Terms of Reference

For

"Conducting Detail Feasibility Study of Utility Scale Grid Connected Solar PV Project at Bardiya"

1. Background

a. About AEPC

Alternative Energy Promotion Centre (AEPC) is a Government institution established on November 3, 1996, under the Ministry of Science and Technology with the objective of developing and promoting renewable/alternative energy technologies in Nepal. Currently, it is under the Ministry of Energy, Water Resources and Irrigation. It functions independently and has an eleven members board with representatives from the government sector, industry sector and non-governmental organizations.

b. About NREP

The Nepal Renewable Energy Programme (NREP) is a Government of Nepal programme dedicated to increasing private sector investment in distributed renewable energy (DRE) and increasing universal energy access, while facilitating a policy, planning, legal construct, and regulatory environment conducive to both enabling and sustaining progress in DRE market development and universal energy access. The NREP was designed to support the all three tiers of federal structure of Nepal. It also attracts private sector to plan and invest in a low-carbon development path resulting in economic growth, poverty reduction and climate-smart development with the provision of Sustainable Energy Challenge Fund (SECF). The SECF offers both financial and technical support to the RE projects proposed by private sector to make the project financially viable and sustainable beyond SECF support. The Programme's intended outcome is for government institutions and the private sector to increase investments in distributed renewable energy (DRE) technologies in industries, businesses, schools, health centers, communities, and homes across Nepal. The programme will work to institutionalize change through an enabling governance, policy, planning and regulatory environment. The Programme's intended outcome is to increase investments in the RE sector at federal, provincial and local government level with special focus in Province 2, Lumbini, and Karnali Province.

c. Current scenario of Grid Connected PV projects in Nepal

Nepal has significant potentials for establishment of solar energy system. Nepal receives 3.6 to 6.2 kWh of solar radiation per square meter per day, with roughly 300 days of sun a year, making it ideal for solar energy production. White paper 2018 of Government of Nepal has envisioned renewable energy in national energy mix for energy security and proposes 5-10% from renewable energy source for power generation mix. It aims for distributed generation in each of 753 local units – "Providing Energy Access to All Settlement". Under the concept of " One Province, One Mega Projects" the white paper recommends at least 200 MW solar power generation in province no. 2. The solar power helps reduce power outages in winter seasons when hydropower potential is reduced. Furthermore, it is expected to increase the reliability of the power supply system and minimize system loss.

The 15th periodic plan depicts renewable energy as mainstream energy source for all the energy needs of the country. Public as well as private investments in RE sector have been prioritized as energy mixing strategy by the plan that helps generate enough power to meet the electricity demand for development and its services. The 15th plan articulates that energy efficiency programmes and programmes to connect rooftop solar energy plants to the grid based net metering and net payment will be promoted under the concept of "Every Home, Energy Home".

The plan also puts forward the proportion of renewable energy in energy consumption to increase from 7 to 12 per cent and electricity consumption per capita to reach 700 kilowatts per hour. For the achievement of this target, it offers development of solar energy system and its integration into national grid through the collection and verification of field data on solar energy sources.

As per department of electricity development, all together 17 solar power projects with estimated generation capacity of 110.47 MW have received license so far for the construction of solar projects in Province 2. Similarly, 11 solar power projects with cumulative capacity of 63.49 MWp have been issued with survey license in Lumbini Province. Recently, the Badganga Municipality in Lumbini Province has also signed a contract with Risen Energy Singapore to explore the possibility of installing 125 MW solar power plant. As per the study carried out by national planning commission, the highest number installed capacity of Solar PV sites in the country with cumulative capacity of 127 MWp and 85 MWp respectively for Province 2 and Lumbini Province. Recently, Eco power Development has completed 10 megawatts of solar power in the southeastern region of Dhalkebar, Mahottari, Province 2. Also, one solar PV project with 8.5 MWp capacity has been connected to national grid in Lumbini Province. Nepal government also, has inaugurated the first phase of its first 25MWp solar array that will feed electricity directly into the national grid. The project employs solar PV modules without storage batteries, meaning electricity produced is fed directly into the grid when sunlight is available.

The Local Government Operation Act, 2074 that came into effect since 15 October 2017 has paved a strong legal foundation towards institutionalizing legislative, executive and quasi-judiciary practice of the local government. The Act has stipulated several arrangements related to authorities, duties and responsibilities of local government, assembly meeting and working system, assembly management procedures, plan formulation and implementation, judicial works, financial jurisdictions, administrative structure, and district assembly, among others. Without adversely affecting the universality of Schedule-8 of the Constitution, it clarifies the function, duties, and rights of municipalities/ rural municipalities. The act clearly states that the local government can formulate, implement, monitor, evaluate and regulate local level policies, laws, standards, and plans related to Renewable energy and hydro power projects up to one megawatt. Further, the municipality can manage, operate, and regulate local electricity distribution system and services.

2. Objectives of the Study

The main objective of this study is to perform and prepare a full technical, financial and economic feasibility assessment of grid connected solar PV sites. The details of the site are in Annexure 2.
The Specific objectives of the assignment are to:

- Detail site assessment and feasibility study (including technical, financial and socio-economic viability)
- Detailed Engineering Design and Drawings (power generation and distribution system)
- Bill of Quantities and Cost estimation of the proposed energy system

3. Scope of Work

Under the assignment objectives following are the main Scope of Work.

1. The consultant has to conduct meeting/s with the client (project developer) to understand their need and to investigate their readiness for the large-scale solar PV system.
2. Analyze and confirm the possibility of grid-connection through interaction with Local/Regional NEA offices.
3. In consultation with local/regional NEA officials, obtain the information like voltage level available at the PCC1, outage rate of the T&D line, capacity of the substation, existing protection system, etc.
4. Propose the interconnection system which should at least comply following: system reliability and stability, fault levels, protection system, voltage flicker and voltage rise, reverse power flows, synchronization of generators,

[1] **PCC** stands for Power Control Centre. **PCC** is an important part in distribution of power. It generally receives stepped down voltage through transformer LT line and then redistributes to different MCCs & other power distribution centers.

islanded operation, safety aspect, harmonics, etc. These analyses should comply with international standard for grid interconnection e.g. IEEE 1547. The system should not violate the statutory technical limits or standards of NEA.

5. The consultant shall have to give an overview of project location and natural conditions, such as topography, geological conditions and air temperature, Precipitation, wind, fog, dust storms etc. The consultant shall follow the template as per Annexure 3.
6. Provide the detailed description of the solar energy resources considering overview at the project area and the solar energy resources map and other meteorological data available
7. Analyze and collect PV engineering long term observation data including the monthly radiation data of many years (such as direct radiation" heat radiation, total radiation data), monthly sunshine data for many years (sunshine duration or sunshine percentage data), rainfall, temperature and other meteorological data & inter annual variation chart of solar radiation, inter annual variation of sunshine duration.
8. Carry out the topographical survey of the identified site
9. Measure the optimum angle and height for PV Cells. PV cells may affect each other which should be considered during study.
10. Based on the published high-level solar resource data and estimates of plant losses or an assumed performance ratio can be used. Seasonal production estimates should be made
11. Evaluate the stability of the proposed construction area and adaptability of construction site.
12. Conducting the geological zoning of the site area. Assessment of main engineering geological problems, load bearing capacity.
13. Based on the resource assessment, design major components of solar system. The component information should include minimum of
    a. Site plan and layout
    b. Electrical single line diagrams
    c. Instrumentation and control systems
    d. Major equipment list with sizing
    e. Major equipment specifications and
    f. Plant cost estimation (implementation and operation)
14. The consultant shall have to calculate energy yield for 25 years, considering the annual attenuation coefficient of PV module.
15. The consultant shall have to determine the total efficiency of the system, considering all the losses.
16. The consultant shall Prepare probability-based forecasts for the expected power production in MWh (including P50, P75, P90 and P99 estimates based on the available data).
17. The Consultant shall develop a conceptual plant design for the proposed solar PV plant that includes, but are not limited to, the following items:
    - Major Equipment List with Sizing;
    - Site Plan and Layout;
    - Array layout and placement of inverter and DC combiner box
    - Initial Electrical Layouts (Single line diagram of PV generating system – module to inverter, single line diagram of power evacuation system, single line diagram of control and monitoring system
    - Process Flow Diagrams;
    - Compliance with Safety Requirements of NEA
    - Major Equipment Technical Specifications;
    - Energy Generation Estimation;
    - Bill of Materials and Cost Estimate;

- Detailed work schedule for EPC Work;

18. After completing the conceptual design for the Project, the Project Team shall analyse plant design variables and run cost and performance model(s) to develop an energy production profile for the Project using an industry standard model. Based on the technical analysis and conceptual design, the Consultant shall provide recommendations on how the Project Owner can operate the Project. The Consultant shall identify the factors and considerations for smooth operation of PV capacity at the Project site and recommend options for layout of the Project site to best optimize the design to accommodate the proposed MW solar PV capacity. The Project Team's recommendations shall address following infrastructure required for subsequent PV installations (i.e., foundations; racks; and enclosures for modular components such as inverters, switchgear, and controllers; site electrical collection system backbone sizing; and sizing of grid interconnection equipment such as transformers, capacitor banks and their foundations, racks and enclosures) to ensure that installation would not be constrained by the layout of the initial Project phase.
19. The Consultant shall assess interconnection requirements and develop a conceptual design for grid interconnection based on both the site assessment conducted and Nepal's Grid Code. Since the capital cost of the Project may include the substation and the associated connection costs to the national electrical grid, the Consultant shall prepare a conceptual design for the new solar PV plant and power evacuation facility to the national grid. The Consultant shall also carry out a grid connection study to assess the potential impact of the Project on the national grid and required modifications to the existing substation equipment and other infrastructure. Since a grid connection study may be required as part of Nepal's Power Purchase Agreement ("PPA") program, this grid connection study shall meet the PPA guidelines issued by the Ministry of Energy/ Nepal Electricity Authority, if applicable.
20. The Consultant's conceptual design for power evacuation shall take into account existing on- site substation equipment from the adjacent NEA Substation at, such as electric lines, substation equipment, transformers, and other auxiliary equipment that could be leveraged. The Consultant shall also provide high-level analysis and recommendations on potential options for integrating the existing infrastructure with the solar PV plant in a hybrid configuration at a future stage of operation, if find feasible. This objective of this Task will be to determine and complete:
    - Electrical Connection
    - Power Evacuation Line
    - Scheme Grid Connection Design
    - Metering
    - Power Off-take Options
    - Indication of Stability and Load Demand / Absorption
    - Identification of Suitable Grid Infrastructure
    - Scheduling
    - Interconnection Voltage
21. The Consultant shall perform the load flow analysis of the proposed power evacuation plan and develop an implementation plan for the Project, including a comprehensive plan, schedule, and timeline for the implementation of Project. The timeline shall include a list of required steps for Project implementation, including the PPA negotiations; detailed engineering design, procurement, construction; commissioning; start-up; and performance acceptance testing; indicating the estimated time required for each step, as well as milestones, including commercial operation date.
22. The consultant shall propose the interconnection system which should at least comply following: system reliability and stability, fault levels, protection system, voltage flicker and voltage rise, reverse power flows, synchronization of generators, islanded operation, safety aspect, harmonics, etc. These analyses should comply with international

standard for grid interconnection e.g. IEEE 1547. The system should not violate the statutory technical limits or standards of NEA.

23. For power evacuation to nearest NEA substation, carry out the following task;
    a. The route of T&D has to be determined through GPS tracking system which could be later seen from Google Earth too. The total T&D length should be validated based on both tape measured data and GPS tracker data.
    b. Carryout the voltage drop analysis. It is advisable not to exceed 10% of voltage drop in any section of line.
    c. Design of electric pole, insulator, cross arm, stay set and other distribution system component. It is highly recommended to refer NEA's practices of distribution system design.
    d. Design of lightning system to ensure safety of personal and equipment from lightning.
24. Based on information analyzed under previous Tasks, the Consultant shall complete a Leveled Cost of Energy ("LCOE") analysis for the conceptual design. The intent of the LCOE is to provide a high-level estimate of the anticipated capital, O&M, performance, and other LCOE cost factors for the Project. The Consultant shall include in its analysis a cash flow analysis, Life Cycle Cost Analysis ("LCCA"), market conditions, raw material availability, supply agreements, the PPA, and competing alternative methods of achieving the same or similar Project objectives. The LCCA shall consider all initial capital costs (e.g., plan, design, development, and construction) and long-term operational costs (e.g., warranties, operations, maintenance, spare parts, installation, refurbishment, and disposal).
25. The Consultant shall perform the financial analysis which incorporates all costs and benefits associated with Project implementation, including assigning monetary value to non-market goods and services, if applicable. The financial analysis may also take into account when the costs and benefits are incurred. The Consultant's economic analysis shall include a Net Present Value and any other relevant factor as determined by the Project Owner for appraising the project. The Consultant's financial analysis shall consider, at a minimum, the following items:
    - Forecasted financial statements and supporting information;
    - Forecasted sources and uses of funding;
    - Forecasted key financial ratios and financial covenants; Expenses, O&M costs, and projected revenues;
    - Inflation;
    - Cost of capital (equity finance and external debt finance);
    - Discounted value of future cash flows for the Project and discount rate used;
    - Taxes; and Development fees and success payments
26. The Consultant shall provide a rationale for the selected discount rate to ensure that the assumptions and methodologies used to select the discount rate are clear for Project Owner. Rationales may include the following:
    - Opportunity cost of capital;
    - Societal rate of time preference;
    - Zero interest rate; and
    - Cost of borrowing funds, if applicable.
27. The Consultant shall perform a sensitivity analysis related to Project risk, including, but not limited to, capital costs (from minus (-) percent to (+) percent, in increments of relevant percent, or as per applicable standard), operating and maintenance expenditure (from minus (-) percent to (+) percent, in increments of relevant percent as per applicable standard - the Project Team must provide the relevant basis on such assumptions), inflation indices where appropriate, exchange rates, and discount rate. The Consultant's sensitivity analysis may account for the cost recovery indicators based on different assumptions for key Project variables, such as electricity tariffs, sales volumes, capital and operating cost estimates, interest rates and investment requirements. The Consultant shall provide a financial model and report, including, but not limited to, net present value, payback time, internal rate of return, cash flow, and LCCA for the base case and all sensitivity analyses. The Consultant shall meet with potential sources of implementation financing and gauge level of interest and potential terms from lender(s) and equity

investor(s), and the Consultant shall determine potential combinations of debt and equity that would provide the full capital requirements for the Project. Based on the Consultant's outreach and analysis, the Project Owner shall be provided with recommendations for the financial structure of the Project.

28. The Consultant shall prepare a report of all work performed under financial analysis and Modelling, including the EPC cost estimates, O&M cost estimates, cash flow analysis, financial analysis, financial models, LCCA, and sensitivity analysis necessary to advance the development of the Project. The Consultant shall provide the Project Owner with copies of the original electronic files for all financial analysis and financial models. The Task Deliverable shall be included as a stand-alone chapter in the Final Report.
29. The consultant shall consider:
    - Design and cost estimate should be technically and economically optimized. All potential optimized solutions should be presented in the final report.
30. The Consultant shall provide an assessment of the potential development impact in Nepal if the Project is implemented according to the Study's recommendations. The Project Team's analysis of the potential development impacts shall be concrete, detailed, and based on the data and information collected during the performance of the Study. The development impact factors are intended to provide the Project's Project Owner and interested parties with a broader view of the Project's potential effects in Nepal. The Project Team shall analyze each of the indicators listed below:
    - Clean Energy Generation: A description of Nepal's physical infrastructure developed as a result of the implementation of the Project. Quantity of operational renewable electric generation capacity as a result of the Project, measured in MW.
    - Human Capacity Building:
    - Job Creation: A description of the number and type of staff, including the anticipated level of education and/or skills that would be needed to construct the Project.
    - GHG Emissions: The Consultant shall quantify the GHG emissions reduced or avoided, measured in metric tons of carbon dioxide ("CO_2"), if the Project is implemented. The study Team shall calculate GHG emissions using publicly available tools from the U.N. Framework Convention on Climate Change or an equivalent. The Consultant shall also quantify any CO_2 that may be produced if the Project is implemented (e.g., diesel backup generation).
    - Technology Transfer and Productivity Enhancement: A description of the potential knowledge and skills transfer and capacity building impacts expected from both the Project and the Study.
    - Market Oriented Reforms: A description of any regulatory, legal, or institutional changes that are recommended and the effect such changes would have if implemented.
31. The Consultant shall assess potential risks and mitigation strategies for the Project. The Consultant's risk assessment shall include, but not be limited to, risks associated with the solar PV plant during all phases of the project (e.g., planning, construction, and operation), and potential mitigation options to manage these risks.
32. The Consultant shall provide all of the details including, but not limited to, a risk analysis and recommendations for risk mitigation. The details shall be included as a stand-alone chapter in the Final Report.

4. Deliverables

The following are the expected results of the assignment:

- The consultant/ firm should be able to give a complete report of Detailed Feasibility Study using simulation softwares like PV Syst/PVSol/Helioscope.

- The report should contain Detailed cost estimation including all solar PV system components (including load management), land acquisition if any, grid connection, project costs and operational costs (i.e. all CAPEX and OPEX estimates)
- The report should contain cashflow analysis to determine project IRR/NPV. This should include sensitivities around different CAPEX, OPEX and tariff scenarios taking into considerations
- The report should contain energy yield, demand analysis and the supply system
- The report should contain the drawings of the power generation, transmission and distribution.
- The report should contain detailed description of the solar energy resources considering overview at the project area and the solar energy resources map and other meteorological data available
- The report should identify the best business model for operation and maintenance of the system.
- The report should contain Detailed project implementation schedule (Gantt chart), including work required for site survey, stakeholders' consultations to electricity grid connection

The Consultant (including the individual members of any Joint Venture) shall submit only one Proposal, either in its own name or as part of a Joint Venture in another Proposal. If a Consultant, including any Joint Venture member, submits or participates in more than one proposal, all such proposals shall be disqualified and rejected. This does not, however, preclude a Subconsultant, or the Consultant's staff from participating as Key Experts and NonKey Experts in more than one Proposal when circumstances justify.

(Note: The Detailed project report should follow the contents as per guidelines from Ministry of Energy, Water Resources, and Irrigation Government of Nepal for developing utility-scale solar PV project in Nepal)

5. Proposal Submission Guideline

The Consultant should submit Technical proposal and Financial Proposal in separate sealed envelop (counted as one proposal package). There should be seal of the firm (lead firm in case of consortium) on the envelop and each page of technical and financial proposal. The Consultant (including the individual members of any Joint Venture) shall submit only one Proposal package, either in its own name or as part of a Joint Venture in another Proposal. If a Consultant, including any Joint Venture member, submits or participates in more than one proposal, all such proposals shall be disqualified and rejected. This does not, however, preclude a Subconsultant, or the Consultant's staff from participating as Key Experts and NonKey Experts in more than one Proposal when circumstances justify. Also, CVs of the experts should be signed by respective expert.

6. Evaluation Criteria:

The method of selection will be Technical Quality and Cost Based Selection (QCBS), using 90%/10% weightings for Technical and Financial Proposals, respectively. Financial proposal of only qualified bidders who scored at least 80% In technical proposal be opened for further evaluation. The assessment areas and their corresponding weightage are as below:

Assessment Area	**Weightage**
A. Technical Quality Technical Proposals will be first evaluated and ranked on their Technical Quality, per the following elements and weightings:	
Study methodology and Approach	25%
Corporate Capabilities	5%
Relevant experiences of having carried out many KW scale mini grid projects	20%
Management approach and key personnel	40%
Subtotal Technical Score	**90%**
B. Financial Cost	

Cost Proposals associated with top-rated Technical Proposals will then be evaluated on the following elements and weightings:	
Alignment of costs with Technical Proposal elements	5%
Lowest price	5%
Subtotal Financial Score	**10%**
C. Total Score	**100%**

The Evaluation Committee will be comprised of relevant experts from NREP and AEPC.

Note: The technical and financial submission templates for evaluation are presented in the annex 5 and annex 7 respectively.

7. Key Personnel

The Bidder must propose key personnel with demonstrated experience in developing, implementing, coordinating, managing and delivering timely output. The team composition should also demonstrate the network capacity required amongst agencies related to natural resources, energy, utility, financing institutions, developers and relevant private and public agencies. The Key Personnel should also be familiar with ongoing assessment and methodologies in development inside Nepal. The professional personnel and major tasks to be undertaken by the team of expert of Consulting Firm should be as follows:

SN	Team Member	Qualification	Scope of Work
1	Senior Electrical Engineer (Team Leader)	• At least bachelor's degree in electrical engineering. • Must have relevant experience in electrical design (Power Evacuation Plan) and construction supervision. • Must have experience of design and construction supervision of grid-connected solar PV project with design experience of at least one project of MW scale. • Must have experience in load forecast, generation plan, long term and short-term transmission plan, power evacuation, and grid impact study. • Must have design experience of high voltage andmedium voltage projects. • Must have experience in the grid connection agreement and power purchase agreement and should be familiar with the grid code of NEA.	The specialist will serve as the Team Leader and supervise all the Project Team, project implementation activities, prepare and supervise reports, deliver the outputs, and achieve the outcome. The Team Leader shall lead and/or develop the Power Evacuation Plan for the proposed solar PV plant.
2	Electrical Engineer (Solar PV Expert)	• At least bachelor's degree in engineering (electrical or electronics) with specialization in power system/ load flow analysis / renewable energy. • Must have relevant work experiences in design, construction, erection, and commissioning of solar power system, earthing system, transmission line, • substations, and transformer. • Must have design experience of at least one project of MW scale	The specialist will perform the solar resource assessment, survey of existing electrical infrastructure, shade analysis, estimation of energy yield, power output calculation, power evacuation plan, Network Study, Grid Synchronization Analysis, Conduct Electricity Usage and Existing Load Profile Analysis, develop plant layout, design AC and DC system, conduct system simulations, design configurations of power electronics and balance of plant and prepare technical specifications.

		• Must have gained professional training with certification in design of solar power plant.	
3	Civil Engineer (Structure)	• At least bachelor's degree in engineering – civil • Must have relevant work experience as a civil/ structure engineer with proven experiences in survey, structure design, construction supervision, operations and maintenance works, develop technical specifications for foundations and structure, building, transmission tower, and substations with a design experience of at least one solar project of MW scale.	The specialist will supervise the Surveyor team on detailed topographic survey requirements, review topographical survey report and prepare civil design with specifications for: • Earthwork for site grading, cutting, filling, levelling, and compacting of land • Design of Foundations for Solar PV and Mounting Structure, Transmission Line Pole • Design of Equipment Rooms (LV/MV station, MV/HV station, Communications Room), Office, and Security room • Design of Water Drainage and Sewage Network • Design of Fencing of PV Plant • Prepare the calculations & details of all the design • Prepare civil operations and maintenance plan, construction scheduling, conduct civil/construction risk assessments and prepare mitigation plan, quality management plan, develop necessary calculations, design diagrams including: • Solar PV Supporting Structure Layout (Plain) & Detail Drawings • Layout Plan of Power Conditioner House, Lookout Post, Control House • Elevation View of Power Conditioner House, Lookout Post, Control House • Drawing of Foundations, Structure Drainage, and Sewage Network, etc.
4	Geotechnical Specialist	• Must have relevant experiences in geological and geotechnical assessment including investigations of soil and surface conditions, landslide mapping and collection of disaster data, land suitability maps and risk maps, and structural design. • Should be proficient in GIS application such as ArcGIS, ArcView, ILWIS, RS application such as Envi, ERDAS Imagine, and AutoCAD.	• Preliminary geological and geo-morphogical mapping of the project site. • Task 1 shall be incorporated in engineering geological map with additional information of rock and soil properties as well as if any potential discontinuity that can cause instability. Carry out basic laboratory tests for rock and soil properties (with a consent and approval of the Project Owner). • Evaluate slope instability conditions based on plus mapping of instability factors. • Prepare topographic map in 1:10,000 scale by using Surveyor. Get digital image of project site in 1:10,000 scale. • Repeat tasks 1 - 3 (Phase 1) in newly prepared topographic map (at this scale, detailed features should be mapped and shown). Determine actual investigations requirements (what geotechnical investigations and analysis is needed which is necessary for the design phase and provide recommendation on the same). • Identify proper locations for slope protection and stability measures (Cut/Fill, Compaction/Stabilization,

			Bioengineering, Retaining Wall, Drainage and Surface Water Management).
5	Financial Analyst	• At least Master's degree in finance, Business Administration, Economics • Must have relevant work experiences in developing and analysing financial models for solar projects and tariff analysis. • Must have worked as a Financial Analyst of the Utility-Scale Solar PV projects.	• Prepare Financial modelling detailing Financial Assumptions, Energy Yield, and Evaluation of Results. Detailed EPC cost estimate with cost breakdown of equipment and materials for all major components, O&M costs, Cash Flow Analysis, Payback Time, Internal Rate of Return. • Perform Financial Analysis for the selected technology specifying the investment cost (NPR/kW), Levelized Cost of Energy (NPR/kWh), Subsidies, Incentives (e.g. applied to the equipment's costs, etc.), Energy Tariffs, Costs and Benefits Analysis for different technologies, Total Cost of Ownership/Life-Cycle Costs Analysis (LCCA) of plant, Payback Time, Insurances Costs, Costs Recovery, etc. • Perform Sensitivity Analysis related to Project Risk including, but not limited to, Capital Costs, operating and maintenance expenditure, inflation indices where appropriate, exchange rates, and discount rate. The sensitivity analysis may account for the cost recovery indicators based on different assumptions for key Project variables, such as electricity tariffs, sales volumes, capital and operating cost estimates, interest rates and investment requirements. • The investment plan analysing return on investment, costs and revenues trajectory, running and recovery costs, distribution channels, risks, and profitability and performance analysis. • Determine potential combinations of debt and equity that would provide the full capital requirements for the Project. Based on the analysis, provide the Project Owner with recommendations for the financial structure and sources of financing for the Project. • Identify and assess the potential Financial Risks of the Project and recommend possible Mitigation Plan.
6	Social Safeguards Specialist	• Master's degree in Sociology with experiences in Social Safeguards studies comprising of Occupational Health and Safety, Emergency Preparedness Plan, Monitoring and Evaluation, and Preparation of Social Management Plan. • Must have worked as a Social Safeguard Specialist / Sociologists in the EIA and IEE study team for the projects.	

Corporate Qualifications:
Bidders must supply information the relevant qualifications of the proposing company or consortium in the prescribed format as presented in Annexure 4.

Relevant Experience:
Bidder must supply information on at least three relevant and successfully completed projects or assessments of similar nature and scope completed within the last five years.

Cost-effectiveness:

Bidders must propose a cost that reflect a high degree of cost-effectiveness and value for money.

8. DURATION OF THE ASSIGNMENT

It is expected that the work will cover a total period of Three (3) calendar months. The Consultant will provide all the necessary expertise and services to enable all the tasks to be completed within the agreed duration of the contract.

Deliverables and time schedule

- Inception Report: Within two weeks after signing the contract
- Field Survey: Within seven weeks after signing the contract.
- Draft Report for review: within ten weeks after signing of the contract.
- Final Report: within two weeks of receipt of panel-reviewed draft report.

The final version of each deliverable must include an Annex describing in a matrix format the comments on the draft report received from the client's counterpart team, the Consultant's response to each comment and a reference to the contents of the final report addressing the comment.

9. Instruction for Submission of Proposal

Consultancy firms, which meet the above requirements should apply by submitting their financial and technical proposal in the prescribed outline to procurementnrep@nrepnepal.com as instructed below.

- The proposal must contain Technical and Financial bids in .pdf format, which should be sent in 2 separate emails with Title as below:
    - For the technical proposal – ***Technical Proposal_ short name of the firm***
    - For Financial proposal: ***Financial Proposal _ short name of the firm_ PLEASE DO NOT OPEN UNTIL THE TECHNICAL EVALUATION IS COMPLETED***

As an administrative requirement, applicants/consultants must submit the scanned copies of a) Registration documents b) PAN/VAT certificate and c) Tax clearance certificate for FY 2076/77) along with the proposal in the time of application.

ANNEX 1: PROPOSAL TEMPLATE

PLEASE USE THIS TEMPLATE AS PER ANNEXURE TO RESPOND TO THE CALL BY 1st December 2021.
LIMIT YOUR RESPONSE TO NO MORE THAN 10 PAGES (EXCLUDING ANNEXES), PLEASE.

- **Prime Contractor Information**
  - Address
  - Point of Contact
  - Email
  - Phone Number
- **Subcontractor(s) Information** *if applicable*
  - Address
  - Point of Contact
  - Email
  - Phone Number
- **Corporate Capabilities (details to be included in the annex)**
  - Prime Contractor
  - Subcontractors(s) *if applicable*
- **Proposed Key Personnel (CVs in the annex)**
  - Prime Contractor
  - Subcontractors(s) *if applicable*
- **Technical Proposal**
  - Approach
- **Relevant Experience**
  - Prime Contractor
  - Subcontractors(s) *if applicable*
- **Completed Projects (details can be included in the annex)**
  - Prime Contractor
  - Subcontractors(s) *if applicable*
- **References**
  - Prime Contractor
  - Subcontractors(s) *if applicable*
- **Cost Proposal**
  - Level of Effort (labor) x Rates
  - Other Direct Costs
  - Total
  - Duration

ANNEX 2- PROJECT SITE

S. No.	Name of the Developer	Province	District	Rural Municipality/ Municipality	Details of Proposed Project				
					Tentative Capacity (MW)	Availability of Land	Type & Ownership of Land	Ease of access	Proximity of nearby grid (kms)
1	Harmony Solar P.L.	Lumbini	Bardiya	Thakurbaba	5	Yes	Own Land	1 km from E-W HW	1.5

ANNEX 3: SITE INFORMATION FORM **Date:**

1. General Information:

a) Survey Engineer(s) Name:
b) Survey Stage: (i) Preliminary ☐ (ii) Detailed Topographic ☐ (iii) Geo-Technical ☐

2. Project Site Details:

a) Municipality:
b) Ward No.:
c) Address:
d) Available Land Area:
e) Ownership of Land:
f) 4 Points Coordinates:
g) Elevation:
h) Road Accessibility:
i) Available Infrastructure:
j) Type of Terrain: (i) Flat ☐ (ii) Semi-Terrace ☐ (iii) Terrace ☐ (iv) Plain Slope ☐ (v) SteepSlope ☐
k) Percentage of Undulation of Land:
l) Possible Shading:
m) Type of Soil: (i) Sandy ☐ (ii) Marsh ☐ (iii) Clay/Loam ☐ (iv) Rocky/Boulders ☐ Other ☐
n) Possibility of Draining Water:
o) Source of Water for Cleaning:
p) Current Usage of Land: (i) Landfill ☐ (ii) Agriculture Land ☐ (iii) Jungle ☐ (iv) Other ☐
q) Level, Graded Surface? Yes ☐ No ☐
r) Obstructions on the Site: Yes ☐ No ☐ If Yes, mention here. For example, trees, building,etc.
s) Obstruction Below the Site: For example, water pipes, electricity cable, drainage system, etc.
t) Possibility & Level of Flood, if applicable only:
u) Proposed Bay Location & Accessibility:
v) Fencing Requirements: Yes ☐ No ☐
w) Shadow Free Area Availability:
x) Shadow Object Height:
y) Potential Solar PV Installed Capacity:
z) Any Transmission Towers Nearby Connecting the Plant to the Identified Substation: Yes No If Yes, mention here. ☐

3. Connectivity:

a) Nature of Roads (National Highway/ State Highway/ Village Road):
b) Distance from Main Road to Project Site:

4. Climate:

a) Temperature: (i) Max: ……°C (ii) Avg:……°C (iii) Min .....°C

b) Basic Wind Speed (mph):
c) Rainfall:
d) Humidity:

5. Radiation Potential:

a) Azimuth Orientation:
b) Insolation (kWh/ m²):
c) GHI:

6. Power Evacuation:

a) Point of Connection:
b) No. of Bays in Substation:
c) Space Availability for Bay Extension:
d) Proposed Bay Location (Accessibility):
e) Conductor Sizes:
f) Interface Voltage Range:
g) Bus Voltage Fault Level:
h) Transmission line distance from the substation: Aerial and along the road:
i) Transformer Capacity & Additional Capacity under construction, if applicable:
j) Current Major Load (Substation Log):
k) Network Diagram (from DCS) Collected: Yes ☐ No ☐
l) No. of Incoming Source of Substation: Load Diversion – Tapping:

ANNEX 4- GENERAL INFORMATION OF THE BIDDER

Note: separate sheets may be used wherever necessary.

1. Name and Address of the Bidder:

2. Name & designation of the concerned officer to whom all references shall be made.

3. Fax nos.:

4. Phone nos./Mobile No.:

5. E-Mail Ids :

6. Chief of the Organization:
   E-Mail Id:
   Telephone/ Mobile No:

7. Total No. of Employees/Manpower Strength:

8. Type of the organization (Public Sector/Limited/ Private Limited/Partnership/Proprietary/Consultant/Society/Any Other.)

9. No. of Officers/Centers(Enclose The List):

10. Bidder's Proposal No. & Date:

11. Particulars of Past Experience of Similar Works Furnished.

12. Any other information that bidder may like to give in order to highlight his bid.

13. Name & address of local representative, if any:

Place: Signature Of Party:

Date: Name In Full:

Designation/status:

Company seal:

ANNEX 5: TECHNICAL PROPOSAL SUBMISSION FORM

Consultant's Experience

1. List only previous similar assignments successfully completed in the last 5 (Five) years.
2. List only those assignments for which the Consultant was legally contracted by the Client as a company or was one of the joint venture partners. Assignments completed by the Consultant's individual experts working privately or through other consulting firms cannot be claimed as the relevant experience of the Consultant, or that of the Consultant's partners or sub-consultants, but can be claimed by the Experts themselves in their CVs. The Consultant should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if so requested by the Client.

Using the format below, provide information on each assignment for which your Consultant/entity, either individually as a corporate entity or as one of the major companies within an association, was legally contracted.

<table>
<tr><td colspan="2">Assignment Name:</td><td>Country:</td></tr>
<tr><td colspan="2">Location within Country:</td><td>Professional Staff Provided by Your Firm/Entity (profiles):</td></tr>
<tr><td colspan="2">Name of Client:</td><td>No. of Staff:</td></tr>
<tr><td colspan="2">Client contact details:</td><td rowspan="2">No. of Staff-Months:
Duration of Assignment: months

Approx. value of the contract (in current NPR):</td></tr>
<tr><td>Start Date (Month/Year):</td><td>Completion Date (Month/Year):</td></tr>
<tr><td colspan="2">Name of Associated Consultants, If Any:</td><td>No. of Months of Professional Staff Provided by Associated Consultants:</td></tr>
<tr><td colspan="3">Name of Senior Staff (Project Director/Coordinator, Team Leader) Involved and Functions Performed:</td></tr>
<tr><td colspan="3">Narrative Description of Project:</td></tr>
<tr><td colspan="3">Description of Actual Services Provided by Your Staff:</td></tr>
</table>

ANNEX 6: CURRICULUM VITAE (CV)

Name of the firm/Company/Agency:	
Name of the Employee:	
DATE OF BIRTH(DD/MM/YYY):	
Year with Firm (in years):	
Nationality:	
Detailed Task Assigned:	
Key Qualifications:	
Education: Institution: Year: Course: Employment Record:	
Summary of Relevant Experience:	
Language Proficiency:	
Certification: I, the undersigned, certify that these data correctly describe my qualifications, experience and confirms my availability to the firm for the proposed work should we be awarded the project.	
[Signature of Employee]	Date:
[signature of authorized representative of the firm]	Date:
Full Name of Employee: Full Name of Authorized Representative:	

NOTE: Separates sheets may be used wherever necessary.

SIGNATURE OF THE BIDDER

SEAL OF THE BIDDER

ANNEX 7: FINANCIAL PROPOSAL SUBMISSION FORM

S.N	Particulars	Man Days	Unit	Rate (NRs)	Amount	Remarks
1	2	3	4	5	6 = (3*5)	7
1	Senior Electrical Engineer (Team Leader)		Person days			
2	Electrical Engineer (Solar PV Expert)		Person days			
3	Civil Engineer (Structure)		Person days			
4	Geotechnical Specialist		Person days			
5	Financial Analyst		Person days			
6	Social Safeguards Specialist		Person days			
Other Expenses						
7	Transportation		LS			
8	DSA		Person Days			
9	Equipment and Accessories Rental		LS			
10	Professional Liability Insurance		LS			
	Total					
	Vat (13%)					
	Total including Vat					

SIGNATURE OF THE BIDDER

SEAL OF THE BIDDER