United Nations Industrial Development Organization

TERMS OF REFERENCE (TOR)

Title: Ocean Energy Technical Pre-Feasibility Study

CTCN request reference number 2020000016

Countries: Nauru

27 July 2020

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 co-hosted by the United Nations Environment (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 development 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. Eligible requests are processed by a group of selected experts who develop a Response Plan. The scope of services under these Terms of Reference shall be executed based on a restricted solicitation process where only accepted Members of the CTCN Network, are eligible to submit proposals.

In case you are not a CTCN network member yet, you may bid for implementation of the technical assistance, subject to the condition that you submit your completed application for CTCN Network membership before the last date of 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. The requirement to join the CTCN network is only relevant to the main bidder and no sub-contractors.

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 guidance at https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-toolresponse-plan-development

The maximum estimated budget for this contract is USD 217,800**.**

2 PROJECT CONTEXT

The main contribution of the Republic of Nauru to climate change mitigation is the implementation of its Energy Road Map (NERM) 2014-2020 in order to reduce greenhouse gas emissions and achieve energy security by reducing reliance on imported fuel.

The specific targets of the NERM by 2020 are:

• 50% of grid electricity supplied from renewable energy sources.

• a 30% improvement in energy efficiency in the residential, commercial and government sectors.

In order to achieve these objectives, as the Republic of Nauru has limited land due to existing, intense phosphate mining, alternative renewable energy options (such as ocean energy) need to be assessed and mapped.

As per a study[1] conducted, Ocean Thermal Energy Conversion are found to be competitive in various markets in coastal and island countries, globally. Amongst the various markets worldwide, the Pacific Island countries are expected to be most promising pertaining to the cost of oil-fired power, the demand for desalinated water, potential of aquaculture and the social benefits of this clean energy technology.

Furthermore, the enormous potential of ocean energy in Nauru is long known as the world's first OTEC pilot plant was set up in Nauru by the Japanese Tokyo Electric Power company in 1981. It was the highest power OTEC plant ever operational and the first and last to feed power to an operating commercial grid. Due to extreme weather events, this OTEC plant is not operational anymore because of the damage made to the plant pipes.

Since the installation of the OTEC pilot plant in 1981, there have been significant improvements in OTEC technology and design, with side benefits such as the production of large amounts of fresh water. With the very rapid drop-off beyond the reef in Nauru, there is an opportunity for OTEC energy development in the country. Construction techniques have now also improved to become climate-proof.

However, the Republic of Nauru lacks technical and financial resources as well as in-country expertise to conduct a pre-feasibility study and assess the potential of OTEC in comparison to other ocean energy possible solutions. Therefore, Nauru is requiring external technical assistance to collect in-situ data and conduct a technical, socio-economic and financial analysis of an OTEC plant project in comparison to other ocean energy potential solutions.

A request is made to CTCN to support on conducting a pre-feasibility study on Ocean energy technology for Nauru. This pre-feasibility study will collect data and assess the technical, socio-economic and financial potential of different ocean energy technologies (wave, tidal and thermal) aligned with the requirement to fill the template for the GCF concept note. A special focus will be given to ocean thermal energy conversion (OTEC) technology since it is expected to be the most viable option in the context of Nauru and may have significant water security co-benefits. Indeed, because of the absence of water supply in Nauru, the major contribution of usable water is generated using electricity powered reverse osmosis

[1] *https://www.nrgexpert.com/markets-ocean-thermal-energy-conversion/*

systems and is delivered by diesel powered trucks. OTEC technology could provide very valuable byproducts such as freshwater or nutrient rich cold water (improving marine life or aquaculture practices).

The request and response plan with other details about it can be accessed from the following link:

https://www.ctc-n.org/technical-assistance/projects/ocean-energy-technical-pre-feasibility-study

3 AIM OF THE CONTRACT

The contractor is expected to take full responsibility for the satisfactory execution of the technical assistance described herein. All activities will be conducted under the close supervision of Regional Manager in CTCN and with the National Designated Entity (NDE) in Nauru.

The objectives of the technical assistance project are:

- Preliminary preparation for the pre-feasibility study with data monitoring
- Pre-feasibility study with socio economic assessment
- GCF note development with the data and findings generated

Scope and activities of the proposed contracted services

The Contractor/ implementer is expected have thorough understanding of the requirements through this ToR, Signed Response Plan and the request to undertake the following activities in the timeline indicated:

Output 1: Planning and communication documents

Activity 1: Development of implementation planning and communication documents in CTCN templates

A 1.1: Kick off discussion on the project

A 1.2: A work plan detailing activities, respective deliverables, outputs, timelines and responsible persons/organizations and detailed budget to implement the Response Plan, meeting the requirements of the Response Plan.

A 1.3: Monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used for timeliness and appropriateness of the implementation. The 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.

A 1.4: A two-page CTCN Impact Description formulated in the beginning of the technical assistance and update/revised once the technical assistance is fully delivered based on the template provided by CTCN. The template will be provided by CTCN.

A 1.5: A Closure and Data Collection report is to be completed at the end of the technical assistance. The template will be provided by CTCN in the beginning of the activity.

Deliverables 1
D 1.1: Minutes of Kick off meeting discussion
D 1.2: Detailed work plan
D 1.3: Monitoring and evaluation plan
D 1.4: CTCN Impact Description
D 1.5: Closure and Data Collection template and report

Output 2: Preliminary technical preparation conducted

This output will undertake the deployment of scientific equipment in pre-identified areas based on the existing bathymetry data from 2005. Pressure sensors, current meters, CTD (Conductivity, Temperature, Depth) instruments will be deployed in order to capture the water column temperature and identify the most appropriate technology to develop (wave, tidal or thermal energy) as well as the most appropriate sites.

A 2.1: *Background data analysis and site selection*

i. The sites identified based on the bathymetry data from 2005 will be validated in consultation with the NDE and PP. The suitability of the site from the operational aspects of the technologies will also be discussed.
ii. The objective of this activity is also to consider the social and environmental aspects of the proposed sites. Hence, if suggested by NDE and PP, the communities or their representatives would also be consulted for site selection.
iii. Based on i and ii, a list of identified sites and ocean-based energy will be the outcome of this activity with suitable supporting reasoning. Besides technical feasibility, the selected site should also consider the sustainable operation of the proposed technology with climate-proofing to stand extreme weather events.

A 2.2: *Deployment of monitoring equipment, data collection and processing*

The objective of the data collection is to further analyze and document the suitability of the selected sites (1 or 2 sites) and the ocean energy generation technologies to undertake the prefeasibility study.

i. The data set, templates for capturing raw data, data monitoring tenure and work sheet will be designed in consultation with NDE/PP or any relevant stakeholders identified by Nauru Government.

ii. The data sets will be captured through the equipment like Pressure sensors, current meters, CTD (Conductivity, Temperature, Depth) that will be deployed with the logistic support from Nauru Government. The monitoring equipment and the local travelling is to be borne by the implementer.

Deliverables 2

2.1: A report including:

i. List of sites identified with potential ocean-based energy generation technologies
ii. Approaches for site selection
iii. Equipment used for data collection
iv. Data- Data collection process and Data sets (raw and processed data)

2.2: Working sheets including the raw data and data analysis

Output 3: Pre-Feasibility of the identified technologies conducted

The output will undertake a prefeasibility study of the selected technology and site based on technical, social, environmental and economic aspects. The approach used for undertaking the study and the outcomes will be consulted with the stakeholders comprising the communities and the Government agencies.

A 3.1: *Technical pre-feasibility (commissioning and operational aspects)*

i. The scientific data collected through the monitoring equipment will be processed and used to analyze in systemic way, the most suitable sites for the different ocean energies (wave, tidal or thermal) to provide both renewable energy-based electricity and water security to the island. Particular attention will be given to OTEC technology since it is expected to be the most cost-effective for the Republic of Nauru.
ii. The pre-feasibility study will address but not limited to the following:
    a. Overview of technology and state of the art
    b. Potential size
    c. Performance and cost
    d. Challenges and barriers with references from other projects
iii. Besides technical implementation to produce renewable energy, the pre-feasibility study shall also consider the following
    a. sustainable operation of the plant throughout the technical lifetime of the technology with climate proof ability to stand extreme weather conditions
    b. fresh-water production through desalination

c. undertake the feasibility of the potential of Aquaculture along with the OTEC. The feasibility will be conducted in consultation with stakeholders aligning with the National Act on Coastal Fisheries and Aquaculture[2]

A 3.2: *Socio- Economic and financial analysis*

This activity will cover a socio-economic analysis, weighing the socio-economic costs against the socio-economic benefits of each ocean energy technology (incl. distributive aspects). It will also include a financial analysis[3], assessing the viability and profitability of each technology as well as the different financing options. This analysis will also take into consideration environmental impacts of the development of ocean energy technologies.

i. Required data will be collected regarding the demography (focusing on the communities of the identified sites), biodiversity in the coastal areas and financial data on the identified ocean energy technologies from primary and secondary sources
ii. Socio economic impact assessment be conducted using globally recognized approach but applicable to the local conditions. For example, if MCDA tool is used, it should be designed to accommodate the aspects of the targeted communities on gender inclusiveness, employment, food and water security and capacity building.

Financial analysis will be conducted to assess the profitability of the selected ocean-based energy technologies and various financing options will be identified.

A 3.3: *Pre-feasibility report and stakeholder consultations (Communities and Government)*

i. The analysis conducted on technical aspects under 3.1 will be complemented by the socio economic and financial analysis undertaken in Activity 3.2 to package and present under the draft pre- feasibility study.
ii. Tools like Multi Criteria Decision Analysis (MCDA) will be used to undertake the prefeasibility of the selected technologies.
iii. The underlying tool and the draft outcomes of the report will be consulted with stakeholders comprising the communities and Government agencies.
iv. The comments and feedbacks of the stakeholders will be addressed and reflect in the revised prefeasibility study.

If the prevailing situation due to COVID19 are limiting face to face consultation, alternate approaches may be suggested. For example, a webinar followed by online consultation on the prefeasibility report through a structured survey to that can be filled by the communities.

[2] Coastal Fisheries and Aquaculture Act 2020- http://ronlaw.gov.nr/nauru_lpms/files/acts/0396cd0f5de48ecbb5afb4a68ddbb361.pdf

[3] For instance, by modelling the tariff rates in Power Purchase Agreements for the given technology against the interest rates of the loan and the upfront capital costs to develop a business case that can be used to bring together the development lender, the national government and the private sector companies, within the context of Nauru and its Energy regulation.

Deliverables 3:

3.1: Draft Pre-feasibility study report with worksheets on the socio-economic and financial analysis conducted

3.2: Stakeholder consultation/ Webinar with follow up online consultation survey

3.3: Final Pre-feasibility study report with worksheets on the socio-economic and financial analysis conducted

Output 4: Draft concept note for GCF

The guidelines to prepare GCF concept note are to be considered throughout all the activities (listed above) for better alignment of the deliverables with the requirements of the concept note and would help in the filling of the GCF note template under this output with best available data and information generated from this TA. Other Pacific Island countries have potential to harness ocean energy. The note should also serve as a successful case for the other countries in the region to replicate the approach.

A 4.1: *Concept note will be prepared based on the pre-feasibility conducted in GCF template, by following the GCF Concept note preparation guidelines, with the supporting documents listed below and as applicable*:

i. Map indicating the location of the project/programme
ii. Diagram of the theory of change
iii. Economic and financial model with key assumptions and potential stressed scenarios
iv. Pre-feasibility study
v. Evaluation report of previous project
vi. Results of environmental and social risk screening

Any gaps identified to fill the GCF note's template that does not fall under the purview of this Response Plan will be the responsibility of the PP/NDE/NDA of Nauru to suffice.

A 4.2: *Review and finalize the concept note*

Deliverables 4:

4.1: Final GCF Concept Note

4.2: Package of supporting documents, as applicable

4 GENERAL TIME SCHEDULE

The activities under this contract should follow the timeline presented for each deliverable and are expected to be completed within a period of twelve (12) months from the award of contract. However, the bidder has the option of proposing a customized duration of the activities under this contract with supporting justifications.

5 QUALIFICATION REQUIREMENTS AND EVALUATION CRITERIA

The bidder shall as a minimum present the following qualifications of the team. Please note the requirement to have national expert(s) in the team. Additional qualifications and experts may be added to the proposal.

Qualification requirements (technical aspects required)	Evaluation criteria
Project Coordinator-PC (International/ National) • Master's Degree fluid/mechanical engineering or equivalent field of specialization • A minimum 7 years of experience in leading, managing and delivering techno-commercial feasibility studies, socio economic assessments and stakeholder consultations	• Experience of designing and implementing the GCF concept notes and proposals • Demonstrated knowledge and understanding of Ocean energy • Fluency in English
Ocean Energy specialist-OES (International) • PhD/ Master's degree in the field of marine engineering/ metocean or coastal engineering or equivalent field of specialization • A minimum of 10 years of experience in the field of ocean energy with 5 years of experience in designing and implementing Ocean Thermal Energy (OTEC) and experience of coupling reverse osmosis/ desalination and aquaculture with the OTEC	• Demonstrated experience of analyzing ocean data, climate modelling for coastal areas and conducting feasibility studies in the related field • Demonstrated experience of working in the Pacific Island Countries or similar geographical landscapes • Fluency in English
Energy Economics specialist-EES (International) • Master's degree in the field of energy economics or equivalent field of specialization	• Demonstrated experience of conducting commercial feasibilities and recommending financing options for the technologies like ocean energy • Demonstrated experience of working in the Pacific Island Countries or similar geographical landscapes • Fluency in English

Qualification requirements (technical aspects required)	Evaluation criteria
• A minimum of 7 years of experience of conducting energy related to socio-economic assessment for communities in remote and island areas	
Local Expert- LE (National) • Bachelor's degree in humanity field • A minimum of 5 years of experience working on social issues in Nauru	• Proven experience of working with communities in Nauru • Fluency in local language and in English
Gender Expert-GE (International/ National) • Master's degree in Social or Natural Sciences or another relevant discipline, preferably with a specialization in gender • A minimum of five years' practical experience in the field of gender equality and gender mainstreaming.	• Understanding and demonstrated ability of gender considerations in community led energy intervention • Fluency in English

6 LANGUAGE REQUIREMENTS

The working language for the purposes of this project is English, thus an excellent command of English is required of the proposed personnel. The final deliverables must be submitted in English. The technical and financial proposal under this tender must also be submitted in English.

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

7 DELIVERABLES SCHEDULE

The table below details the indicative schedule for this assistance.

Deliverables	Delivery date
D 1.1: Minutes of Kick off meeting discussion	As soon as after signing the contract
D 1.2: Detailed work plan	Within 1 month from Kick off meeting

Deliverables	Delivery date
D 1.3: Monitoring and evaluation plan	Within 1 month from Kick off meeting
D 1.4: CTCN Impact Description	Within 1 month from Kick off meeting
D 1.5: Closure and Data Collection template and report	12 months from Kick off meeting
D 2.1: A report including: i. List of sites identified with potential ocean-based energy generation technologies ii. Approaches for site selection iii. Equipment used for data collection iv. Data- Data collection process and Data sets (raw and processed data)	5 months from Kick off meeting
D 2.2: Working sheets including the raw data and data analysis	5 months from Kick off meeting
D 3.1: Draft Pre-feasibility study report with worksheets on the socio-economic and financial analysis conducted	7 months from Kick off meeting
D 3.2: Stakeholder consultation/ Webinar with follow up online consultation survey	9 months from Kick off meeting
D 3.3: Final Pre-feasibility study report with worksheets on the socio-economic and financial analysis conducted	10 months from Kick off meeting
D 4.1: Final GCF Concept Note	10-11 months from Kick off meeting
D 4.2: Package of supporting documents, as applicable	11 months from Kick off meeting