Title: Study on the identification and evaluation of technologies and industrial processes used in cement producing industries in Congo – Brazzaville

7 April 2021

CTCN Request Reference No.: 2020000039
Country: Republic of Congo
UNIDO Request for Proposal (RFP) No.: 7000004797

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 CTCN 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 budget for this contract is USD 234,984.

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
2 CONTEXT OF THE ASSIGNMENT

Cement is an important construction ingredient produced in almost every country. With urbanisation, infrastructure development and economic growth, production is steadily increasing in regions with rapid infrastructure development. In 2016, global cement production generated about 2.2 billion tonnes of CO2, equivalent to 8% of total global emissions. The Government of the Republic of Congo (Congo – Brazzaville) has prioritised national cement production in the last decade with a total number of five cement plants at present to meet national demand in the context of the municipalization policy that started in 2004. As a result, the country has reached an installed production capacity of 3,200,000 tonnes/year and, in 2014, carbon dioxide (CO2) emissions reached 93,3324 Gg CO2-eq. Congo recently finalised its Third National Communication (TCN) in which the GHG inventory expert team of the Industrial Processes and Product Use (IPPU) sector obtained an estimate of GHG emissions using the Intergovernmental Panel on Climate Change (IPCC) Tier 1 methodology, and found that the cement industry sector is the key source category, emitting the most GHG in the IPPU sector. In order to receive more realistic and comprehensive data, and to find measures to reduce GHG emissions, Congo – Brazzaville will need to move to higher tier 2 and 3 methods.

In this context, 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 develop a study to obtain all relevant information from the national cement plants through a general analysis and a detailed audit of two (2) cement plants and one (1) grinding plant, and to assess the technological needs in order to establish accurate and country-specific GHG activity data (AD) and emission factors (EF), to propose a system of regular energy audits and reporting, and to identify options for upgrading the technologies used to reduce GHG emissions in this sector.

The consultant assignment will consist of the following outputs:

- Data collection of five (5) cement plants in Congo – Brazzaville
- Detailed energy and thermal audit of two (2) cement plants and one (1) grinding plant
- Identification of technologies and best practices for GHG emissions reduction in the cement industry
- Development of documentations and plans for regular auditing and reporting
- Development of a tier 2 or 3 GHG emissions calculation methodology and calculation of national cement production emissions
The full text of the request submitted to the CTCN can be found here: https://www.ctcn.org/system/files/response_plans/CTCN_Response%20Plan_Congo%20Brazzaville_Cement_Final_countersigned.pdf

The Response plan developed in collaboration with Liberia can be found here: https://www.ctcn.org/sites/www.ctcn.org/files/request/Requ%C3%AAte%20PIUP.pdf

The specific activities are detailed in section 3.

3 OBJECTIVE OF THE CONTRACT

The objective of this contract is the development of a study on the identification and evaluation of technologies and industrial processes used in cement producing industries in Congo – Brazzaville.

Scope and activities of the proposed contracted services

Once the contract is signed, the CTCN will organize a kick-off call among all relevant parties involved in the request to introduce the Contractor to the NDE and Project Proponent (GHG Inventory Expert Team). 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: 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 French). 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: Evaluation of cement plants in Congo – Brazzaville

Activity 2.1: Project kick-off meeting
In a kick-off meeting with IGES (project proponent), the NDE, CTCN and other stakeholders, the objectives and work plan of the technical assistance will be presented. Stakeholders and contact persons for the cement plants will be identified and next steps will be defined.

Activity 2.2: Analysis and data collection of the five cement plants in Congo – Brazzaville
In cooperation with representatives of the cement plants, a detailed analysis and data collection of the five cement plants in Congo (SONOCC, FORSPAK, CIMAF, DIAMONT CEMENT CONGO and DANGOTE) will be conducted. This assessment will provide an overview of the raw materials, equipment and processes used, including, among others, the type of waste heat recovery and fuels used. In addition, available secondary data on activities, energy and heat, such as from electricity bills, will be collected.

Activity 2.3: Stakeholder meeting to identify two priority cement plants and a specialist grinding plant for detailed audit
A stakeholder meeting will be organised to present the results of the general analysis of the five cement plants. The stakeholders will decide which two cement plants should be audited in detail, based on their relevance and representativeness. In addition to the two cement plants, one plant that is specialised only in grinding and packaging will also be audited.

Activity 2.4: Detailed energy and thermal audit of the two priority cement plants and a specialist grinding plant
A detailed energy and thermal audit will be carried out for the two priority cement plants and one specialised grinding and packaging plant. This audit will be based on the "gate-to-gate" concept, taking into account each step of the cement production process, in order to provide a complete and detailed audit of the existing installations.

The detailed energy and thermal audits with audit equipment should be facilitated by the selected cement plants with the support of the Government of Congo and the IGES of the IPPU sector.

In preparation for the audits, the IPCC GHG emission calculation methods should be reviewed.

Activity 2.5: Identification of technologies and best practices for GHG reduction
Technologies and best practices to improve energy and material efficiency, reduce GHG emissions and improve climate resilience throughout the cement production process will be identified. The identified best practices and technologies will be assessed for their relevance, estimated cost and estimated impact (environmental, social, economic, GHG reduction). A cost-benefit analysis for each of the technologies and best practices should be carried out for this purpose. The perspective on the potential impacts or benefits
for women and young people should also be included in the analysis. As a result, best practices and technologies will be prioritised and technology fiches will be developed.

**Deliverable 2.1:** Meeting report  
**Deliverable 2.2:** Report on the general audit including a fact sheet on each cement plant  
**Deliverable 2.3:** Meeting report with prioritized cement plants  
**Deliverable 2.4:** Energy and thermal audit of the two cement plants and one grinding plant  
**Deliverable 2.5:** Report on the identified technologies, including technology fact sheets

**Output 3: Development of an audit and reporting plan including templates**

**Activity 3.1: Development of an audit manual with worksheets**  
A manual will be developed for the energy and thermal audit to be carried out regularly by each cement production plant. The manual will include an audit schedule and worksheets.

**Activity 3.2: Development of a plan and reporting templates on specific energy consumption**  
A reporting plan will be developed on the basis of which each cement production plant will be required to report its activity data, including specific energy consumption per stage of the cement production process. Reporting templates will be developed for this purpose.

**Deliverable 3.1:** Audit manual with worksheets  
**Deliverable 3.2:** Reporting plan and templates

**Output 4: Development and implementation of a GHG emissions calculation methodology**

**Activity 4.1: Development of a methodology for calculating GHG emissions from cement plants**  
Based on the IPCC guidelines for calculating GHG emissions in cement production (Tier 1 to 3) and the type of data that has been collected throughout the audits of the Congo cement plants, a methodology for calculating GHG emissions in Congo will be developed.

**Activity 4.2: Calculation of GHG emissions and emission factors from domestic cement production**  
GHG emissions from domestic cement production will be calculated using the previously developed calculation method. Emission factors specific to the Congo will be provided.

**Deliverable 4.1:** Methodology for calculating GHG emissions  
**Deliverable 4.2:** Report on GHG emissions and emission factors for cement production in Congo
Output 5: Communication and closure

**Activity 5.1: Presentation of final results**

A closing meeting will be organised with IGES, NDE, CTCN and other stakeholders to present the final results of the technical assistance. Communication materials on the project results will be developed for this purpose.

**Deliverable 5.1:** Meeting report with communication documents

### 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. The proposed plan for the implementation of activities and deliveries:

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Months</th>
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<tbody>
<tr>
<td><strong>O1. Planning and communication documents</strong></td>
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<tr>
<td>D1.1 Work plan in the form of CTCN response plan template</td>
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<td>D1.2 Monitoring and Evaluation Plan</td>
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<td>D1.3 CTCN Impact Description</td>
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<td>D1.4 Closure and Data Collection Report</td>
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<td><strong>O2. Evaluation of cement plants in Congo – Brazzaville</strong></td>
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<tr>
<td>A2.1 Project kick-off meeting</td>
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<td>A2.2 Analysis and data collection of the five cement plants in Congo –</td>
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<td>Brazzaville</td>
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<td>A2.3 Stakeholder meeting to identify two priority cement plants and a</td>
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<td>specialist grinding plant for detailed audit</td>
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<td>A2.4 Detailed energy and thermal audit of the two priority cement</td>
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<td>plants and a specialist grinding plant</td>
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<td>A2.5 Identification of technologies and best practices for GHG</td>
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<td>reduction</td>
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<td>D2.1 Meeting report</td>
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<td>D2.2 Report on the general audit including a fact sheet on each cement</td>
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<td>D2.3 Meeting report with prioritized cement plants</td>
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<td>D2.4 Energy and thermal audit of the two cement plants and one</td>
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<td>grinding plant</td>
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<td>D2.5 Report on the identified technologies, including technology fact</td>
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<td>sheets</td>
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<td><strong>O3. Development of an audit and reporting plan including templates</strong></td>
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<tr>
<td>A3.1 Development of an audit manual with worksheets</td>
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<td>A3.2 Development of a plan and reporting templates on specific energy</td>
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<td>consumption</td>
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<tr>
<td>D3.1 Audit manual with worksheets</td>
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<tr>
<td>D3.2 Reporting plan and templates</td>
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</table>
4. Development and implementation of a GHG emissions calculation methodology

A4.1 Development of a methodology for calculating GHG emissions from cement plants

A4.2 Calculation of GHG emissions and emission factors from domestic cement production

D4.1 Methodology for calculating GHG emissions

D4.2 Report on GHG emissions and emission factors for cement production in Congo

5. Communication and closure

A5.1 Presentation of final results

D5.1 Meeting report with communication documents

All drafts and final deliverables are subject to approval by the CTCN Climate Technology Manager, NDE and Project Proponent, before these can be considered as completed. Deliverables will be produced in French.

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):

<table>
<thead>
<tr>
<th>Expert title</th>
<th>Minimum qualification requirements</th>
<th>Necessary experience</th>
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| Consultant (C1) - Team Leader and Energy Efficiency Expert | • Master’s degree or higher in energy science, energy engineering or energy management | • More than 8 years of experience in the field of energy efficiency assessment, energy and thermal audits, project management, manufacturing industries and climate technologies.  
• Experience of working in developing countries, prior work in sub-Saharan Africa is a plus  
• Experience in managing multi-stakeholder projects and international teams  
• Fluency in written and spoken English and French. |
| Consultant (C2) - Industrial Engineer | • Master’s degree or higher in industrial, chemical or environmental engineering | • More than 8 years of experience in cement production processes, equipment/process/material audits, and identification of technology upgrade options, including cost-benefit analyses  
• Experience of working in developing countries, prior work in sub-Saharan Africa is a plus |
| Consultant (C3) - GHG Accounting Specialist | • Master’s degree or higher in environmental science, public policy, economics or accounting | • More than 8 years of experience in GHG accounting in the production industries (ideally in the cement sector) and good knowledge of the IPCC GHG accounting guidelines. • Experience of working in developing countries, prior work in sub-Saharan Africa is a plus • Fluency in written and spoken English and French. |
| National Consultant (NC1) - Industrial Engineer | • Master’s degree or higher in industrial, chemical or environmental engineering | • More than 5 years of experience in the field of cement production processes, equipment / process / material audits. • Familiarity with cement plants and the cement industry in Congo – Brazzaville. • Fluency in written and spoken English and French. |
| National Consultant (NC2) - Auditor or Energy Manager | • Bachelor's degree or higher in energy science, energy management or economics • National energy auditor certification | • More than 5 years of experience in the field of energy audit and management, ideally in the production industries. • Extensive experience with energy and thermal audits of industrial plants • Knowledge of cement plants in Congo – Brazzaville is a plus • Fluency in written and spoken English and French. |

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

6 LANGUAGE REQUIREMENTS

The working languages for the purposes of this assessment are English and French, thus an excellent command of English and French is required for the proposed personnel. All delivered documents must be of sufficient quality so that no further editing shall be required.