



Technical Assistance Report

Project Number: 44068-012
Research and Development Technical Assistance (RDТА)
June 2012

Economics of Climate Change in Central and West Asia

(Cofinanced by the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility and the Climate Change Fund)

ABBREVIATIONS

CO ₂	–	carbon dioxide
GHG	–	greenhouse gas
TA	–	technical assistance
UNFCCC	–	United Nations Framework Convention on Climate Change

TECHNICAL ASSISTANCE CLASSIFICATION

Type	–	Research and development technical assistance (RDTA)
Targeting classification	–	General intervention
Sector (subsectors)	–	Multisector (water-based natural resources management, energy sector development, transport management and policies)
Themes (subthemes)	–	Environmental sustainability (natural resources conservation, global and regional transboundary environmental concerns)
Climate change	–	Mitigation and adaptation
Location (impact)	–	National (high), urban (low), rural (low), regional (medium)
Partnership	–	Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility

NOTE

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

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I. INTRODUCTION

1. The proposed technical assistance (TA) seeks to address the lack of robust evidence on the options and costs to reduce greenhouse gas emissions (mitigation) and reduce the negative effects of climate change (adaptation) in Central and West Asia.¹ Preliminary consultations with the target countries during missions fielded in 2010–2012 indicated support for the TA. The design and monitoring framework is in Appendix 1.²

II. ISSUES

2. Climate change presents unprecedented threats to the achievement of development goals in the countries of Central and West Asia. Some of these countries—Afghanistan, the Kyrgyz Republic, and Tajikistan—are among the most vulnerable to the adverse effects of climate change, requiring significant investments in climate change adaptation to reduce risks to critical infrastructure, vulnerable communities, and ecosystems. Some other Central and West Asia countries (Azerbaijan, Kazakhstan, and Uzbekistan) are among the most carbon-intensive economies in the world, offering substantial opportunities for investments in energy efficiency and greenhouse gas (GHG) abatement.³

3. Preliminary evidence indicates that Central and West Asia countries are being hit hard by climate change.⁴ Predicted warmer temperatures, accelerated glacial melt, reduced winter snow cover and associated changes in river flows, and more frequent and intense drought and floods threaten the stable water supply for agriculture, hydropower, and human consumption—one of the major concerns in the arid and semiarid region of Central and West Asia.⁵ More frequent droughts, catastrophic flooding from glacial lake outbursts, and landslides caused by destabilization of mountain slopes will lead to a progressive increase in economic losses and risk to the population, and reduce the ability of communities to move out of poverty.⁶ These adverse effects, which will be compounded by projected population growth in the 21st century, will exacerbate underlying national socioeconomic and environmental constraints such as crumbling infrastructure, land degradation, and limited institutional capacity. Key river basins, such as the Amu Darya, Syr Darya, and Indus, are important to the economies of several countries and to the political stability of the region, as they supply water to vast expanses of agricultural land and generate most of domestic electricity in the form of hydropower. The ongoing glacial melt and reduction of snow melt are expected to exacerbate transboundary water and energy tensions in Central Asia, i.e., the clash between summer irrigation needs in downstream countries (Kazakhstan, Turkmenistan, and Uzbekistan) and winter energy needs in upstream countries (Afghanistan, the Kyrgyz Republic, and Tajikistan).

¹ The concept paper was approved by Vice-President, Operations 1 on 6 January 2012.

² The TA first appeared in the business opportunities section of ADB's website on 7 January 2012.

³ Carbon intensity is defined as GHG emissions per unit of gross domestic product (tons of carbon dioxide per \$1,000).

⁴ World Bank. 2009. *Adapting to Climate Change in Europe and Central Asia*. http://www.worldbank.org/eca/climate/ECA_CCA_Full_Report.pdf; M.L. Parry, O.F. Palutikof, P.J. van de Linden and C.E. Hanson. 2007. *Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Intergovernmental Panel on Climate Change Fourth Assessment Report*. Cambridge University Press. Cambridge, UK and New York, USA.

⁵ ADB. 2010. *Islamic Republic of Pakistan: Glacial Melt and Downstream Impacts on Indus Basin-Dependent Water Resources and Energy*. Consultant's Report. Manila (TA 6420-REG).

⁶ United Nations Development Programme. 2011. *Human Development Report*. <http://hdr.undp.org/en/reports/global/hdr2011/>

4. Central and West Asia offers significant opportunities for emission reduction investments and carbon financing. Preliminary assessments conducted to support the formulation of the climate change implementation plan of ADB's Central and West Asia Department⁷ show that Azerbaijan, Kazakhstan, Pakistan, and Uzbekistan offer mitigation opportunities involving improved clean energy (i.e., energy efficiency and renewable energy), fuel switching, more efficient industrial processes, improved waste management systems, and land restoration.⁸ Economic and population growth in these countries, coupled with GHG emissions, have increased emission rates to levels higher than those of the rest of the world. However, little information is available on the mitigation potential and the associated cost to implement effective GHG emission reduction actions in these emission-intense countries.

5. ADB has been providing assistance to Central and West Asia to adapt to the adverse effects of climate change and promote GHG emission reduction measures. For example, a TA project in Tajikistan developed a preliminary climate vulnerability assessment of communities in the Pyanj River Basin and informed the preparation of a project aimed at piloting community-based adaptation in the river basin.⁹ Another TA project in Tajikistan will build the technical capacity of a climate modeling center and a national implementing entity for climate change activities.¹⁰ A regional TA project is assessing the impacts of climate change on the runoff of the Syr Darya and Amu Darya river basins.¹¹ Another regional TA project is developing geographic information system-based maps of the solar and wind energy potential in 10 countries in Central and West Asia, supporting the Pakistan medium-term renewable energy policy, and promoting carbon finance in Pakistan and Uzbekistan.¹² A TA project on solar energy development is identifying investment opportunities in Uzbekistan.¹³ While preliminary evidence indicates that countries in Central and West Asia are highly vulnerable to climate change and offer good potential for GHG emission reduction, no assessment has been made of the economic impact of climate change at the regional, national, and sub-national levels. This information is pivotal to better understand the risks that climate variability, change, and extremes pose to the achievement of countries' development goals, and to identify adaptation and mitigation investments across the region. The information is also crucial to leverage the additional financial resources required to meet the incremental cost of climate change, and to support strategic mitigation and adaptation actions across the region. As countries in Central and West Asia possess limited institutional, technical, financial, and human capacity, they are ill-equipped to deal with the additional challenges posed by a changing climate.¹⁴

6. The proposed TA will complement current efforts by filling the knowledge gaps on economic, social, and environmentally viable climate change adaptation and mitigation options in the target countries. The TA will support the countries' readiness for leveraging public and private sector finance to address prioritized adaptation and mitigation investment needs. The TA is aligned with ADB's Strategy 2020 priorities on environmentally sustainable growth, including

⁷ ADB. 2009. *Climate Change Implementation Plan 2009–2012, Central and West Asia Department*. Manila.

⁸ World Resources Institute. *GHG Emissions by Sector in 2005, Climate Analysis Indicator Tool*. <http://cait.wri.org/cait.php?page=sectors>

⁹ ADB. 2011. *Technical Assistance to the Republic of Tajikistan for Climate Resilience for Natural Resources Investments*. Manila.

¹⁰ ADB. 2012. *Technical Assistance to the Republic of Tajikistan for Building Capacity for Climate Resilience*. Manila.

¹¹ ADB. 2011. *Technical Assistance for Water and Adaptation Interventions in Central and West Asia*. Manila.

¹² ADB. 2009. *Technical Assistance for Enabling Climate Change Interventions in Central and West Asia*. Manila.

¹³ ADB. 2011. *Technical Assistance to the Republic of Uzbekistan for Solar Energy Development*. Manila.

¹⁴ United Nations Framework Convention on Climate Change. Non-Annex I National Communications. http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php. Most countries in Central and West Asia report their lack of technical, institutional, and financial capacity as barriers to understand climate change, devise adequate coping strategies, and incorporate climate change into planning.

addressing the impact of climate change and supporting developing member countries in moving their economies onto low-carbon growth paths by improving energy efficiency and expanding the use of clean energy sources.¹⁵ The TA is also aligned with the target countries' national priorities as identified in country partnership strategies and development strategies. Extensive interdepartmental discussions took place to define the scope and methodology of the TA, and to learn from other departments' experience in conducting similar studies.

III. THE PROPOSED TECHNICAL ASSISTANCE

7. This TA will identify priority investments for climate resilience and low-carbon growth. The TA will have two components: (i) adaptation to climate change will assess the costs and benefits of implementing adaptation measures to reduce the adverse effects of climate change on energy and water resources in the most vulnerable countries, i.e., Afghanistan, the Kyrgyz Republic, and Tajikistan; and (ii) mitigation of climate change will assess the costs and benefits of GHG emission reduction measures and formulate low-carbon growth investment proposals for energy and transport in the most carbon-intensive countries in the region, i.e., Azerbaijan, Kazakhstan, and Uzbekistan.

A. Impact and Outcome

8. The impact will be climate change actions implemented in the target countries. The outcome will be a better understanding of the cost of climate change in the target countries.

B. Methodology and Key Activities

9. Each country team will tailor the methodology to the local context, while maintaining a basic standardized approach to be used across the target countries. Activities will build on national communications; the fourth assessment report of the Intergovernmental Panel on Climate Change; and work carried out by governments, international organizations, academics, and nongovernment community-based organizations.

10. **Output 1.** The cost of climate change mitigation in energy and transport will be estimated in Azerbaijan, Kazakhstan, and Uzbekistan. Output 1 will assess the cost of mitigation measures and the deployment of clean energy technologies, i.e., how much it would cost to reduce GHG emissions using cost-effective clean energy technologies in the target countries under different emission scenarios. Output 1 will also assess the policy and measures needed for low-carbon growth, including market-based mechanisms, energy price setting, carbon taxation, subsidy removal, and urban planning. Through country workshops, consultation, and surveys, energy and transport emissions data will be gathered and a GHG mitigation analysis methodology defined. Output 1 will (i) develop the countries' GHG baselines and projections for two time periods up to 2050; (ii) identify GHG abatement options and targets with the use of marginal abatement cost curve analysis; and (iii) identify gaps and needs in climate policies and plans. A cost-benefit analysis of mitigation technologies and policies will be performed, including co-benefits in terms of energy security, competitiveness, and local environmental quality, to identify low-carbon growth priorities in each country. Output 1 will be supported by a capacity development program aimed at training decision makers in economic analysis of low-carbon growth measures and policy, and strengthening national systems for GHG emission monitoring, verification, and reporting.

¹⁵ ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

11. **Output 2.** Climate change mitigation investment opportunities will be identified in Azerbaijan, Kazakhstan, and Uzbekistan. Output 2 will formulate nationally appropriate mitigation actions for each country, with priority climate mitigation policies and measures in energy and transport. Options to ensure access of women and other vulnerable groups to clean energy and other mitigation measures will be considered. Climate mitigation investment proposals will be formulated in consultation with national and local stakeholders. Criteria for proposal selection will include GHG abatement potential, alignment with national development priorities, high sector demonstration value, replication and scaling-up potential, and cost effectiveness.

12. **Output 3.** The cost of climate change adaptation will be estimated for Afghanistan, the Kyrgyz Republic, and Tajikistan. Output 3 will estimate the costs and benefits of climate change adaptation policies and technologies in energy and water resources, i.e., by how much the benefit of adaptation (avoided losses) exceeds the cost incurred. Climate change scenarios for temperature, precipitation (rain and snow), climate-induced extreme events, and other climatic parameters will be developed in Afghanistan and the Kyrgyz Republic for different time periods up to 2100 under different GHG emission scenarios to identify the likelihood of exceeding manageable thresholds. The impacts of climate change on energy and water resources will be assessed and adaptation measures identified in consultation with government and nongovernment stakeholders. The impacts of climate change on vulnerable groups such as women and the youth will be assessed. Priority adaptation measures will be identified through cost-benefit analysis based on an integrated economic assessment combined with consultations and field assessments. Adaptation measures will consider different systems such as cities and river basins, as well as address the vulnerability of groups such as women and the youth. In Afghanistan and the Kyrgyz Republic, output 3 will be supported by a capacity development program aimed at: (i) training decision makers in climate scenario development, economic analysis of adaptation technologies, and policy development; and (ii) strengthening national systems for climate resilience monitoring and reporting. In Tajikistan, output 3 will focus on the economic assessment of adaptation measures and draw on ongoing work on climate scenario development and impact assessment (footnote 10).

13. **Output 4.** Climate change adaptation investment opportunities will be identified in Afghanistan, the Kyrgyz Republic, and Tajikistan. Output 4 will formulate national adaptation plans in each country with priority investments, policy needs, and financing options. Adaptation investment proposals in water resources and energy will be developed.

C. Cost and Financing

14. The TA is estimated to cost \$3,250,000 equivalent, of which (i) \$1,250,000 equivalent will be financed on a grant basis by the Climate Change Fund,¹⁶ and (ii) \$2,000,000 will be financed on a grant basis by the Asian Clean Energy Fund¹⁷ under the Clean Energy Financing Partnership Facility and administered by ADB. The cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

15. The TA will be implemented over 25 months, from December 2012 to December 2014. ADB will be the executing agency. The Central and West Asia Department will implement the

¹⁶ Established by ADB. Outputs 3 and 4 (adaptation component) will be financed by the Climate Change Fund.

¹⁷ Established by the Government of Japan. Outputs 1 and 2 (mitigation component) will be financed by the Asian Clean Energy Fund.

TA in coordination with government counterparts, the Regional and Sustainable Development Department, and the Economics and Research Department. Government counterparts will be the ministries of economic development of the target countries. Since the TA requires new areas of expertise and presents a high level of complexity, a quality-based selection method and full technical proposal will be used to engage consultants. The consultants will be engaged by ADB in accordance with the Guidelines on the Use of Consultants (2010, as amended from time to time). Disbursements will be made in accordance with the *Technical Assistance Disbursement Handbook* (2010, as amended from time to time). Procurement of non-consulting inputs, including equipment, will be undertaken in accordance with ADB's *Procurement Guidelines* (2010, as amended from time to time).

16. ADB will recruit consulting firm(s) to provide 68.25 person-months of international consulting services (30.00 person-months for the adaptation component and 38.25 person-months for the mitigation component), and 173.50 person-months of national consulting services (89.50 for the adaptation component and 84.00 for the mitigation component). The consultants will have expertise in (i) climate change modeling; (ii) climate impact assessment; (iii) climate change economics; (iv) communications, workshop organization, and capacity building; (v) GHG emission projections; (vi) marginal abatement cost curves; (vii) energy, transport, and water resources management; and (viii) finance and investment. The outline terms of reference for consulting services is in Appendix 3.

17. A steering committee will be set up to guide TA implementation and ensure consistency in the methodology across the target countries and with other ADB studies on the economics of climate change. The committee will comprise representatives from the Central and West Asia Department, the Economics and Research Department, the Regional and Sustainable Development Department, and government focal points. No activities under the TA will begin or be financed in the territory of a target country until a no-objection letter has been obtained from the government of the country concerned.

18. Knowledge sharing through national and regional workshops will take place during TA implementation to define the methodology for climate scenario development, impact assessment, and GHG baselines, and to strengthen climate change mitigation and adaptation practices and awareness among stakeholders, including civil society and highly vulnerable groups such as women and the poor. Knowledge products will be disseminated at international conferences.

IV. THE PRESIDENT'S RECOMMENDATION AND DECISION

19. The President recommends that the Board approve ADB administering a portion of technical assistance not exceeding the equivalent of \$2,000,000 for the Economics of Climate Change in Central and West Asia, to be financed on a grant basis by the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility. If the Board approves ADB administering the technical assistance, the President, acting under the authority delegated by the Board, will approve ADB providing the balance of the technical assistance not exceeding the equivalent of \$1,250,000 on a grant basis for the Economics of Climate Change in Central and West Asia.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
Impact Climate change actions are implemented in the target countries.	CO ₂ equivalent per capita reduced by 5% by 2020 (2010 baseline: 5.2 tCO ₂ e/capita in Azerbaijan, 14.5 tCO ₂ /capita in Kazakhstan and 4.42 tCO ₂ e/capita in Uzbekistan) Vulnerability index increased by 5% by 2020 (2010 baseline: 0.627 in Afghanistan, 0.263 in the Kyrgyz Republic and 0.329 in Tajikistan)	National GHG inventories Global Adaptation Institute statistics	Assumption Policy and decision makers consider climate change a priority issue. Risk Adverse effects of climate change intensify.
Outcome The cost of climate change in the target countries is better understood.	Cost of climate change adaptation reported in at least one national communication to the UNFCCC by 2015 Cost of climate change mitigation reported in at least one national communication to the UNFCCC by 2015	National communication to the UNFCCC National communication to the UNFCCC	Assumption Governments are supportive of climate change programs. Risk Government policies and cooperation of participating countries change.
Outputs 1. The cost of climate change mitigation is estimated in Azerbaijan, Kazakhstan, and Uzbekistan. 2. Climate change mitigation investment opportunities are identified in Azerbaijan, Kazakhstan, and Uzbekistan. 3. The cost of climate change adaptation is estimated in Afghanistan, the Kyrgyz Republic, and Tajikistan.	National reports on the economics of climate change mitigation endorsed by Azerbaijan, Kazakhstan, and Uzbekistan by 2014 Appropriate national mitigation actions formulated for Azerbaijan, Kazakhstan, and Uzbekistan by 2014 60 officials trained on GHG measuring and monitoring, of which 18 (30%) are women (2011 baseline: 0%) Three climate change mitigation investment proposals formulated by 2014 Afghanistan, the Kyrgyz Republic, and Tajikistan endorse national reports on the economics of climate change adaptation by 2014	National reports on economics of climate change mitigation National mitigation strategy documents Workshop reports Concept notes National reports on economics of climate change adaptation	Assumptions Governments and national stakeholders provide relevant data and information. Governments support the introduction of new incentives. Stakeholders participate in consultations and national expert workshops. Risk Good quality data is not available in some target countries.

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
4. Climate change adaptation investment opportunities are identified in Afghanistan, the Kyrgyz Republic, and Tajikistan.	National adaptation plans formulated for Afghanistan, the Kyrgyz Republic, and Tajikistan by 2014	National adaptation plan documents	
	60 officials trained on climate risk management, of which 18 (30%) are women (2011 baseline: 0%)	Concept notes	
	Three climate change adaptation project proposals formulated by 2014		
Activities with Milestones		Inputs	
1. Output 1: The cost of climate change mitigation is estimated in Azerbaijan, Kazakhstan, and Uzbekistan.		Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility: \$2,000,000	
1.1 Review national mitigation policies and measures (year 1)			
1.2 Develop stakeholder engagement and communication plan (year 1)			
1.3 Conduct three national and one regional inception workshops (year 1)			
1.4 Define methodology for mitigation analysis			
1.5 Establish GHG emission baselines (year 1)			
1.6 Project GHG emissions up to 2050 (year 1)			
1.7 Develop GHG marginal abatement cost curves (year 1)			
1.8 Estimate cost and benefits of mitigation options (year 1)			
1.9 Conduct three national and one regional interim workshop (year 2)			
1.10 Identify priority mitigation measures for energy and transport in Azerbaijan, Kazakhstan, and Uzbekistan (year 1)			
1.11 Produce knowledge products on study's objectives, methodologies, and findings (years 1 and 2)			
1.12 Produce country reports on the economics of climate change mitigation for Azerbaijan, Kazakhstan, and Uzbekistan (year 2)			
2. Output 2: Climate change mitigation investment opportunities are identified in Azerbaijan, Kazakhstan, and Uzbekistan.			
2.1 Conduct consultations with stakeholders from energy, transport, and finance sectors and capital markets (year 2)			
2.2 Identify market barriers and opportunities for mitigation investments (year 2)			
2.3 Support formulation of nationally appropriate mitigation actions in Azerbaijan, Kazakhstan, and Uzbekistan (year 2)			
2.4 Formulate three investment proposals (year 2)			
2.5 Conduct final national and regional workshops (year 2)			
2.6 Disseminate knowledge products on the study's findings at the 20th conference of the parties to the UNFCCC and other international conferences (years 1 and 2)			
3. Output 3: The cost of climate change adaptation is estimated in Afghanistan, the Kyrgyz Republic, and Tajikistan.			
3.1 Review national adaptation policies and measures (year 1)			
3.2 Develop stakeholder engagement and communication plan (year 1)			
3.3 Conduct three national and one regional inception workshops (year 1)			

Activities with Milestones	Inputs
<ul style="list-style-type: none"> 3.4 Define methodology for adaptation analysis (year 1) 3.5 Develop climate change scenarios up to 2100 (year 1) 3.6 Assess observed and projected climate-induced extreme events 3.7 Assess observed and projected climate change impacts on water resources and energy (year 1) 3.8 Estimate the cost of projected impacts (year 1) 3.9 Identify adaptation options under different climate change scenarios (year 1) 3.10 Estimate cost and benefit of adaptation options (year 1) 3.11 Conduct three national and one regional interim workshops (year 2) 3.12 Identify priority adaptation measures in Afghanistan, the Kyrgyz Republic, and Tajikistan (year 1) 3.13 Produce knowledge products on the study's objectives, methodologies, and findings (years 1 and 2) 3.14 Produce country reports on the economics of climate change adaptation for Afghanistan, the Kyrgyz Republic, and Tajikistan (year 2) 3.15 Produce national adaptation plans for Afghanistan, the Kyrgyz Republic, and Tajikistan (year 2) 4. Output 4: Climate change adaptation investment opportunities are identified in Afghanistan, the Kyrgyz Republic, and Tajikistan. 4.1 Conduct consultations with stakeholders from energy and water resource sectors (year 1) 4.2 Identify market barriers and opportunities for adaptation investments (year 2) 4.3 Formulate three investment proposals (year 2) 4.4 Conduct final workshops 4.5 Disseminate the knowledge products on the study's findings at the 20th conference of the parties to the UNFCCC and other international conferences (years 1 and 2) 	

CO₂ = carbon dioxide, GHG = greenhouse gas, UNFCCC = United Nations Framework Convention on Climate Change.

Source: Asian Development Bank estimates.

COST ESTIMATES AND FINANCING PLAN (\$'000)

Item	Total Cost
A. Asian Clean Energy Fund^a under the Clean Energy Financing Partnership Facility	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	765.00
ii. National consultants	252.00
b. International and local travel	127.70
c. Reports and communications	148.70
2. Equipment ^b	96.60
3. Training, seminars and conferences ^c	226.00
4. Surveys ^d	200.00
5. Miscellaneous administration and support costs ^e	50.00
6. Contingencies	134.00
Subtotal (A)	2,000.00
B. Asian Development Bank^f	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	556.00
ii. National consultants	268.50
b. International and local travel	57.00
c. Reports and communications	15.90
2. Equipment ^b	49.50
3. Training, seminars, and conferences ^g	203.00
4. Surveys ^d	20.00
5. Miscellaneous administration and support costs ^e	15.60
6. Contingencies	64.50
Subtotal (B)	1,250.00
Total	3,250.00

^a Established by the Government of Japan and administered by the Asian Development Bank. Outputs 1 and 2 (mitigation component) will be financed by the Asian Clean Energy Fund.

^b Equipment includes dedicated weather and climate models, software, hardware, computers, servers, videoconference facility, photocopier, printers, digital camera, scanners, and other equipment. The equipment will be handed over to the government at TA completion.

^c Training, seminars, and conferences are geared toward improving the capacity of the target countries to conduct economic analysis, greenhouse gas emissions monitoring and reporting, and mitigation options appraisal.

^d Surveys include collection of hydrometeorological and socioeconomic data, and sector-based assessments.

^e Miscellaneous administration costs include leased vehicles and translation costs.

^f Financed by the Climate Change Fund. Outputs 3 and 4 (adaptation component) will be financed by the Climate Change Fund.

^g Training, seminars, and conferences are geared toward improving the capacity of the target countries to conduct vulnerability and impact assessment, economic analysis, and adaptation options appraisal.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Introduction

1. A team of consultants will be engaged through consulting firm(s) to provide 68.25 person-months of international consulting services (30.00 person-months for the adaptation component and 38.25 person-months for the mitigation component), and 173.50 person-months of national consulting services (89.50 for the adaptation component and 84.00 for the mitigation component). The consultants will have expertise in (i) climate change modeling; (ii) climate change impact assessment; (iii) climate change economics; (iv) communications, workshop organization, and capacity building; (v) greenhouse gas (GHG) emission projections; (vi) marginal abatement cost curves; (vii) energy, transport, and water resources management; and (viii) finance and investment.

B. Climate Change Adaptation Component

1. International Consultants

2. **Climate change adaptation specialist and team leader** (8 person-months). The team leader will be responsible for the delivery of the outputs of the TA adaptation component. The team leader will

- (i) lead the consultation and dialogue for the formulation of national adaptation plans of action and the prioritization of climate change adaptation policy and measures;
- (ii) identify priority investment opportunities on climate change adaptation and formulate investment proposals, including implementation arrangements and financial plans;
- (iii) develop and carry out a capacity development program to ensure knowledge transfer and the creation of a national skills pool for climate change modeling, impact assessment, and formulation of adaptation options; and
- (iv) ensure the accuracy and quality of knowledge products and reports prepared by the team members; and prepare the inception, interim, and final reports, which will include the summary of the consultations and modeling results.

3. **Climate change scenarios specialist** (6 person-months). The specialist will be responsible for the development of high-resolution climate scenarios. The specialist will

- (i) define a methodology for the development of climate scenarios, including assumptions under different scenarios and treatment of uncertainties;
- (ii) develop national climate change scenarios for Afghanistan, the Kyrgyz Republic, and Tajikistan, detailing changes in temperature, precipitation, extreme events, and other climatic factors by 2030, 2050, 2080, and 2100;
- (iii) prepare reports and knowledge products, and present results at the regional and national consultation workshops; and
- (iv) assess technical gaps in the target countries' hydrometeorological services, and undertake a program of training and capacity building on climate modeling and scenario development.

4. **Climate impact assessment and water resources specialist** (4 person-months). The specialist will be responsible for the development of the climate change impact assessment of water resources and the formulation of adaptation options. The specialist will

- (i) develop the integrated climate change impact assessment of water resources, including an analysis of the impacts of climate variability and change on the water balance for irrigation and river basin runoff, consequences for crop production, availability of water in cities, and implications for competing water uses at the river basin and national levels, taking into consideration highly vulnerable groups such as women and youth;
- (ii) identify adaptation policies and measures aimed at reducing the adverse effects of climate change on the water resources in the target countries, and contribute to the inclusion of those measures in the countries' national adaptation actions;
- (iii) support the formulation of investment proposals;
- (iv) assess technical gaps in key government agencies and perform a program of training and capacity building on integrated impact assessment; and
- (v) carry out sensitivity analysis on key modeling assumptions and indicate the confidence intervals of the results.

5. **Climate impact assessment and energy specialist** (4 person-months). The specialist will contribute to the development of the climate change impact assessment of the energy sector and the formulation of adaptation options. The specialist will

- (i) develop the integrated climate impact assessment of the energy sector, including an analysis of the impacts of climate variability and change on energy production and highly vulnerable groups;
- (ii) support the formulation of investment proposals;
- (iii) identify adaptation policies and measures that can reduce the adverse effects of climate change on the energy sector in the target countries and ensure the inclusion of those measures in the countries' national adaptation actions; and
- (iv) carry out sensitivity analysis on key modeling assumptions and indicate the confidence intervals of the results.

6. **Climate change economist** (8 person-months). The economist will carry out economic modeling and an assessment of the climate change impact and adaptation options across sectors. The economist will

- (i) conduct economic modeling for Afghanistan, the Kyrgyz Republic, and Tajikistan covering energy and water resources toward 2100;
- (ii) assess the costs and benefits of adaptation measures by country and sector using economic modeling techniques;
- (iii) conduct consultations to complement the economic modeling with experience of implementing adaptation on the ground;
- (iv) rank adaptation options;
- (v) contribute to reporting, workshops, and knowledge products; and
- (vi) carry out a capacity development program on economic assessment.

2. **National Consultants from Afghanistan, the Kyrgyz Republic, and Tajikistan**

7. **Climate change specialists and national team leaders** (one from each target country, 17 person-months in total). The national team leaders will support the activities under the TA and coordinate the consultations with national stakeholders. The team leaders will

- (i) review relevant studies, including work carried out by governments, international institutions, academic institutions, and nongovernment organizations;
- (ii) collect required national meteorological and hydrological data;
- (iii) coordinate and facilitate national consultations and participate at the regional consultations, including the training workshops;

- (iv) facilitate the formulation of the country-specific adaptation action plans; and
- (v) coordinate the development of investment concepts for adaptation measures identified during country consultations.

8. **Climate change modelers** (one from Afghanistan and one from the Kyrgyz Republic, 14.5 person-months in total). The modelers will support the collection of hydrometeorological data and the development of climate scenarios and integrated impact assessments.

9. **Research analysts** (one from Afghanistan and one from the Kyrgyz Republic, 3 person-months in total). The analysts will

- (i) review studies, including work carried out by governments, international institutions, academic institutions, and nongovernment organizations;
- (ii) provide inputs and assist the national team leader in preparing and finalizing the country reports;
- (iii) gather data and maintain all technical databases for the countries; and
- (iv) contribute to the organization of national and regional workshops.

10. **Water specialists** (one from Afghanistan and one from the Kyrgyz Republic, 17.75 person-months in total). The specialists will

- (i) review studies on climate change impacts, adaptation options, and water policies of their countries;
- (ii) prepare a report on climate change and the water resources of the country;
- (iii) identify appropriate robust adaptation measures at the country level for the development of an action plan;
- (iv) provide inputs for the development of investment concepts for adaptation measures for the water sector; and
- (v) provide inputs to the preparation of the country reports.

11. **Energy specialists** (one from Afghanistan and one from the Kyrgyz Republic, 17.75 person-months in total). The specialists will:

- (i) review current and existing studies on climate change impacts, adaptation options, and the energy policies of their countries;
- (ii) prepare a report on climate change and energy for the country;
- (iii) identify robust adaptation measures at the country level for the development of an action plan;
- (iv) provide inputs for the development of investment concepts for adaptation measures for the energy sector; and
- (v) provide inputs to the preparation of the country reports.

12. **Economists** (one from each target country, 11.5 person-months in total)

The economists will support cost–benefit assessments of the identified adaptation measures through economic modeling, the use of a participatory approach, and field assessment.

13. **Communications and participatory approach specialists** (one from each target country, 8 person-months in total). The specialists will conduct stakeholder mapping and develop a communications strategy. The specialists will support the consultations with national stakeholders.

C. Climate Change Mitigation Component

1. International Consultants

14. **Climate change mitigation specialist and team leader** (12.75 person-months). The team leader will:

- (i) ensure timely delivery of all mitigation outputs including the development of marginal abatement cost curves, cost–benefit analyses, mitigation investment concept notes, and nationally appropriate mitigation actions;
- (ii) lead consultations with national government and nongovernment stakeholders; national and regional climate change workshops; and capacity building activities on GHG inventory, assessments of climate change mitigation baseline and mitigation scenarios, and GHG monitoring, reporting, and verification plans;
- (iii) formulate low-carbon development investment concept notes;
- (iv) identify policy gaps and needs, including market-based mechanisms, energy price-setting, carbon taxation, subsidy removal, and urban planning; and
- (v) report and prepare knowledge products.

15. **Energy and transport specialist** (13.5 person-months). The specialist will take the lead in assessing energy and transport issues in support of the economics of climate change project. The specialist will:

- (i) contribute to the development of business-as-usual and low-carbon energy and transport emission scenarios based on technological, financial, and socioeconomic policy assumptions using key macroeconomic variables, appropriate discount rates, and other relevant data and information gathered from the countries;
- (ii) identify viable GHG abatement options and emission reduction targets in each country;
- (iii) present the results at national workshops and regional events;
- (iv) formulate investment proposals based on the priority mitigation technologies and policies; and
- (v) contribute to consultations, workshops, capacity building, and reporting activities.

16. **Investment specialist for mitigation** (6 person-months). The specialist will:

- (i) evaluate the target countries' investment policies, programs, plans, and strategies to identify mitigation investment development gaps and barriers, and synergies and opportunities in the public and private sectors;
- (ii) consult with public and private sector stakeholders to assess potential investors in low-carbon technologies;
- (iii) formulate recommendations to strengthen the policy framework to promote public and private low-carbon technology investments and facilitate their deployment in the target countries;
- (iv) support the formulation of mitigation investment proposals that can be replicated, scaled up, and aligned with the country's development plans;
- (v) participate in national and regional consultations, workshops, and other capacity building activities to promote mitigation investment opportunities in the country; and
- (vi) provide investment guidance in support of formulation of nationally appropriate mitigation actions.

17. **Economist** (6 person-months). The economist will be responsible for developing cost–benefit analyses of climate mitigation options and the capacity development program on economic assessment. The economist will:

- (i) conduct cost–benefit analyses of the mitigation measures;
- (ii) prioritize mitigation options for energy and transport;
- (iii) assess different packages of climate policies and measures;
- (iv) develop key economic indicators to monitor the economic consequences of the different packages of mitigation policies and measures; and
- (v) support the formulation of nationally appropriate mitigation actions, national consultations, and capacity development activities.

2. National Consultants from Azerbaijan, Kazakhstan, and Uzbekistan

18. **Climate change mitigation specialists** (one from each target country, 11 person-months each, 33 person-months in total). The specialists will take the lead in developing nationally appropriate mitigation actions, and undertake data and information gathering and analyses for climate change mitigation in support of the TA. The specialists will prepare country-level climate change reports, including the historic and current trends, policy interventions including sector-specific policy interventions, and pending policy legislation and recommendation.

19. **Energy and transport specialists** (one from each target country, 11 person-months each, 33 person-months in total). The specialists will undertake data and information gathering and analyses for the energy-transport sectors in support of the TA. The specialists will review energy and transport policy and legislation, produce country-level reports on the energy–transport nexus and contribute to the formulation of investment proposals.

20. **Mitigation investment specialists** (one from each target country, 6 person-months each, 18 person-months in total). The specialists will collect data and review national policies on climate mitigation and clean energy investment, prepare country-level reports on barriers to public and private sector investments in low carbon technologies, and provide technical support for the formulation of nationally appropriate mitigation actions, investment concepts, and reports.