical support needed for private sector bankable projects for renewable energy-based rural electrification; (v) calculate viable tariff and/or cost-recovery measures, including the use of subsidies to fill financing gaps and output-based aid programs; and (vi) support the team leader on the renewable energy finance-related aspects of the TA project's energy access planning task. An advanced academic qualification in finance or business administration and regional experience in the financing of renewable energy systems are preferred.

5. **Capacity development and institutional strengthening specialist** (international, 3 person-months; national, 12 person-months, intermittent). The capacity development and institutional strengthening specialist, in collaboration with the technical experts on the team, will develop capacity-building and training programs for the MEW and representatives of regional governments and agencies, covering technical and institutional management in the areas of procurement; financial management; community development; and climate, environmental, and social safeguards. These programs will be held periodically in Kabul or in the states and regions for which energy access plans will be developed under the TA. The specialist will also help design and supervise the overall capacity development program required for renewable energy development in Afghanistan, and work closely with the team leader. Academic qualifications in social science, economics, or other similar disciplines, and regional experience in development-partner-funded and community-focused development programs are preferred.

6. **Renewable energy technology specialist (wind and solar)** (2 national, 24 person-months; intermittent). The renewable energy technology specialists will work closely with other team members to develop the criteria for mini-grid site selection and prioritization, assess electricity demand for household and other productive uses, and develop and review technical design of the electricity generation and distribution systems in the feasibility studies. The specialists will (i) design, develop, and implement possible energy access applications and models for mini-grid applications; (ii) review investment plans and engineering cost estimates, and support due diligence on all solar hybrid projects being considered for development under the TA; (iii) where needed, work closely with the renewable energy specialist to upgrade resource analysis and fill in gaps; (iv) validate any engineering designs provided by the government, and complete detailed designs; (v) develop project implementation guidelines and recommendations, including scheduling and monitoring and evaluation; and (vi) support the team leader on the solar-, wind-, and hydropower-related aspects of the TA project's energy access planning task. An advanced academic qualification in mechanical or electrical engineering and regional experience in the design, erection, and commissioning of mini-grid systems are preferred.

7. **Deputy team leader** (national, 14 person-months). The deputy team leader will (i) assist the team leader in local coordination, renewable energy projects design, and organization of

capacity-building activities; (ii) help other stakeholders facilitate community mobilization, organization, and engagement in project planning; and (iii) assist in strengthening the community's overall capacity to ensure sustainability of the renewable energy installations. The deputy team leader will be an engineer with at least 10 years of experience in the energy sector in Afghanistan, preferably in project management and implementation.

C. Reporting Requirements

8. The consultants will work under the supervision and guidance of ADB and the team leader. The following outputs will be produced in English at key stages of the implementation of this TA:

(i) An inception report within 1 calendar month of TA commencement, a midterm report within 9 months of TA commencement, a draft final report in the 20th month of TA implementation, and a final report in the 23rd month of TA implementation. These reports will provide information on progress, trainings held, and key achievements of the TA.
(ii) Five hard copies of each report and three digital copies on CD-ROM submitted by the consulting team to ADB and the executing agency.
(iii) A knowledge product highlighting results of this TA to be published by ADB.
(iv) Administer the training, seminars, and surveys envisioned under the TA.
(v) Submit any other reporting tasks required under the TA or by ADB.