TERMS OF REFERENCE FOR CONSULTANTS

A. Objectives, Major Outputs and Activities

1. The transaction Technical Assistance (TA) will help facilitate the implementation of the government’s hydro sector development strategy and integrate climate resilience in the hydropower development master plan with key activities as follows: (i) reviewing and assessing Uzbekistan’s hydropower sector and its long-term development plan with emphasis on resilience to climate change and water-energy security; (ii) formulating project selection criteria and assessment tools taking into account of technical, financial, environmental, and socio-economic characteristics and climate resilience; (iii) conducting due diligence on the planned hydropower projects and developing a new hydropower sector master plan based on the selection criteria; and (iv) conducting stakeholder consultations and workshop to disseminate the outcome and knowledge.

2. The master plan will further identify the short-term priority investment projects that are urgently needed for the improved reliability of power supply, which will eventually be included in the capital investment program of the government and Uzbekhydroenergo. To this end, the various stakeholders including related government authorities and donor partners, will closely be consulted throughout the implementation of the TA and preparation of the master plan. The TA will assist for the preparation of the government’s investment plan, including the review of project readiness, potential safeguard issues, and financing sources. In the course of the TA implementation, cooperation with neighboring countries will be sought under the Central Asia Regional Economic Cooperation Program (CAREC) with possible expansion into a regional cooperation agenda.

3. The expected outputs of the TA are as follows:

   a. Output 1 - Climate resilience promoted in hydropower planning; and
   b. Output 2 - Capacity enhancement of Uzbekhydroenergo’s management.

4. To meet the TA objectives, the consultants’ scope of work for Output 1 will cover the following:

   a. reviewing and assessing Uzbekistan’s hydropower sector and its long-term development strategy with emphasis on climate resilience and watershed risks;
   b. formulating project selection criteria and assessment tools taking into account technical, financial, environmental and socio-economic characteristics and climate resilience;
   c. developing a hydropower sector master plan based on the selection criteria with prioritized investment plan;
   d. conducting stakeholder consultations and workshop to disseminate the outcome and mainstream climate adaptation into the institutional and policy landscape throughout the implementation of the TA and the preparation of the master plan;
   e. identifying short-term priority investment projects that are urgently needed to improve the reliability of power supply through the master plan; and
   f. developing preliminary due diligence reports and consulting with stakeholders.

5. To meet the TA objectives, the consultants’ scope of work for Output 2 will cover the following:
a. review Uzbekhydroenergo’s policy on climate change and suggest new climate change policy measures;
b. develop integrated capacity development and training program, including a series of thematic workshops; and
c. support in enhancing Uzbekhydroenergo’s and other related agencies’ staff capacity in planning and implementing hydropower projects to keep the master plan updated and relevant.

B. Consulting Services

6. The Asian Development Bank (ADB) will engage a consulting firm and individual consultants following the ADB Procurement Policy and Procurement Regulation for ADB Borrowers (2017, as amended from time to time) and its associated project administration instructions and/or staff instructions. One international consulting firm, with 27 person-months of international and national consultants over 37 months, will be selected through the quality- and cost-based selection (QCBS) method using full technical proposal (FTP). The ratio of quality against cost will be 90:10 given the technical complexity of assignment. Individual consultants will be recruited to provide expertise on bank due diligence and project preparation and/or as resources persons. Output-based and/or lump sum contracts will be considered for the engagement of international consulting firms, individual consultants and resource persons.

<table>
<thead>
<tr>
<th>Positions</th>
<th>Person-Months</th>
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<tbody>
<tr>
<td></td>
<td>International</td>
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<tr>
<td>Hydro Planning Engineer/Team leader</td>
<td>5</td>
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<tr>
<td>Geologist</td>
<td>2</td>
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<tr>
<td>Geotechnical Engineer</td>
<td>2</td>
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<tr>
<td>Hydrologist</td>
<td>3</td>
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<tr>
<td>Climate Change Specialist</td>
<td>3</td>
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<tr>
<td>Civil Engineer</td>
<td>2</td>
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<tr>
<td>Electrical Engineer</td>
<td>3</td>
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<tr>
<td>Mechanical Engineer (Hydro)</td>
<td>3</td>
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<tr>
<td>Environmental Specialist</td>
<td>2</td>
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<tr>
<td>Financial Management Specialist</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>27</strong></td>
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</table>

7. The terms of reference and required qualifications for each expert are described in the succeeding paragraphs.

C. International Experts

8. **Hydropower Planning Engineer/Team Leader.** The Team Leader shall have a bachelors or higher degree in engineering and has at least 5-year experience of leading a team. The consultant should have at least 20 years of professional experience in the design and management of major hydropower projects. The consultant should preferably have previous experience in procurement, engineering, business administration; knowledge of international organizations/agencies; donor-funded projects particularly by ADB. The consultant will manage the team, simultaneously serving as lead consultant and hydropower planning engineer. Previous experience in developing countries in the Central and West Asia Department (CWRD) region is desirable. The team Leader/hydropower planning engineer will undertake the following tasks:
coordinate with other members the development of a detailed work plan and implementation schedule;
(ii) ensure quality reports are delivered on time;
(iii) review and assess the existing investment plan and update data necessary to estimate construction costs based on the latest market prices;
(iv) examine construction methods for civil works in consideration of the site conditions and conduct geological and geotechnical assessments for new hydropower projects, and incorporate risks and mitigation measures;
(v) ensure application of technically feasible climate change adaptation solutions in the project design to address projected climate vulnerability;
(vi) review the sedimentation study carried out by the hydrological engineer to identify the least-cost solution with minimum environmental impacts;
(vii) reflect the optimal design in the cost estimates;
(viii) help plan a hydraulic model test on sediment flushing facilities that will be conducted by the consultant team for the detailed engineering study;
(ix) prepare any disaster risk management plan including local flood control and early warning systems, with the hydrological engineer; and
(x) revise and finalize a hydropower development master plan scheme based on the reservoir sedimentation study with the hydrological engineer.
(xi) develop an overall capacity building program and supervise the implementation of the program.

9. **Geologist.** Qualified expert shall have a bachelor’s or higher degree in related field, and at least 10 years of relevant working experience in major hydropower projects. The consultant should preferably have previous experience in developing countries in the CWRD region is desirable. The expert’s tasks will include:

(i) review data and results of testing from previous studies to assess overburden and rock conditions;
(ii) supervise geological and geotechnical investigations to enable identification of overburden and rock types, determination of condition and strength of materials for design of slope stability, foundation, and leakage as required for the size of the structures, and selection of construction materials;
(iii) supervise geotechnical design of structures for all stages of the work, assess seismicity for each subproject, and ensure that earthquake effects have been adequately addressed in the design of the structures; and
(iv) assess the project’s technical risks, particularly unknown subsurface conditions associated with foundations and leakage.

10. **Geotechnical Engineer.** The expert shall have a bachelor’s or higher degree in related field, and at least 10 years of relevant working experience in major hydropower projects. The consultant should preferably have previous experience in developing countries in the CWRD region is desirable. The expert’s tasks will include:

(i) review data and results of testing from previous studies to assess overburden and rock conditions;
(ii) supervise geological and geotechnical investigations to enable identification of overburden and rock types, determination of condition and strength of materials for design of slope stability, foundation, leakage as required for the size of the structures, and selection of construction materials;
(iii) supervise geotechnical design of structures for all stages of the work, assess seismicity for each subproject, and ensure that earthquake effects have been adequately addressed in the design of the structures; and
(iv) assess the project’s technical risks, particularly unknown subsurface conditions associated with foundations and leakage.

11. **Hydrologist** (International, 3 person-months). The expert shall have a bachelor’s or higher degree in related field, and at least 10 years of relevant working experience in major hydropower projects. The consultant is preferred to have previous experience in developing countries in the CWRD region is desirable. The key tasks are to:

(i) undertake hydrological and sedimentological assessment under various climate change scenarios for each of subprojects;
(ii) revise the generation scheme based on the reservoir sedimentation study and recalculate the installed capacity and annual generating energy for the project in coordination with hydropower planning engineers;
(iii) update inflow data at the dam site, if necessary, to be used for revision of the generation scheme;
(iv) prepare input data used for the reservoir sedimentation simulation and plan the simulation under discussion with the hydropower planning engineers to optimize the sediment flushing operation;
(v) prepare a final assessment on reservoir sedimentation and sediment flushing operation;
(vi) prepare any disaster risk management plan including local flood control and early warning systems;
(vii) review the overall watersheds risks;
(viii) provide recommendations for climate change adaptation interventions.

12. **Climate Change Expert** (International, 3 person-months). The expert shall have a bachelor’s or higher degree in related field, and at least 10 years of relevant working experience in climate change modeling, hydrological modeling, and in climate change risk assessment in hydropower projects. The consultant should preferably have previous experience in developing countries in the CWRD region is desirable. The consultant will:

(i) prepare the climate change impact, vulnerability and adaptation assessment reports for all subprojects following ADB guidelines for climate proofing investment in the energy sector;
(ii) identify the climate change parameters to be assessed and the modeling scale (temporal and spatial) to be used in the impact assessment. Identify the goal of the climate change impact assessment in the context of the overall project objectives;
(iii) study the existing information such as relevant climate change projections and local historical climate data available. Prepare an assessment on the reliability of existing climate change projections based on the model’s ability to represent past climate conditions;
(iv) evaluate the range of climate projections and select projections that would be representative of this entire range (i.e., dry, average, and wet scenarios). Identify any need for further modelling, or where existing modelling is sufficient for the project, prepare a short synthesis report;
(v) identify the probabilities of occurrence of specific climate changes from taking place and the level of certainty. Identify assumptions and limitations in terms of the use of the projections for influencing project design;
(vi) formulate downscaled climate change scenarios for the relevant time horizon of the project, specifying the technique used for downscaling as necessary;
(vii) identify possible technical gaps, in country and generally, for improving capabilities for climate change projections in the country;
(viii) submit for review and approval a draft outline of the analysis to be undertaken, including recommended methodology for impact assessment (i.e., hydrological modeling, the climate scenarios to be used in the analysis, the impact models, and a justification for their choice); and
(ix) provide an expert opinion on the probability of further climate change research potentially altering project design protocols or operations requirements.

13. **Mechanical Engineer (Hydro)** The expert shall have a bachelor’s or higher degree in mechanical or related engineering field, and at least 15 years of relevant working experience in major hydropower projects. The consultant should preferably have previous experience in procurement and business administration; knowledge of international organizations/agencies; donor-funded projects particularly by ADB. Previous experience in developing countries in CWRD region is desirable. The key tasks are to:

(i) review the feasibility studies and finalize the design for the mechanical equipment to be used for the projects prepared by executing agency (EA) for the detailed engineering study;
(ii) prepare technical specifications for the hydro mechanical equipment for bidding documents in the tender documents for rehabilitation subprojects;
(iii) prepare feasibility studies for the new hydropower plant (HPP) subprojects;
(iv) finalize optimal project cost estimates of mechanical equipment based on the construction schedule and provide input for economic/financial analysis;
(v) prepare the implementation schedule for design, transportation, and installation works of mechanical equipment; and
(vi) coordinate with other experts concerned to prepare all the tender documents for turnkey contracts for the subprojects;

14. **Electrical Engineer**. The expert shall have a bachelor’s or higher degree in electrical or related engineering field, and at least 15 years of relevant working experience in major hydropower projects. The consultant should preferably have previous experience in procurement, business administration; knowledge of international organizations/agencies; donor-funded projects particularly by ADB. Previous experience in developing countries in CWRD region is desirable. The expert will:

(i) review the feasibility studies and finalize the design of the electrical equipment and transmission lines. Incorporate risks and mitigation measures;
(ii) examine methods of electric equipment installation works, considering the site conditions;
(iii) prepare feasibility studies for the new HPP subprojects selected;
(iv) prepare the implementation schedule for installation works of electric equipment and transmission lines;
(v) prepare a schedule for design, transportation, and installation works for the electrical equipment and transmission lines;
(vi) finalize construction cost estimates for electrical equipment and transmission lines based on the construction schedule; and
(vii) coordinate with other experts concerned to prepare all the tender documents.
15. Civil Engineer. The expert shall have a bachelor’s or higher degree in civil or related engineering field, and at least 15 years of relevant working experience in major hydropower projects. The consultant should preferably have previous experience in procurement, business administration; previous experience in developing countries in the CWRD region is desirable. The key tasks will:

(i) review the existing investment plan and feasibility studies, if any, and update data necessary to estimate construction costs for the civil works based on the latest market prices;
(ii) conduct feasibility studies for the new HPP subprojects;
(iii) examine construction methods for civil works in consideration of the site conditions and conduct geological and geotechnical assessments. Incorporate risks and mitigation measures;
(iv) prepare a construction schedule for civil works and finalize construction optimal least-cost estimates of civil works based on the construction methods and schedule;
(v) review the reservoir sedimentation study carried out by the hydrological engineer to identify the least-cost solution with minimum environmental impacts;
(vi) help plan a hydraulic model test on sediment flushing facilities that will be conducted by the consultant team for the detailed engineering study (in particular hydraulic model test experts and civil design engineers (head works);
(vii) prepare any disaster risk management plan including local flood control and early warning systems, in coordination with the hydrological engineer;
(viii) prepare general and technical parts of civil works in the tender documents in the procurement process, incorporating clear evaluation criteria;
(ix) assist in identifying all benefits of the climate change adaptation options for subprojects and their costs for the project; and
(x) prepare technical documentation, including project design and specifications with climate change adaptation considerations.

16. Environment Specialist. The expert should have a master’s or higher degree in environmental sciences, environmental engineering, or related fields, and at least 15 years of relevant working experience, including working experience with an international financing institute like ADB, European Investment Bank, Islamic Development Bank, World Bank, etc. The consultant must be familiar with the development of environmental assessment reports, such as environmental impact assessments (EIAs) or initial environmental examinations (IEEs). The key tasks are to:

(i) prepare and finalize rapid environmental assessment checklist to determine environment category;
(ii) conduct environmental survey and testing required for the EIAs/IEEs;
(iii) assist EA in presenting at public consultation as required by ADB’s Safeguard Policy Statement (SPS 2009);
(iv) prepare EIA/IEE reports for each of subprojects meeting SPS 2009 requirements and finalize the reports incorporating comments from ADB and other stakeholders including EA, IA, State Committee for Nature Protection, local environmental authorities, co-financier, NGOs and potential project affected people etc.;
(v) work closely to obtain technical inputs from the Hydrological expert, social specialist, and climate change specialist in preparing the EIA/IEE reports, including fully costed EMPs;
(vi) help conduct a vulnerability assessment in the project area to identify vulnerability of the planned infrastructure as well as of the local area and people.
17. **Financial Management Specialist.** The expert shall have (i) a degree in accounting, corporate finance, business, or a related field; (ii) professional certification (e.g., chartered accountants, certified public accountant, chartered financial analyst); and (iii) a minimum of 10 years of work experience in financial management and reporting, including experience in conducting financial and managerial capacity assessment of state-owned enterprises in the energy sector. Skills in advanced modelling, credit rating, and financial analysis are mandatory. The consultant will:

(i) undertake Uzbekhydroenergo’s financial due diligence and complete credit analysis including its financial position (balance sheet, profit and loss, cash flow statements);

(ii) develop financial and managerial performance benchmarks ensuring financial self-sustainability and management improvement, and identify gaps with benchmarks, their causes, and measures to improve performance;

(iii) prepare standard methodologies of financial and economic analysis, indicators, template models and benchmarks for investment decision in each power subsector for the use of executing and implementing agency officials;

(iv) support team leader in preparing policy note specifying gaps and issues in the energy sector, and priority agenda and actions for energy reform and development including performance benchmarks and the size of capital investments and source of financing up to 2020; and

(v) assess longlisted capital investment projects for public, public–private, and sole private initiatives; prioritize short-, medium- and long-term candidate investment projects; and prepare the projects’ summaries including but not limited to presentation, financial and economic models.

D. **National Experts**

18. National consultants will include the following experts who will be primarily responsible for assisting the international consultants. The team leader will assign the responsibilities to the domestic consultants. The national consultants will include (i) hydropower expert, (ii) geologist, (iii) hydrologist, (iv) civil engineer, (v) electrical engineer, (vi) mechanical engineer, (v) environmental specialist, (vi) financial analyst, (vii) financial management specialist. The national expert shall have a bachelor’s or higher degree in their own fields or related fields as identical to the international expert, and at least 5 years of relevant working experience in major projects.

E. **Reporting Requirements**

19. The consultants will submit the following key reports: (i) inception report (October 2019), (ii) interim report (March 2020), (iii) key findings of consultation and workshop (April 2020), (iv) training reports for Uzbekhydroenergo staff (June 2020), (v) draft final/final report (master plan) (August 2020), and (vi) Monthly progress reports.

F. **Implementation Arrangement**

20. The TA will be implemented from September 2019 to December 2020 with Uzbekhydroenergo as the executing agency. ADB will administer the TA by the Central and West Asia Department’s Energy Division (CWEN) and supported by the Uzbekistan Resident Mission. The CWEN will select, supervise, and recruit consultants.
21. Uzbekhydroenergo will provide support to the consultants which includes: (i) arranging meetings with relevant government stakeholders and site visits; (ii) providing access to all relevant data and maps; and (iii) providing a suitably furnished office (desks, office chairs, book shelves/cabinets adequate to accommodate the full complement of international and local consultants) with utilities and telecommunication access (national and international telephone lines, electricity and air conditioning/heating, and internet connections). The consultants will be responsible for personal computers and other facilities for producing reports. The consultants should also coordinate with other government agencies, as necessary. Disbursements under the TA will follow the ADB’s Technical Assistance Disbursement Handbook (May 2010, as amended from time to time). Local expertise may be provided by a competent local design institute through subcontracting arrangements.

G. Individual consultants

22. Public-Private Partnership Specialist (International, 3 person-months). The expert will have at least a university degree in business, finance, engineering or related field; and 15 years’ relevant experience. The expert will (i) identify, review, and analyze the existing policy, regulatory, and institutional frameworks and capacity for private sector involvement in financing, constructing, operating and maintaining gas transmission and distribution infrastructure; (ii) evaluate the constraints on the existing frameworks and capacities’ abilities to enhance public sector financing capacity and attract private sector participation according to the government's objectives; (iii) determine the reforms necessary to establish the policy, regulatory, and institutional frameworks and capacity that will enable the government to attract private finance to develop gas transmission and distribution infrastructure in line with government objectives; and (iv) carry out a market assessment considering demand risk and potential mitigations that may be available, including any legislative or regulatory measures.

23. Social Safeguard Expert (resettlement) (international 2 person-month, and national, 6 person-months). The international expert should have a master’s or higher degree in related field and at least 10 years of relevant working experience, including evidence of preparing and implementing resettlement instruments and monitoring resettlement plan implementation. The key tasks are to (i) the review of the initial impact assessment for new and modernization projects; (ii) the assessment of social impact; (iii) the preparation of a Land Acquisition and Resettlement Framework (LARF); (iv) the preparation of a draft land acquisition and resettlement plan (LARP) in compliance with national laws and regulation and ADB Safeguard Policy Statement; (v) consultations with displaced persons and key stakeholders; (vi) assessment of EA capacity and capacity building on LAR issues, and (vii) coordination and orientation of agencies involved in LAR implementation.