



United Nations Industrial Development Organization

TERMS OF REFERENCE (TOR)

Title: Request for technical assistance for a study on forest biomass energy conversion

CTCN request reference number: 2019000036

Countries:

Central Africa: The Republic of the Congo, the Democratic Republic of the Congo, the Central African Republic, the Republic of Cameroon, the Gabonese Republic, the Republic of Equatorial Guinea, the Republic of Chad, the Republic of Burundi

West Africa: The Republic of Senegal, the Republic of Côte d'Ivoire, the Republic of Mali, Burkina Faso, the Togolese Republic, the Republic of Benin

East Africa: The Republic of Djibouti

1 BACKGROUND INFORMATION

The Climate Technology Centre and Network (CTCN) is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and hosted by the United Nations Environment Programme (UN Environment) in collaboration with the United Nations Industrial Development Organization (UNIDO) and supported by 11 partner institutions with expertise in climate technologies. The mission of the CTCN is to promote accelerated deployment and transfer of climate technologies at the request of developing countries for energy-efficient, low-carbon and climate-resilient development.

These requests for Technical Assistance (TA) are being submitted to the CTCN by the National Designated Entity (NDE) of the respective country. The scope of services under these Terms of Reference shall be executed based on a restricted solicitation process. By mandate, only accepted Members of the CTC Network are eligible to execute the required services to implement the response. Should the bidder partner with another institution to deliver a minor part of the services described in these Terms of Reference, it is expected that the partner institution also joins the CTC Network.

In case you are not a CTC Network member yet, you may bid for implementation of the technical assistance, subject to the condition that you submit your completed application for CTC Network membership before the bid closure and the same is acknowledged by the CTCN. Furthermore, the contract award – should your bid be selected – is conditional to your network membership application having been successfully approved by the Director of CTCN. Should the bidder partner with another institution to deliver the services described in these Terms of Reference, it is expected that the partner institution also joins the CTC Network.

The maximum estimated budget for this contract is USD 305,000.

It is mandatory for the implementer(s) to allocate at least 1% of the budget to integrate a gender-approach to the activities. Please refer to the CTCN Gender Mainstreaming Tool for Response Plan Development for



United Nations Industrial Development Organization

guidance at <https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development>.

2 CONTEXT OF THE ASSIGNMENT

Demand for energy wood (wood charcoal and firewood) in the countries in the COMIFAC area is and has been a direct cause of deforestation and forest degradation in the Congo basin. This growing demand is due to the combined effect of the following three underlying causes: (i) population growth, (ii) the absence of alternative energy sources appropriate for low-income populations, and (iii) inefficient production and use of wood charcoal.

To mitigate this challenge the Government of the Republic of the Congo, the Democratic Republic of the Congo, the Central African Republic, the Republic of Cameroon, the Gabonese Republic, the Republic of Equatorial Guinea, the Republic of Chad, the Republic of Burundi, the Republic of Senegal, the Republic of Côte d'Ivoire, the Republic of Mali, Burkina Faso, the Togolese Republic, the Republic of Benin and the Republic of Djibouti approached the CTCN for a technical assistance.

In order to address this challenge the CTCN has developed these Terms of Reference, outlining an intervention that will produce the outputs listed below and that will be implemented within a period of up to 12 months. The overarching goal is to identify the options for economical industrial conversion of forest waste through projects with a significant positive climatic and social impact.

The assignment will consist of the following outputs:

- Identification of the source of forest residues in the forest supply chain. Identification of hot spots of wastes in the supply chain in order to map the sites where the greatest amount of waste is generated;
- Determine the requirements and availability of technologies for converting the identified biomass resources;
- Assessment of the sustainability of the suggested bioenergy solutions;
- Identification of pilot projects.

The full text of the request submitted to the CTCN can be found here: <https://www.ctc-n.org/technical-assistance/requests/study-valorization-forest-biomass-waste-energy>

The Response plan developed in collaboration with the countries can be found here: <https://www.ctc-n.org/content/study-valorization-forest-biomass-waste-energy-0>

The specific activities are detailed in section 3.



United Nations Industrial Development Organization

3 OBJECTIVE OF THE CONTRACT

The objective of this contract is to assess the status of the 14 participating countries on the bioenergy potential from sustainable biomass sources, such as wood waste from forest harvesting operations and industry.

Scope and activities of the proposed contracted services

In case of Contract award, the CTCN will organize a kick-off call among all relevant parties involved in the request to introduce the Contractor to the NDEs and Proponent. This kick-off virtual meeting shall present the activities, their timeline and clarify roles and responsibilities.

The Contractor shall undertake the following activities:

Output 1: Development of implementation planning and periodical reporting documents

Activity 1.1: Preparing the consultancy work plan, periodical progress reports and final reports.

Deliverable 1.1: A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organizations and detailed budget to implement the CTCN response plan. The detailed work plan and budget must be based directly on the CTCN response plan included in the tender package, as per CTCN standard procedure in all technical assistances (In English). The response plan framework represents the basic common structure of the work.

Deliverable 1.2: Based on the work plan, a monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation. The monitoring and evaluation plan should apply selected indicators from the Closure and Data Collection report template and enable the lead implementer to complete the CTCN Closure and Data collection report at the end of the assignment (in English).

Deliverable 1.3: A two-page CTCN Impact Description formulated in the beginning of the technical assistance and update/revised once the technical assistance is fully delivered (a template will be provided) (in English).

Deliverable 1.4: A Closure and Data Collection report completed at the end of the technical assistance (a template will be provided) (in English).

Output 2: Identification of the source of forest residues in the forest supply chain in order to map the sites where the largest amount of waste is generated.

Activity 2.1: Map the forest supply chain in the selected countries.

During this initial activity, it is fundamental that countries NDEs support the data collection phase. The NDE should act as focal point for the country in this process to help the local consultant to obtain all the



United Nations Industrial Development Organization

needed information in order to assess the biomass potential. Other studies and projects that may have been already prepared should be mentioned and provided to the consultant. The implementer will closely liaise with the country to make sure that the mapping task is satisfactorily completed. Due to the large number of countries involved, it is suggested that a NDE from Central Africa and a NDE from West Africa will act as focal points for the sub-regions in order to facilitate the communication task of the consultant.

- i) Mapping actors involved in the supply chain;
- ii) Mapping flows of wood and their wastes;
- iii) Georeferencing of the links where wood waste is generated in the supply chain.

Activity 2.2: Quantify the waste generated in each link of the supply chain

- i) Define calculation formulas for the quantification of wood waste in each link of the wood supply chain;
- ii) Prioritize chain links where there is greater potential to generate bioenergy products by quantity, costs and current uses.

Activity 2.3: Assess the feasibility of a pilot project.

It must include the assessment of wood energy plantations (new forests) to support the sustainability of raw materials identified and to increase the conservation potential (the assessment must show factors such as conditions for access to financing, forest species, land size focus in a medium-size, and others factor related, for a given country with the best feasibility conditions).

Deliverable 2.1: A report with the collected information that explains how supply chains work and at what points the greatest amount of wood waste is generated

Deliverable 2.2: A map that presents the geographical location of the hot spots of wood waste generation in the mapped supply chains.

Deliverable 2.3: A report on the projects feasibility analysis and the prioritization methodology to select the pilot project.

Output 3: Determination of the requirements and the available technologies for converting the identified biomass resources.

The thermochemical composition of forest biomass differs from one forest to another. This means that bioenergy technologies must be specific for feasible solutions according to the context of each selected country.

Activity 3.1: Identify the energy demand by sector in the selected countries and identify in which sectors the forest biomass potential can contribute, considering the current problem of traditional biomass consumption.



United Nations Industrial Development Organization

Activity 3.2: For the options identified in Activity 3.1, determine the most appropriate conversion technologies, including pre-treatments and treatments of biomass to produce the final energy use for each identified sector.

Activity 3.3: Identify a pilot project for each identified sector. It must include budget, site design, logistics and biomass suppliers. Deliverable 2.3 will be the basis for the prioritization criteria.

Deliverable 3.1: A report on the energy demand by sector for the selected countries.

Deliverable 3.2: A report on the most appropriate conversion technologies, including pre-treatments and treatments of biomass to produce the final energy use for each sector identified.

Deliverable 3.3: A report on the identified pilot projects for each sector, including budget, site design, logistics and biomass suppliers (see deliverable 2.3).

Output 4: Assessment of the sustainability of the suggested bioenergy solutions

Many factors may influence the final performance of the suggested bioenergy end solutions. The analysis must focus on risk and benefit in environmental, socio-economic, policies, model business and funding sources factors.

Activity 4.1: Define and analyze the environmental factors (GHG emissions, pressure on natural resources, extraction of forest residues) of the suggested bioenergy end solutions.

Activity 4.2: Define and analyze the economic factors (business model, supply chain, funding sources, markets) of the suggested bioenergy end solutions.

Activity 4.3: Define and analyze the social factors (policies, traditional biomass consumption social drivers, jobs) of the suggested bioenergy end solutions.

Deliverable 4.1: Report on the analysis of the environmental factor risks and benefits identified, including recommendations of actions to mitigate risks and increase benefits.

Deliverable 4.2: Report on the analysis of the economic factor risks and benefits identified, including recommendations of actions to mitigate risks and increase benefits.

Deliverable 4.3: Report on the analysis of the social factor risks and benefits analyzed, including recommendations of actions to mitigate risks and increase benefits.

Output 5: Support the selection and the implementation of pilot projects

Activity 5.1: The information generated in Output 2 will be used to propose a pilot project in each country tailored to the local conditions. Three main criteria should guide the design: replicability, engagement



United Nations Industrial Development Organization

with local private sector and bankability. The possibility of merging projects in some of the countries with similar conditions should be taken in due account.

Activity 5.2: Prepare a concept note for a project for each of the selected countries, including an evaluation of the expected impacts.

Deliverable 5.1: A report with the pilot project selection, including the justification for selection.

Deliverable 5.2: One concept note for each of the selected countries, including an evaluation of the expected impacts (take into account output 4 deliverables).

Output 6: Organization of a workshop to present the results of the technical assistance

Activity 6.1: A final 1-day workshop will be organized to present the results of the technical assistance. Every country NDE and the implementer along with key stakeholders from the relevant sectors will be invited. The implementer and the countries will organize the workshop, and the countries will verify the possibility to co-fund this workshop, for example providing in-kind contribution providing the venue for the workshop as well as some of the necessary services for the meeting such as advertisement and dissemination. Country NDEs will help identifying another event in the region to which associate the organization of the final workshop in order to maximize visibility and increase the potential audience. Private sector representatives should be specifically targeted in order to find opportunities for match-making opportunities with the pilot projects identified in the technical assistance.

Deliverable 6.1: A workshop report that must include material (agenda, concept note, participants lists, etc.) and proceedings (final report, presentations delivered, press release, media, etc.). A final report describing the meeting outcomes will be also prepared.

4 GENERAL TIME SCHEDULE

CTCN technical assistance activities under this contract have an expected duration of up to twelve (12) months from the contract signature. However, the bidder has the option of proposing a customized duration of the activities under this contract. The proposed plan for the implementation of activities and deliveries:

Outputs	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
O1. Planning and communication documents												
D1.1 Work plan in the form of CTCN response plan template (ENG)	*											
D1.2 Monitoring and Evaluation Plan (ENG)	*											
D1.3 CTCN Impact Description (ENG)	*											*
D1.4 Closure and Data Collection Report (ENG)												*



United Nations Industrial Development Organization

O2. Identification of the source of forest residues in the forest supply chain												
A2.1 Map the forest supply chain in the selected countries.												
A2.2 Quantify the waste generated in each link of the supply chain												
A2.3 Assess the feasibility of a pilot project.												
D2.1 A report with the collected information that explains how supply chains work and at what points the greatest amount of wood waste is generated (ENG and FR)				*								
D2.2 A map that presents the geographical location of the hot spots of wood waste generation in the mapped supply chains. (ENG and FR)					*							
D2.3 A report about the projects feasibility analysis and the prioritization methodology to select the pilot project. (ENG and FR)					*							
O3. Determination of the requirements and the available technologies for converting the identified biomass resources.												
A3.1 Identify the energy demand by sector in the selected countries and identify in which sectors the forest biomass potential can contribute												
A3.2 Determine the most appropriate conversion technologies												
A3.3 Identify a pilot project for each identified sector												
D3.1 A report on the energy demand by sector for the selected countries. (ENG and FR)						*						
D3.2 A report on the most appropriate conversion technologies (ENG and FR)							*					
D3.3 A report on the identified pilot projects for each sector (ENG and FR)								*				
O4. Assessment of the sustainability of the suggested bioenergy solutions												
A4.1 Define and analyze the environmental factors of the suggested bioenergy end solutions.												
A4.2 Define and analyze the economic factors of the suggested bioenergy end solutions.												
A4.3 Define and analyze the social factors of the suggested bioenergy end solutions.												
D4.1 Report on the analysis of the environmental factor risks and benefits identified (ENG and FR)									*			
D4.2 Report on the analysis of the economic factor risks and benefits identified (ENG and FR)										*		
D4.3 Report on the analysis of the social factor risks and benefits identified (ENG and FR)										*		
O5. Support the selection and the implementation of pilot project												
A5.1 Propose a pilot project in each country tailored to the local conditions												
A5.2 Prepare a concept note for a project for each of the selected countries, including an evaluation of the expected impacts.												
D5.1 A report with the pilot project selection, including the justification for selection. (ENG and FR)											*	
D5.2 One concept note for each of the selected countries, including an											*	



United Nations Industrial Development Organization

evaluation of the expected impacts (ENG)													
O6. Organization of a workshop to present the results of the technical assistance													
A6.1 A final 1-day workshop will be organized to present the results of the technical assistance													
D6.1 A workshop report, it must include material (agenda, concept note, participants lists, etc.) and proceedings (final report, presentations delivered, press release, media, etc.). A final report describing the meeting outcomes will be also prepared. (ENG and FR)												*	

All drafts and final deliverables are subject to approval by the CTCN Climate Technology Manager, before these can be considered as completed.

5 PERSONNEL IN THE FIELD (PROFESSIONAL EXPERIENCE AND QUALIFICATIONS)

The Contractor is expected to provide the services of a team that should ideally comprise the following competencies (see Section 4 in the Response Plan for a detailed description):

Expert title	Minim qualification requirements	Necessary experience
Project coordinator	<ul style="list-style-type: none"> Environmental sciences, forestry, energy engineering or other relevant education. Master's degree in bioenergy or other relevant education. 	<ul style="list-style-type: none"> A minimum of 7 years relevant work experience in bioenergy projects. Experience in project coordination in the bioenergy sector Excellent written and communication skills in English and French Demonstrated experience in typology, assessment and management of supply chain management in developing countries, preferably in Africa.
Environmental specialist	<ul style="list-style-type: none"> Environmental sciences, forestry, energy engineering or other relevant education. Master's degree in bioenergy or other relevant education. 	<ul style="list-style-type: none"> A minimum of 7 years relevant work experience in bioenergy projects. Demonstrated experience in environmental and social impact studies. Excellent written and communication skills in English and French
Environmental economist	<ul style="list-style-type: none"> Economics or other related relevant education. Master's degree in natural resources economics, environmental economics or other relevant education. 	<ul style="list-style-type: none"> A minimum of 7 years relevant work experience in forestry and/or energy economics. Experience in project formulation and evaluation. Demonstrated experience in



United Nations Industrial Development Organization

		<p>typology, assessment and management of supply chain management in developing countries, preferably in Africa</p> <ul style="list-style-type: none"> • Excellent written and communication skills in English and French.
Bioenergy forest specialist	<ul style="list-style-type: none"> • Energy engineering, industrial engineering or other relevant education. • Master's degree in bioenergy or other relevant education. 	<ul style="list-style-type: none"> • A minimum of 5 years relevant work experience in bioenergy projects. • Demonstrated experience in the design and engineering of biomass technologies (structural and non-structural) in developing countries, preferably in Africa. • Experience in project evaluation and formulation. • Experience in bioenergy supply chains. • Excellent written and communication skills in English and French
SIG specialist	<ul style="list-style-type: none"> • Geography, forestry or other relevant education. • Master's degree in SIG. 	<ul style="list-style-type: none"> • A minimum of 5 years relevant work experience in mapping and algorithms to estimate logistics feasibility. • Excellent written and communication skills in English and French
Consultant	<ul style="list-style-type: none"> • Forest engineering, business administration or other relevant education. 	<ul style="list-style-type: none"> • Experience in conducting surveys, tabulation, project analysis, data collection, forest waste quantification. • Excellent written and communication skills in English and French.
Gender expert (national/international)	<ul style="list-style-type: none"> • Postgraduate university degree in social or natural sciences or another relevant discipline, preferably with a specialization in gender, forestry and/or energy. 	<ul style="list-style-type: none"> • A minimum of 5 years' practical experience in the field of gender equality and gender mainstreaming. • Formal training in gender analysis and gender planning and demonstrated expertise in mainstreaming gender in projects and programmes in sectors relevant to forestry, biomass value chain in Africa and/or bioenergy. • Proficiency in reading, writing and speaking English and French and must be able to communicate with stakeholders effectively.



United Nations Industrial Development Organization

The CVs of the respective experts assigned to this assignment by the Contractor must be provided.

Full qualification requirements for the contractor, including specific requirements of the proposed team are in the Evaluation criteria, which is an annex to this ToR.

6 LANGUAGE REQUIREMENTS

The working language for the purposes of this assignment is English and French, thus an excellent command of English and French is required for the proposed personnel. The deliverables must be submitted in the language specified in section 4.

All delivered documents must be of such a quality, that no further editing shall be required.