

National or International consultant: International Consultant

Description of the assignment (Title of consultancy): International Consultancy to provide the necessary technical support for the effective design, implementation, and validation of biogas projects

Project Title: Country Entrepreneurship for Distributed Renewables Opportunities (CEDRO 5) - 00118152

Period of assignment/services: 76 working days spread over 24 months

Is this a LTA (yes/no): No

Terms of Reference

1. Background / Project Description

The United Nations Development Programme, in support of the Ministry of Energy and Water, has initiated the implementation of the CEDRO 5 project, co-funded by the European Union. The CEDRO 5 project is implemented in partnership with the Association of Lebanese Industrialists (ALI), The Lebanon Green Building Council (LGBC), and the International Renewable Energy Credits (I-REC) Institution.

The European Commission (EC) is encouraging innovation and entrepreneurship in Lebanon to support a clean energy transition. The overall aim of the EC is to address job creation and growth in support of Lebanon's economy, in line with the priority sector of the Single Support Framework for EU Support to Lebanon (2017-2020), while supporting Climate Change Mitigation in Lebanon. The specific objective is to promote innovation, entrepreneurship, and job creation in support of Lebanon's clean energy transition and Nationally Determined Contributions (NDCs) for the energy sector. The EC proposes the gradual shift towards a clean energy transition (gradual phasing out from fossil fuels by switching to renewable energy sources) and circular economy principles, paving the way for (1) tapping into the potential for green jobs and growth (in particular in the energy sector), (2) alleviating financial and economic burden of the current energy system on the various sectors and sub-sectors of Lebanon, (3) facilitating access to financing, and (4) improving the linkages amongst green entrepreneurship, small-and-medium sized enterprises (SMEs), industries and research/technology centers.

The CEDRO 5 project aims to achieve the above outlined objectives through enhancing innovation, entrepreneurship, and research, assisting in technology transfer and the creation of new value chains in the renewable energy and energy efficiency sector, supporting and initiating enabling policy, training and capacity building, and targeting effective awareness initiatives on renewable energy (RE) and energy efficiency (EE).

2. Scope of work, responsibilities and description of the proposed analytical work

UNDP are responsible to secure the 5 beneficiaries for industrial and/or commercial institutions for the biogas technology interventions.

The facilities targeted for the biogas plants assessments are:

- From animal farms and/or slaughterhouses,
- From agro-food industry or the commercial sector such as supermarkets, caterers...
- From municipal solid waste sorting plants where sorting at source has taken place

The selection of the 2 facilities will be done by CEDRO team in close coordination with the international consultant.

The objective of the international consultant is to provide the necessary technical support for the effective design, technical specifications drafting, monitoring of implementation of biogas activities, and technology transfer.

This includes:

- Task 1: Prefeasibility studies for 5 different selected facilities**
- Task 2: Support in the design, technical specifications drafting, and monitoring of implementation of end-use biogas projects in various commercial and/or industrial facilities across the Lebanese Territory;**
- Task 3: Support the process of technology transfer for the implemented biogas application for Lebanon;**
- Task 4: Assessment of an existing biogas plant and validation of the report done for the rehabilitation of the plant**

The technical backstopping services will include the following:

Task 1 Prefeasibility studies for 5 different selected facilities

The objective of the Task 1 is to provide the CEDRO 5 team with a preliminary and concise overview assessment on the potential applicability, scope (e.g. optimal sizing, technology), and required budget estimation for up to five prospective sites in specific:

- 1.1.1 Data acquisition list preparation to assess the applicability of a biogas plant
- 1.1.2 Assess the applicability of a biogas plant for the selected beneficiary sites based on their submitted application form data and establish the timeframe and major milestones for the proposed works;
- 1.1.3 Identify suitable biogas plant solution including recommendation on minimum technical requirements;
- 1.1.4 Basic concept of biogas systems including digester technology that matches selected site's feedstock, temperature of the surrounding environment, pH values, and other operating parameters in addition to the integration in existing network;
- 1.1.5 The guidelines for each site in terms of storage and utilization of the biogas. Both cooking and/or electricity as an output is expected. Guidelines for any civil work requirements per identified/selected site;
- 1.1.6 Estimation of total budget for the proposed system;

- 1.1.7 Prefeasibility Report and communication (PowerPoint presentation including the recommended solution, estimated budget, and yearly energy produced with clarification if needed) for each site

The international consultant will be required to review up to five sites and recommend the most feasible. All necessary preliminary data needed will be provided, upon guidance on the required data types/parameters from the consultant, by the UNDP CEDRO team.

Task 2 Support in the design, technical specifications drafting, and monitoring of implementation of end-use biogas projects in various commercial and/or industrial facilities across the Lebanese Territory;

The international consultant will be required to develop the **full technical specifications** for two biogas plants out of the five predefined sites to which a prefeasibility study was undertaken.

In order to develop the full technical specifications, the international consultant will be required to undertake the following:

2.1 Support in the design of the selected beneficiary sites

After choosing the two (out of the five assessed sites) beneficiary sites, the international consultant is responsible to:

- 2.1.1 Prepare the necessary biogas technical specifications and tender documents for the procurement of goods and services for all proposed works. The Tender documents and technical specifications will include: design and engineering specifications (complete with sizing notes); equipment specifications; installation requirements; testing and commissioning procedures; monitoring and verification methods; warranty arrangements, evaluation criteria, etc. 2 complete technical specifications and supporting documentation are required;
- 2.1.2 Assist in replying to queries by prospective contractual bidders, and in the review and evaluation of the received bids/offers including the preparation of bid evaluation reports in line with UNDP requirements;
- 2.1.3 Assist in the establishment of general work procedures for contractors, including: supply schedules, goods inspection and certification, quality control and assurance procedures and measures, receipt of goods procedures and arrangements, standard site work formats, etc.

Bidding documents will include the technical specifications for each of the identified solution.

2.2 Support in the supervision of the selected pilot projects

- 2.2.1 Develop checklists for the following: site supervision; operation and maintenance (O&M) (taking into consideration suppliers' recommendations); performance monitoring, and data collection and evaluation – for each site;
- 2.2.2 Support the review of certificates of works, and provide advice to address problems that may arise during the execution of works; as well as advice on handover arrangements and spare parts arrangements;

- 2.2.3 Undertake selected and targeted site supervision and performance testing;
- 2.2.4 Follow-up with the UNDP team to support in the supervision of pilot sites and troubleshoot technical issues that may arise during implementation and/or operation;
- 2.2.5 Assist in capacity building on the operation and maintenance of biogas solutions for the facility teams of the selected sites (through guiding winning contractors that will be responsible for O&M training for the facilities respective staff)
- 2.2.6 Prepare commissioning report for all completed sites

Task 3: Support the process of technology transfer for the implemented biogas applications for Lebanon

The process of technology transfer of the biogas technology will be achieved through three main tasks where the international consultant has to develop and deliver a capacity building program based on the biogas technology types. More specifically:

3.1 Technology Transfer Activities

The international consultant is to develop and deliver one technical workshop detailing the biogas technology deployed by the projects. The target audience will include: engineering professionals in the field, facility managers and engineers, and final year engineering students. The CEDRO 5 team will be in charge of organizing and covering the financial costs of the local logistics related to the capacity building workshop. The workshop will focus on the following:

- Introduction to the technology (general);
- State of the technology (from a technical / financial feasibility perspective);
- Design process (data collection, needs identification, sizing / process identification, developing specifications, implementation guidelines, testing and commissioning, operation and maintenance);
- Implementation procedures and case study examples;
- Questions and answers.

3.2 Guideline Report

The international consultant is to prepare a Guideline Report for the Lebanese context on applicable biogas technology types (stirred tank reactor, plug flow reactor, up-flow anaerobic sludge blanket, and/or an expanded granular sludge bed). The report will feature the following sections:

- Procedures for sizing and design;
- Recommended specifications for system components;
- Installation best-practices;
- Operation and maintenance standards and procedures, and;
- Financial appraisal of the systems.

The report shall be prepared in English and must be proof-read by English-writing editors for publication objectives. An executive summary is required.

3.3 Assessment for biogas potential in Lebanon

The international consultant shall prepare an assessment report for biogas potential in Lebanon where he/she shall review all the currently available data and information on biogas in Lebanon, including yet not limited to the National Bioenergy Strategy for Lebanon (UNDP-CEDRO, 2012 - <https://www.cedro-undp.org/Library/Assets//Gallery/Publications/Bioenergy.pdf>), and list the potential projects that require further investigation and validation, through site visits and/or interviews in addition to the legal aspects stating what rules and regulations need to be set and advocated for to create this value chain in Lebanon.

Task 4 Assessment of an existing biogas plant and validation of the report done for the rehabilitation of the plant

In 2014, a biogas unit at a Solid Waste Composting Facility was implemented consisting of the below main items in addition to all accessories needed for a proper operation. Unfortunately, the biogas plant is not functioning:

- 2x100KW (85m³/hr each) co-generators
- 150 m³/hr Dehumidifier with blower
- 150 m³/hr Desulfurization
- 150 m³/hr torch
- 30 m³ buffer tank

In July 2018, an international biogas expert firm assessed the site and drafted a detailed report on the equipment and works needed to make it functional again with a detailed BOQ for the cost of the rehabilitation.

The international consultant will be required to undertake the following:

- Conduct a site visit to assess the site
- Revise the written report (UNDP will share the report in due time)
- Draft a new report validating the old report and identifying additional works needed for a good operation of the biogas plant and PowerPoint presentation

3. Expected Outputs and deliverables

The deliverables are to be submitted in stages of draft and final. Each deliverable is to be submitted in the form of a soft copy to the CEDRO 5 team. The time needed by the CEDRO 5 team for the review of each submitted deliverable is 5 working days. All deliverables are to be submitted in the English Language. The Required deliverables under the terms of reference are:

Table 1 Expected Deliverables

Deliverables/ Outputs	Estimated Duration to Complete	Expected Target Due Dates	Exp. No. of working day(s) in Lebanon over 6 trips	Review and Approvals Required
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Deliverable 1: Techno-financial feasibility study (Tasks 1.1.1-1.1.7 for 2 sites)	6 working days	2 months after contract signature		Reviewed and approved by the CEDRO 5 team
**Deliverable 2: Task 4 report and presentation (Task 4)	8 working days (Including trip to Lebanon)	3 months after contract signature	1 trip to Lebanon for 3 working days	
Deliverable 3: • Techno-financial feasibility study (Tasks 1.1.1-1.1.7 for 3 sites)	9 working days	5 months after contract signature		
Deliverable 4: • Site inspection report for beneficiary site 1 • Full technical specifications for beneficiary site 1 • Assist PMU in clarifying procurement related questions • Report on the evaluation of bids • General work procedures for contractors and checklists (Tasks 2.1.1-2.1.3 & 2.2.1-2.2.5 for 1 site)	15 working days (including trips to Lebanon)	10 months after contract signature	2 Trips to Lebanon: ○ 3 working days for the detailed assessment for site 1 ○ 5 working days for Site visits during implementation or testing & commissioning of biogas site 1	
Deliverable 5: • Site inspection report for beneficiary site 2 • Full technical specifications for beneficiary site 2 • Assist PMU in clarifying procurement related questions • Report on the evaluation of bids • General work procedures for contractors and checklists	15 working days (including trips to Lebanon)	15 months after contract signature	2 Trips to Lebanon: ○ 3 working days for the detailed assessment for site 2 ○ 5 working days for Site visits during implementation or testing & commissioning of biogas site 2	

(Tasks 2.1.1-2.1.3 & 2.2.1-2.2.5 for 1 site)				
Deliverable 6: <ul style="list-style-type: none"> • Prepare the commissioning report for implemented site 1 (Task 2.2.6 for 1 site) • Technology transfer workshop (Task 3.1) 	7 working days	18 months after contract signature		
Deliverable 7: <ul style="list-style-type: none"> • Prepare the commissioning reports for implemented site 2 (Task 2.2.6 for 1 site) • Development of guideline report (Task 3.2) 	8 working days	20 months after contract signature		
Deliverable 8: <ul style="list-style-type: none"> • Assessment report for biogas potential in Lebanon (Task 3.3) 	8 working days (including trips to Lebanon)	24 months after contract signature	1 trip to Lebanon for 8 working days for the Assessment for biogas potential in Lebanon	

**Additional site visits could be accepted if the consultant considers this necessary*

The payments shall be affected per deliverable after acceptance by UNDP of the invoice submitted by the Consultant, upon achievement and approval of deliverables.

4. Institutional arrangements

Under the framework of the present consultancy, the consultant will be supported by the CEDRO 5 team. The selected consultant will be working under the direct supervision of the UNDP / Energy and Environment Programme and in coordination with the CEDRO 5 team.

The work will be done partially remotely with the support of CEDRO 5 team from Lebanon, and there will be 6 trips to Lebanon expected (details in section 5. Duty station).

The CEDRO 5 team is responsible to secure the beneficiaries and collect the main data from the stage **1.1 Support in the prefeasibility preparation of 5 project beneficiary sites**.

In addition to that, CEDRO 5 team will be in charge of organizing and covering the financial costs of the local logistics related to the capacity building workshop.

5. Duration of work

The present assignment is expected to last for 76 working days over a span of 2 years, effective from contract signature date. The time required for deliverable review is 5-working days. Work is expected to start **immediate** after Contract signature.

The approval of the submitted deliverables (as detailed in Section 3 above) will be based on clearance and review of the CEDRO 5 project manager.

Payment will be issued upon satisfactory completion of the required outputs.

The awarded party has to comply with the terms of reference of this consultancy service, and to have all deliverables submitted and approved before/by the last working day of the consultancy period. Extensions, if deemed necessary, can only be granted through mutual agreement between the parties.

The general expected and tentative timeline of tasks 1,2, and 3 is spread out over a period of 24 months from contract signature.

6. Duty station

No former duty station is foreseen for the assignment; the work will be done remotely with the support of CEDRO 5 team from Lebanon.

As outlined in Table 1, 6 site visits are expected over the course of the consultancy.

7. Requirements for experience and qualifications

The Individual Consultant should possess the following minimum qualifications:

I- Academic Qualifications:

- a. Bachelor's degree in mechanical engineering, chemical engineering, renewable energy, biomass/biogas or related field (required)
- b. Masters' degree in mechanical engineering or related field with focus on renewable energy (is a plus)

Copy of degrees / certifications must be submitted for full evaluation grading.

II- Years of Experience:

At least 7 years of experience in conducting feasibility studies and detail design of biogas systems

III. Technical experience:

- Overall relevant experience in biogas sector of not less than 7 years - The bidder should submit proof of completed assignment.
- Experience in preparation of tender document and elaboration of technical specifications
- Experience in working with UNDP or other local or international non-governmental organizations on biogas design and/or implementation.

List of completed projects (to be accounted for in the experience) should be provided listing: project name, nature of work completed, year of completion, description of type of facility. Failure to submit the here mentioned information, the criterion will not be considered.

IIV. Competencies:

- Ability to work with tight deadlines amending based on the CEDRO team's feedbacks.
- Strong analytical and report-writing skills
- Excellent interpersonal and communication skills
- Commitment to team and cross-disciplinary work
- Emphasis on delivery of results and reacts well to constructive criticism
- Proficiency in English

8. Scope of Price Proposal and Schedule of Payments

Payment	Deliverables	Potential dates
8%	Deliverable 1: Techno-financial feasibility study for sites 1 and 2 (Tasks 1.1.1-1.1.7 for 2 sites)	2 months after contract signature
10%	Deliverable 2: Task 4 report and communication (Task 4)	3 months after contract signature
12%	Deliverable 3: Techno-financial feasibility study for sites 3,4, and 5 (Tasks 1.1.1-1.1.7 for 3 sites)	5 months after contract signature
20%	Deliverable 4: <ul style="list-style-type: none">• Site inspection report for beneficiary site 1• Full technical specifications for beneficiary site 1• Assist PMU in clarifying procurement related questions• Report on the evaluation of bids• General work procedures for contractors and checklists (Tasks 2.1.1-2.1.3 & 2.2.1-2.2.5 for 1 site)	10 months after contract signature
20%	Deliverable 5: <ul style="list-style-type: none">• Site inspection report for beneficiary site 2• Full technical specifications for beneficiary site 2• Assist PMU in clarifying procurement related questions• Report on the evaluation of bids• General work procedures for contractors and checklists (Tasks 2.1.1-2.1.3 & 2.2.1-2.2.5 for 1 site)	15 months after contract signature
10%	Deliverable 6: Prepare the commissioning reports for implemented site 1 (Task 2.2.6 for 1 site) Technology transfer workshop (Task 3.1)	18 months after contract signature

10%	Deliverable 7: Prepare the commissioning reports for implemented site 2 (Task 2.2.6 for 1 site) Development of guideline report (Task 3.2)	20 months after contract signature
10%	Deliverable 8: <ul style="list-style-type: none"> Assessment report for biogas potential in Lebanon (Task 3.3) 	24 months after contract signature

Payment will be done upon full completion of the mentioned deliverables as set in the Terms of Reference, and upon submission of certificate of payment that shall be reviewed and validated by E&E Program Manager. Living allowances for Lebanon and travel cost will be paid with each relevant deliverable after UNDP acceptance.