



Technical Assistance

TAR: AFG 37085

Technical Assistance to the Islamic Republic of Afghanistan for Preparing the Natural Gas Development Project

October 2005

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 30 September 2005)

Currency Unit	–	afghani/s (AF)
AF1.00	=	\$0.0205
\$1.00	=	AF48.87

ABBREVIATIONS

ADB	–	Asian Development Bank
MMI	–	Ministry of Mines and Industries
TA	–	technical assistance

WEIGHTS AND MEASURES

bm ³	–	billion cubic meters
m ³	–	cubic meters
MW	–	megawatt

TECHNICAL ASSISTANCE CLASSIFICATION

Targeting Classification	–	General intervention
Sector	–	Energy
Subsector	–	Energy sector development
Themes	–	Sustainable economic growth, environmental sustainability, private sector development
Subthemes	–	Fostering physical infrastructure development, cleaner industrial (energy) production, public-private partnerships

NOTES

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

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I. INTRODUCTION

1. In response to the Government of Afghanistan's request, a fact-finding mission from the Asian Development Bank (ADB) visited Afghanistan on 5–10 July 2005 to formulate the project preparatory technical assistance (TA)¹ for upstream natural gas development. The TA is included in the 2005 Country and Strategy Program for Afghanistan, and the ensuing loan project is proposed for approval in 2007 or 2008. The mission held discussions with the Ministry of Mines and Industries (MMI) and other donor agencies. An understanding was reached with the Government on the rationale, objectives, scope, implementation arrangements, terms of reference, and cost estimates of a project preparatory TA for the proposed Natural Gas Development Project (the Project). The preliminary project design and monitoring framework is in Appendix 1.

II. ISSUES

2. Afghanistan has one of the lowest rates of per capita energy consumption in the world. More than 85% of primary energy consumption is in the form of fuelwood, animal dung, and agricultural waste, with the balance supplied by petroleum products, natural gas, coal, and hydropower. Fuelwood accounts for about 75% of total energy supply, constituting the basic source of energy for cooking and heating in rural areas, where the majority of the population lives. However, this has negative environmental and ecological impacts, given the country's limited forest resources. Commercial energy production, which accounts for more than 50% of total energy consumption, is dominated by petroleum products. Hydropower is underdeveloped² and existing electricity purchase agreements with neighboring countries are renewed on an annual or biennial basis, with no long-term guarantee of supply.

3. Domestic consumption of natural gas has remained low, as new facilities for gas production and distribution have not been extended beyond the network constructed in the 1970s, which has fallen into disrepair following years of conflict. As a result, natural gas is not supplied to most of the energy demand centers. The limited gas infrastructure serves less than 300,000 people. Gas production, transmission, and distribution systems are in urgent need of rehabilitation. About 30% of gas production is lost to leakage and theft. Gas leakage is a revenue loss and major safety hazard. Gas theft—via illegal taps on the pipeline system—is believed to be significant. The main domestic natural gas consumers are a fertilizer plant; gas-fired thermal power plant with a total capacity of 48 megawatts (MW) at the fertilizer factory; commercial sector (bakeries, textile factory, food processing plant, etc.); and household consumers (for heating and cooking). Gas production in the first 6 months of 2005 averaged 500,000 cubic meters per day (m³/day), about one-fourth the level of production in the 1980s. Gas supply to the fertilizer plant is about 300,000 m³/day—the power plant consumes about 130,000 m³/day and about 170,000 m³/day is supplied to commercial and household consumers.

4. The Government has given high priority to the rehabilitation and development of natural gas as a primary domestic energy source, so that a higher proportion of Afghanistan's primary energy requirements can be met by natural gas, and dependence on imported electricity and petroleum products can be reduced. Short-term estimates of proven recoverable gas reserves from existing fields range from 6–8 billion cubic meters (bm³). Identified but undeveloped fields

¹ The TA first appeared in *ADB Business Opportunities* (internet edition) on 23 February 2005.

² Potential hydropower development will be addressed through a separate TA to be approved in 2005, leading to a possible 2007 loan for a Hydropower and Transmission Project.

contain probable reserves of about 20 bm^3 . Potential reserves from additional prospective areas, not yet tested by drilling, are estimated to be as high as 250 bm^3 . Recovery, reconstruction, and longer-term development will require new investment estimated at more than \$500 million. This scale of investment will require substantial private sector participation.

5. The Government's operational strategy for the energy sector is aimed at promoting economic growth by removing impediments to the modernization and reconstruction program—in particular, policy, financial, regulatory, and institutional constraints. The Government plans to open up the energy sector to private participation—in particular, oil and gas exploration, petroleum imports and marketing, and the mining sector. There is a need to (i) establish separate policy and regulatory functions; (ii) undertake sector restructuring; and (iii) improve operations, maintenance, and safety standards. It will, however, take time to formulate new policy frameworks, modify legislation and regulations, achieve financial sustainability, and reorganize the sectors.

6. Long-term sustainability requires promoting development of energy resources on a least-cost basis in an environmentally sound and socially acceptable way. Afghanistan's natural gas, hydropower, and coal could be utilized economically, and estimates suggest that all the country's energy needs could be met from domestic resources.³ Given the extreme winter conditions, the heating load is substantial. An expanded natural gas grid could meet most urban and rural energy needs and would assist in reducing environmental degradation caused by excessive harvesting of limited firewood resources.

7. The oil, gas, coal, and power subsectors are controlled by the Government, which acts as owner, operator, regulator, and policy maker. The line ministries with specific responsibilities for energy and hydrocarbon resources are MMI (oil exploration, natural gas, coal, and other mining), Ministry of Energy and Water (electric power and water supplies), and Ministry of Commerce (oil imports and distribution).

8. MMI is the Government's administrative arm for the petroleum, natural gas, and coal subsectors, and is responsible for sector development and coordination. MMI's Department of Oil and Gas undertakes geological surveys and exploration of oil and gas. Raisat-e-Tasadi (Afghan Gas) is responsible for production, transmission, and distribution of natural gas. Other major departments and enterprises reporting to MMI in the energy sector are the Department of Mines Affairs, Department of Geological Survey and Mineral Resources, Planning Department, Technical Review Department, Research Institute, Private Sector Department, Geo Engineering and Hydrology Enterprise, Mine Exploitation Enterprise, and North Coal Enterprise. The Department of General Petroleum Products under the Ministry of Commerce is responsible for import, storage, and distribution of petroleum products in Afghanistan.

9. The key issues in the natural gas sector are the following:

- (i) Strengthening the capacity of the key institutions to support sector rehabilitation and reconstruction.
- (ii) Separating policy making, regulatory, and operations functions.

³ If estimates of potential reserves are correct, the natural gas transmission system can eventually be extended to Kabul and other cities to meet industrial, commercial, and household energy requirements predicted by year 2025. Substantial investment and lead time of 5 years or more would be required to establish the gas reserves and production rates needed to make such a pipeline feasible.

- (iii) Establishing an efficient policy and regulatory framework to facilitate future private sector investment in oil and gas exploration and development.
- (iv) Increasing government revenues by improving overall system efficiency, eliminating production and transmission losses, phasing out price subsidies, and improving payment collection by gas and power utilities.
- (v) Developing policy on interregional energy trade among neighboring countries to facilitate import and export of natural gas through a transmission network.
- (vi) Creating institutional capacity for negotiating and monitoring investments in oil and gas exploration and development.
- (vii) Establishing appropriate codes and standards for the oil and gas industry, and preparing enforcement and monitoring procedures.

III. THE TECHNICAL ASSISTANCE

A. Impact and Outcome

10. The purpose of the TA is to design and prepare a project that will expand natural gas production and further develop a commercial domestic natural gas market. The ensuing project will support government investment and private sector participation in a 5–10 year development program. The TA will define an investment program for development of natural gas reserves in known fields. Potential for private sector participation under production sharing contracts or other business models will be evaluated. The ensuing project is expected to include the following components: (i) development of gas reserves from existing fields, (ii) rehabilitation of production facilities, (iii) rehabilitation of gas pipeline networks, (iii) seismic surveys to support optimized exploitation of gas reserves, (iv) commercialization of Afghan Gas, and (v) capacity building to ensure project sustainability.

B. Methodology and Key Activities

11. The TA will be conducted in two phases. Phase 1 will comprise sector assessment and policy analysis, including (i) review of gas production history⁴ and the role of natural gas in near (5-year) and medium term (15-year) energy development scenarios; (ii) update and confirmation of gas demand in northern Afghanistan; (iii) update of government policy framework to promote and develop natural gas resources (with special attention to tariff structure, legal framework, and contract options for private sector participation); (iv) estimation of investment requirements to increase natural gas production from existing wells and known but undeveloped gas fields; (v) determination of potential greenhouse gas emission reductions resulting from improved production and transmission infrastructure;⁵ (vi) analysis of alternative project designs (including direct support to government-managed gas development, and/or leveraging potential ADB financing of Government's equity stake in a public-private development partnership); and

⁴ Including ongoing gas well and pipeline rehabilitation financed by ADB Loan 1997-AFG (ADB. 2003. *Report and Recommendation of the President to the Board of Directors on Proposed Loan to the Islamic Republic of Afghanistan for Emergency Infrastructure Rehabilitation and Reconstruction*. Manila.)

⁵ The ADB Clean Development Mechanism facility can provide support to MMI in evaluating potential reductions in greenhouse gas emissions and possible revenue from trading emission reduction credits in global markets.

(vii) confirmation of ensuing project design (i.e., project components, lending modes, and financing instruments).

12. Phase 2 will prepare the project for potential ADB funding and will include (i) technical confirmation of engineering feasibility; (ii) financial and economic analyses (including confirmation of tariff and pricing structures); (iii) social and environmental analyses; (iv) institutional and legal analyses related to private sector investment in upstream gas development, and (v) commercialization of Afghan Gas with clear proposals for institutional and policy reform. The initial poverty and social analysis is in Appendix 2.

C. Cost and Financing

13. The total cost of the TA is estimated at \$1,055,000 equivalent, comprising a foreign exchange cost of \$825,000 and a local currency cost of \$230,000 equivalent. The Government has requested ADB to finance \$995,000 equivalent to cover the entire foreign exchange cost and \$170,000 equivalent of the local currency cost. The TA will be financed on a grant basis by ADB's TA funding program. The Government will finance the remaining local currency cost of \$60,000 equivalent in kind, covering counterpart staff, office accommodation, and support services. ADB financing will cover remuneration of consultants, per diem, international and domestic travel, communications, reports, interpreter services, training, vehicles, and equipment. Detailed cost estimates and financing plan are in Appendix 3. The Government has been advised that approval of the TA does not commit ADB to finance any ensuing project.

D. Implementation Arrangements

14. MMI will be the Executing Agency for the TA, providing guidance on policy framework and potential investment scenarios. Afghan Gas will be the Implementing Agency, providing detailed data and information to define physical investment for gas development and production as well as human resource investment for operational sustainability. The ADB project implementation unit at MMI, which includes three senior level counterpart staff, will provide day-to-day coordination for the TA. The majority of the TA work will be conducted with Afghan Gas in Shebergan. MMI and Afghan Gas will provide the consultants with adequate office accommodation and support services. The consultants will hold workshops and consultation meetings to obtain input from the various departments and enterprises of MMI, and other relevant ministries. It will be the responsibility of the consultants to develop workshop designs and identify participants in consultation with the project implementation unit and selected individuals assigned by MMI.

15. The TA will be implemented by a firm of international consultants with expertise in (i) energy planning, policy analysis, and economics; (ii) natural gas production, processing, and transmission; (iii) social and environmental analysis; (iv) financial analysis; (v) capacity building; and (vi) legal/regulatory analysis. Domestic consultants will be engaged by the international consulting firm, which will have the overall responsibility for the TA. International consultants will be engaged in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for the selection and engagement of domestic consultants. Simplified technical proposals and the quality- and cost-based system will be utilized for selecting consultants. It is estimated that the TA will require about 25 person-months of international and 42 person-months of domestic consulting services. An international gas sector specialist will act as the team leader and coordinate the activities of all consultants. International consultants will guide the domestic consultants and selected MMI staff in all aspects of project analysis and preparation. The domestic consultants will assist the international consultants in

gathering and analyzing pertinent information and data, and in reviewing documents provided by relevant ministries and energy sector entities. Outline terms of reference for consultants for Phase 1 are in Appendix 4. Indicative terms of reference for Phase 2 are in Appendix 4 and will be developed further during Phase 1.

16. The TA will begin by March 2006 and be implemented over a period of 12 months. Phase 1 will be completed in 4 months; Phase 2 will overlap with Phase 1 and will be completed in 9 months. The consultants will submit (i) an inception report within 1 month, (ii) an interim report covering Phase 1 within 3 months, and (iii) a draft final report covering Phase 2 within 9 months of the commencement of the TA. The draft final report will be discussed with MMI, other relevant ministries, departments and enterprises of MMI, ADB, and consultants at a meeting to be held in Kabul within 1 month of the issuance of the draft final report. The consultant will submit the final report within 1 month of the meeting, incorporating the comments of government agencies and ADB.⁶

17. The TA budget provides for purchase of office equipment, office supplies, telecommunication equipment, office furniture, and vehicles that will be procured by ADB in accordance with ADB's *Guidelines for Procurement* and other arrangements satisfactory to ADB. Equipment will be turned over to the EA upon completion of the TA.

IV. THE PRESIDENT'S DECISION

18. The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of \$995,000 on a grant basis to the Government of Afghanistan for preparing the Natural Gas Development Project, and hereby reports this action to the Board.

⁶ The TA schedule may be further adjusted so that key members of the consulting team are available to support loan fact-finding and appraisal missions.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact (ensuing project) Economic development by expansion of conventional natural gas supplies.</p>	<p>Increase in total gas production by 300%, decrease in production and transmission losses from 30–40% to 10–15% (relative to 2005 baseline).</p>	<p>Gas production and transmission reports Project reports and review missions Project completion report</p>	
<p>Outcome (ensuing project) Rehabilitate existing gas production and transmission system, and facilitate new development in existing but undeveloped gas fields.</p>	<p>Improved stability and quality of gas supply: system capacity increase from current level of 0.5 million m³/day to 1.5 million m³/day by 2015.</p> <p>Expansion of pipeline networks.</p> <p>Reduction in transmission and distribution system losses by 10% per year until losses are equivalent to international norms.</p>	<p>Province and enterprise level energy sector statistical reports and annual reports of gas production and transmission units Project reports and review missions Project completion report</p>	<p>Assumption</p> <ul style="list-style-type: none"> Ability of the Government, EA, and IAs to construct and operate the required production and transmission systems. <p>Risk</p> <ul style="list-style-type: none"> Delays in sector reforms and project construction.
<p>Outputs (PPTA)</p> <p>1. Analysis of gas production potential, gas demand, and investment requirements for developing proven gas reserves. Analysis of investment options and identification of a project suitable for external financing.</p> <p>2. Feasibility study and preparation of the proposed project, including technical, environmental, social, financial, and economic analyses.</p>	<p>Preliminary assessment of gas production and delivery capacity; gas demand analysis; identification of investment requirements; and confirmation of project scope and design.</p> <p>Feasibility analyses following ADB guidelines and methodologies. Summary appraisal reports, including environmental and social safeguard analyses and implementation plans.</p>	<p>Policy dialogue with the Government Project review missions Project completion report</p>	<p>Assumption</p> <ul style="list-style-type: none"> Counterpart funds and staff resources are made available for the TA. Qualified consultants are recruited and mobilized in a timely manner. <p>Risk</p> <ul style="list-style-type: none"> Deterioration of security conditions may delay TA implementation.
<p>Activities with Milestones (PPTA)</p> <p>1.1 Analysis of domestic gas sector and identification of a project suitable for external financing (by end of August 2006).</p> <p>1.2 Confirmation of ensuing project components (by end of August 2006).</p> <p>1.3 Technical, environmental, social, financial, and economic analyses for ensuing project (by end of March 2007).</p>			<p>Inputs</p> <p>ADB: \$995,000</p> <p>Government: \$60,000</p>

EA = executing agency, IA = implementing agency, m³ = cubic meters, PPTA = project preparatory technical assistance, TA = technical assistance.

INITIAL POVERTY AND SOCIAL ANALYSIS

A. Linkages to the Country Poverty Analysis

Is the sector identified as a national priority in country poverty analysis? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Is the sector identified as a national priority in country poverty partnership agreement? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No No poverty partnership agreement with Afghanistan to date.
<p>Contribution of the sector or subsector to reduce poverty in Afghanistan:</p> <p>Support to the energy sector in general is a major intervention to achieve economic progress through infrastructure development. Physical investment support and sector reform are necessary for economic growth to benefit the poor. As a cleaner form of energy, natural gas development will specifically benefit the poor since they are most adversely affected by indoor pollution (especially from use of biomass and other poor quality fuel for cooking) and environmental degradation.</p>	

B. Poverty Analysis

Targeting Classification: General intervention

<p>What type of poverty analysis is needed?</p> <p>Consultants will prepare an initial social impact assessment and a poverty impact assessment. A socioeconomic survey will be undertaken to provide the basis of the assessments. The social assessment will include analysis of resettlement issues, impacts of workforce in construction work, and impacts on indigenous or tribal people. Based on the project design and initial social assessment, the consultant will prepare land acquisition and resettlement plans, if required, and incorporate mitigation measures in cost estimates. The poverty impact assessment will include a poverty profile, an assessment of the impact of the proposed project on the poor, and quantification of poor beneficiaries.</p>
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C. Participation Process

Is there a stakeholder analysis? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Is there a participation strategy? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<p>A participation strategy will be devised during the project preparatory TA stage. Options will be reviewed to enhance stakeholder participation and local ownership.</p>

D. Gender Development

<p>Strategy to maximize impacts on women:</p> <p>The poor and women will be carefully considered in conducting participatory activities. Gender analysis will be conducted as part of the overall gas demand and social impact analyses. Details of gender analysis will depend on the proposed investment program.</p>
Has an output been prepared? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

E. Social Safeguards and Other Social Risks

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Resettlement	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	The proposed loan project involves rehabilitation of gas wells and possibly gas pipelines in a sparsely populated area. The gas wells are located in a controlled area which is not inhabited, except for short-term housing for gas field workers. Livestock grazing is not allowed in the gas fields. Land acquisition is not anticipated. Current project categorization is Category B, but may be downgraded to Category C pending further definition of the project.	<input type="checkbox"/> Full <input checked="" type="checkbox"/> Short <input type="checkbox"/> None
Affordability	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	The project may result in increased prices of natural gas and secondary goods and services accessed by the poor. Project design will maximize beneficial impacts to the poor.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Labor	<input checked="" type="checkbox"/> Significant <input type="checkbox"/> Not significant <input type="checkbox"/> None	The project will require construction labor and will result in permanent employment for the operation and maintenance of project facilities.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	The project will not be in, or will avoid passing through, areas of significant tribal people's settlement or use.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Other Risks and/or Vulnerabilities	<input checked="" type="checkbox"/> Significant Security risk <input type="checkbox"/> Not significant <input type="checkbox"/> None	Project design will ensure all UN and other formal security risk mitigation measures will be strictly followed during TA implementation, and allocate adequate resources.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

TA = technical assistance; UN = United Nations.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Foreign Exchange	Local Currency	Total Cost
A. Asian Development Bank Financing^a			
1. Consultants			
a. Remuneration and Per Diem			
i. International Consultants	625.0	0.0	625.0
ii. Domestic Consultants	0.0	84.0	84.0
b. International and Local Travel			
i. International	75.0	0.0	75.0
ii. Domestic	0.0	21.0	21.0
c. Reports and Communications	10.0	15.0	25.0
2. Equipment			
a. Computers, Printers, Software, etc.	0.0	15.0	15.0
b. Vehicles	40.0	0.0	40.0
3. Training, Seminars, and Conferences	0.0	25.0	25.0
4. Representative for Contract Negotiations	5.0	0.0	5.0
5. Contingencies	70.0	10.0	80.0
Subtotal (A)	825.0	170.0	995.0
B. Government Financing			
1. Office Accommodation	0.0	25.0	25.0
2. Remuneration and Per Diem of Counterpart Staff	0.0	25.0	25.0
3. Others	0.0	10.0	10.0
Subtotal (B)	0.0	60.0	60.0
Total	825.0	230.0	1,055.0

^a Financed by the Asian Development Bank's technical assistance funding program.
Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. The TA will be conducted in two phases. Terms of reference will include but not be limited to the following:

A. Phase 1: Sector and Policy Analysis and Project Identification

2. Phase 1 will comprise sector assessment and policy analysis, including (i) review of gas production history and the role of natural gas in near (5-year) and medium term (15-year) energy development scenarios; (ii) update and confirmation of gas demand in northern Afghanistan; (iii) update of government policy framework to promote and develop natural gas resources (with special attention to tariff structure, legal framework, and contract options for private sector participation); (iv) estimation of investment requirements to increase natural gas production from existing wells and known but undeveloped gas fields; (v) determination of potential greenhouse gas emission reductions resulting from improved production and transmission infrastructure; (vi) analysis of alternative project designs (including direct support to government-managed gas development, and/or leveraging potential ADB financing of Government's equity stake in a public-private development partnership); and (vii) confirmation of ensuing project design (i.e., project components, lending modes, and financing instruments). The proposed assignments and indicative person-month allocations are listed below.

1. Team Leader/Natural Gas Sector Specialist (international, 3 person-months). The consultant will do the following:

- (i) Update and confirm gas sector investments, gas demand forecasts, and gas utilization scenarios for northern Afghanistan and rest of the country in the near and medium term.
- (ii) Review available data on gas potential and update the gas reserve estimates, using internationally accepted definitions of proved, probable, and possible reserves. Based on these updated reserve estimates, confirm the role of natural gas in near (5-year) and medium term (15-year) energy development scenarios.
- (iii) Review gas production history¹ and evaluate the ability to expand production from existing wells. Based on reserve estimates and geological conditions, prepare a draft gas field development plan with priorities assigned to existing and identified but undeveloped reservoirs.
- (iv) Estimate investment requirements to increase natural gas production from existing wells and known but undeveloped gas fields, and present a summary development plan with an indicative implementation schedule.

2. Institutional and Policy Analyst (international, 3 person-months). The consultant will do the following:

- (i) Update and define the current government policy framework to promote and develop natural gas resources, with special attention to the legal framework and outputs of ongoing technical assistance² to establish (a) a gas regulatory system, (b) contract options for private sector participation, and (c) commercial viability of

¹ Including ongoing gas well and pipeline rehabilitation financed by ADB Loan 1997-AFG (ADB. 2003. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Islamic Republic of Afghanistan for Emergency Infrastructure Rehabilitation and Reconstruction*. Manila.)

² ADB. 2004. *Technical Assistance to the Islamic Republic of Afghanistan for Establishing a Gas Regulatory Framework*. Manila.

Afghan Gas. Based on level of interest and risk concerns of potential private sector firms, recommend additional legal provisions and alternative modes of private sector participation. Develop first draft of a step-by-step, time-bound commercialization program for Afghan Gas.

- (ii) Evaluate required investments for gas sector sustainability, and recommend project design components and alternatives including (a) direct donor-funded support to government-managed gas development, (b) pure private sector investment with possible credit and risk guarantees from multilateral or bilateral financial institutions, (c) public-private development partnership, and (d) program loans to support sector development program.
- (iii) Confirm the design of the ensuing project design in consultation with the Government and ADB (e.g., project or sector loan, possibly combined with partial credit and partial risk guarantees for private sector partners).

3. Energy/Gas Sector Specialist (international, 6 person-months). The consultant will do the following:

- (i) Provide Ministry of Mines and Industries (MMI), Afghan Gas, and the Government with up-to-date analysis on energy sector development in Afghanistan and the surrounding region—with specific reference to the role of gas and coal.
- (ii) Prepare policy briefings for ministerial level activities and technical briefings for operational level activities.
- (iii) Assist MMI in defining and updating policy framework to promote and develop natural gas resources, with special attention to creating an enabling environment for development of hydrocarbon and other energy fuels, including policy and legal framework, tariffs, taxes, and royalties.
- (iv) Assist MMI and Afghan Gas in identifying short-term human resource development requirements and drafting appropriate capacity building program to be implemented under the TA and ensuing loan project.

B. Phase 2: Project Preparation

3. Phase 2 will prepare the project for potential ADB funding and will include (i) technical confirmation of engineering feasibility; (ii) financial and economic analyses (including confirmation of tariff and pricing structures); (iii) social and environmental analyses; and (iv) institutional and legal analyses related to private sector investment in upstream gas development and commercialization of Afghan Gas. Detailed terms of reference will be developed during Phase 1 of the TA. The proposed assignments and indicative person-month allocations are listed below.

1. Natural Gas Sector Specialist/Team Leader (international, 3 person-months). The consultant will do the following:

- (i) Coordinate with other team members, as TA team leader, to develop a detailed work plan and implementation schedule; work with MMI and Afghan Gas to oversee the consulting team; and compile, edit, and ensure the quality of all reports prepared under the TA.
- (ii) Identify and analyze potential project investment components according to technical perspective, operating conditions, and sustainability—in consultation with MMI and Afghan Gas. This analysis will take into account current and

- projected natural gas demand, and various technical parameters of gas transmission, distribution, and other infrastructure needs.
- (iii) Review current status of the gas transmission and distribution networks and their plans for expansion, and define least-cost option for rehabilitation work.
 - (iv) Review the scope, capital, and operating cost estimates; implementation schedule; and contracting and implementation arrangements. Prepare procurement packages for the proposed project.
 - (v) Work with the team economist to confirm current natural gas pricing policies and determine adequate tariffs for project sustainability.
 - (vi) Define a policy matrix for sector reforms (with domestic consultants), including issues on (a) segregation and reassignment of policy-making, regulatory, and ownership functions; (b) pricing based on cost-of-service; and (c) sector restructuring and private sector participation. Identify short- (5-year), medium- (15-year), and long-term (25-year) reform targets.
 - (vii) Recommend necessary policy, investment, and capacity-building requirements to ensure project sustainability—in coordination with other team members, based on reviews and analyses.

2. Natural Gas Economist (international, 3 person-months). The consultant will do the following:

- (i) Review the overall gas utilization plans; define and evaluate least-cost options for gas distribution and utilization (including power generation, industrial and commercial consumption, and domestic cooking and heating).
- (ii) Provide economic rationale for the Project, including analysis of alternatives.
- (iii) Estimate the economic capital and operating costs, and carry out least-cost, viability, and beneficiary analysis of the proposed project. Include sensitivity analysis according to ADB's *Guidelines for the Economic Analysis of Projects*.
- (iv) Assess the economic feasibility of various project components, proposed policies, and options for infrastructure needs, including gas distribution networks.
- (v) Incorporate poverty reduction activities into project design—in consultation with the social development specialist—in accordance with ADB's *Handbook on Integrating Poverty Impact Assessment in the Economic Analysis of Projects*.
- (vi) Undertake an economic benefit-cost analysis to confirm the overall viability of the proposed project in terms of economic internal rates of return.
- (vii) Assess various stakeholders' willingness and ability to pay for services under the proposed project.
- (viii) Assess economic and sustainability issues and carry out distribution, sensitivity, and risk analyses.
- (ix) Evaluate the proposed project's direct and indirect environmental impacts. Carry out economic analysis of impacts in terms of net present value and internal rates of return, in accordance with ADB's *Workbook on Economic Evaluation of Environmental Impacts*.

3. Financial Analyst (international, 2 person-months). The consultant will do the following:

- (i) Undertake financial analysis of the proposed project in accordance with ADB's *Guidelines for the Preparation and Presentation of Financial Analysis*, using the financial internal rate of return method and comparing it with the relevant weighted average cost of capital.

- (ii) Assess financial feasibility of subproject components, proposed policies, and options for infrastructure needs, including gas distribution networks.
- (iii) Assess and finalize (a) the financial return of the proposed project to equity, using various levels of equity contribution, and (b) the options available to structure the proposed project to be of interest to the private sector.
- (iv) Assess the financial performance of the executing and implementing agencies. Prepare appropriate financial statements in accordance with ADB's *Guidelines for the Preparation and Presentation of Financial Analysis*.
- (v) Assess financial management and financial sustainability, and carry out distribution, sensitivity, and risk analyses.

4. Commercialization and Restructuring Expert (international, 3 person-months).

The consultant will do the following:

- (i) Evaluate constraints on the institutional structures to attract and raise investment from the private sector and meet Afghanistan's natural gas needs efficiently and at least cost.
- (ii) Determine the optimum organizational and ownership structure that will remove the constraints and meet the objectives of improving sector efficiency and attracting private sector participation, taking into account proposed sector reforms in related energy and industrial sectors.
- (iii) Define a commercialization program for Afghan Gas, including all necessary measures for the enterprise to evolve into a sustainable business. Define a near-term business plan that includes (a) management and staff reorganization; (b) human resource development; and (c) transparent accounting, metering, billing, collection, delineation and separation of non-core business activities.

5. Geophysicist (international, 2 person-months). The consultant will do the following:

- (i) Evaluate the quality of currently available seismic survey data and define a near-term survey program for three-dimensional seismic analysis of known gas fields, including specific recommendations for location of survey lines, and relative priority and timing.
- (ii) Evaluate Afghan Gas' human resource and technical capacity to analyze and interpret seismic data, and define a training program to develop this expertise.
- (iii) Evaluate two general options for conducting seismic surveys: (a) outsource to specialist firms, or (b) develop in-house hardware and software capacity. Estimate relative costs and timing of these options, and recommend the preferred alternative. Prepare draft scope of work, terms of reference, technical specifications, and cost estimates for the preferred option.

6. Environment Specialist (domestic, 6 person-months). The consultant will do the following:

- (i) Prepare environmental assessment reports for proposed project and the required mitigation measures in the design, construction, and maintenance of the proposed project; its components; and policy options. In each case, assess conformity with ADB's *Environmental Policy (2002)*, *Operations Manual F1/BP and F1/OP (2003)*, *Environmental Guidelines for Selected Industrial and Power Projects*, and *Environmental Assessment Requirements*.

- (ii) Prepare a summary initial environment examination report in accordance with ADB's *Environmental Policy (2002)*, *Operations Manual F1/BP and F1/OP (2003)*, *Environmental Guidelines for Selected Industrial and Power Projects*, and *Environmental Assessment Guidelines*, outlining environmental impacts, proposing mitigation measures, and identifying costs related to the mitigation of adverse environmental impacts.
- (iii) Quantify gas leakage in the production and transmission system from well head to end users. Identify possible options for trading carbon emissions reductions related to elimination of fugitive gas emissions, estimate the approximate monetary value of carbon transactions, and define the specific requirements for executing carbon transactions.

7. Social Development Specialist (domestic, 6 person-months). The consultant will do the following:

- (i) Prepare a social impact assessment and its summary. Thoroughly review the socioeconomic impacts of the proposed project components, policy options, and overall project according to ADB's *Handbook for Incorporation of Social Dimensions in Projects*. Include an assessment of indigenous people's issues.
- (ii) Review land acquisition and relocation plans of project components that involve resettlement, and assess their conformity with ADB *Guidelines for Involuntary Resettlement*, including (a) time-bound arrangements, public consultation, relocation, compensation for affected inhabitants; and (b) costs related to relocation, compensation for land acquisition, and right-of-way.
- (iii) Incorporate all mitigation measures into the cost estimates of the project components.

8. Poverty Reduction Specialist (domestic, 6 person-months). The consultant will do the following:

- (i) Evaluate the impact of proposed policy and institutional measures on individuals, households, and groups.
- (ii) Evaluate the impact of proposed project components and the overall project on individuals, households, and groups—in particular, poor and vulnerable segments of society.
- (iii) Estimate the number of beneficiaries and all other stakeholders—in consultation with the natural gas economist—and estimate the economic benefits of the proposed project in terms of direct and indirect earnings, cost savings, and poverty reduction impacts.
- (iv) Estimate the poverty reduction impact ratio according to ADB guidelines and other requirements specified by ADB and MMI.

4. Additional terms of reference will be developed during Phase 1 of the TA for the following domestic consultant assignments: (i) financial analyst (domestic, 6 person-months); (ii) natural gas economist (domestic, 6 person-months); (iii) natural gas policy specialist (domestic, 6 person-months); and (iv) natural gas network engineer (domestic, 6 person-months).