

**Invitation to Tender (ITT) for The Supply and Installation of Carbonization Equipment**

***FRT-LGM-35295***

|  |
| --- |
| **GOAL is completely against fraud, bribery, and corruption.**  **GOAL does not ask for money for bids.**  **If you have any serious concern over wrong doing please report it at**[**www.safecall.co.uk/report**](http://www.safecall.co.uk/report)**or email** [**goal@safecall.co.uk**](mailto: goal@safecall.co.uk) **. All information is treated confidentially by Safecall and you may remain anonymous if you wish** |

# About GOAL

Established in 1977, GOAL is an international humanitarian and development agency committed to working with communities to achieve sustainable and innovative early response in crises and to assist them to build lasting solutions to mitigate poverty and vulnerability. For more information on GOAL and its operations please visit <https://www.goalglobal.org/>.

The Faecal Sludge Management in Freetown is complex emanating from the various challenges in Freetown City. Freetown has hilly terrain presenting physical accessibility issues. This has resulted in hard-to-reach areas of the heavily settled hilly terrain. The City of Freetown, like all other third world countries, grapples with the challenge of accessibility informal settlements which are mostly located in low lying marshy areas presenting 40% in total for inaccessible settlement areas. The accessible 60% of the settled Freetown settled areas (GOAL surveys 2018), is served by the Vacuum trucks to dislodge their faecal sludge containments such as septic tanks, pit latrines, public Toilets which ends up being treated at the only existing faecal sludge treatment plant in Sierra Leone at Kingtom located within the dumpsite.

Waste to Energy and Waste to compost projects were piloted with the output of clean energy cooking briquettes which were processed from the faecal sludge solids by pyrolysis process converting the solids into char. The char is mixed with binders to obtain the right mix which then is compressed into cooking briquettes. GOAL has successfully tested the briquettes produced in the market with good feedback from the community.

GOAL SL wants to scale up this innovation project and is looking for a company who have the capacity and experience to supply this equipment that transforms waste to energy.

# Proposed Timelines

|  |  |  |
| --- | --- | --- |
| **Line** | **Item** | **Date, Time and Time Zone** |
| 1 | ITT published | 8th January 2025 |
| 2 | Closing date for clarifications | 14th January 2025 – 16:00pm GMT |
| 3 | Closing date and time for receipt of tenders | 15th January 2025 at 16:00pm GMT |
| 4 | Tender opening date and time | 16th January 2025 – 11.00am |

# Overview of requirements

## Service Specification

GOAL invites prospective suppliers to submit tenders for waste to Energy Equipment/tools; the technical parameters must meet or exceed minimum specification requirements outlined in Appendix 2 – Technical Specifications.

GOAL invites prospective suppliers to reply to this ITT and submit their bids according to the requirements listed in Appendix 2.

**3.2 EXECUTIVE SUMMARY OF PROPOSAL AND WORK PLAN**

The executive summary must be concise, precise, and less than 5 pages long. It should summarize:

a) Your company profile and the period during which your firm has been in active existence. Point out some of your key locations/country you have successfully supplied related equipment.

b) How you will approach and execute the goods contract from a management, quality, and logistical perspective.

c) The geographical location in Sierra Leone where your firm has operational presence or has a counterpart you are directly doing business with including all paperwork/agreement to the effect

d) Detail all technical equipment and personnel available for production.

# Type of contract

Following this procurement process, GOAL aims to sign the contract with a supplier to supply and install equipment that converts waste to energy.

# Terms of the Procurement

## Procurement Process

### This competition is being conducted under GOAL’s international tender procedure.

### The contracting authority for this procurement is GOAL.

### This procurement is funded by GOAL Sierra Leone. The tender and any contracts or agreements that may arise from it are bound by the regulations of those donors.

INCOTERM applicable shall be DDP (Incoterms 2020)

## Clarifications and Query Handling

### GOAL has taken care to be as clear as possible in the language and terms it has used in compiling this ITT. Where any ambiguity or confusion arises from the meaning or interpretation of any word or term used in this document or any other document relating to this tender, the meaning and interpretation attributed to that word or term by GOAL will be final. GOAL will not accept responsibility for any misunderstanding of this document or any others relating to this tender.

### Requests for additional information or clarifications can be made before the deadline noted in section 2 above, and no later. Any queries about this ITT should be addressed in writing to GOAL via email at [clarifications@goal.ie](mailto:clarifications@goal.ie) with the **reference *FRT-LGM-35295 Supply of Carbonization Equipment*** and answers shall be published online at www.Goalglobal.Org/tenders in a timely manner.

## Conditions Of Tender Submission

### Tenders must be completed in English.

### Tenderers must respond to all requirements set out in this ITT and complete their bid in the response format outlined in Section 7.

### Failure to submit tenders in the required format will, in almost all circumstances, result in the rejection of the bid.

### Tenderers must disclose all relevant information to ensure that all tenders are fairly and legally evaluated. Additionally, tenderers must provide details of any implications they know or believe their response will have on the successful operation of the contract or on the normal day-to-day operations with GOAL. Any attempt to withhold any information that the tenderer knows to be relevant or to mislead GOAL and/or its evaluation team in any way will result in the disqualification of the tender.

### Tenders must detail all costs identified in this ITT. Additionally, tenders must detail any other costs whatsoever that could be incurred by GOAL in the usage of services and/or the availing of options that may not be explicitly identified/requested in this ITT. Tenderers’ attention is drawn to the fact that, in the event of a Contract/ Framework Agreement being awarded to them, the attempted imposition of undeclared costs will be considered a condition for default.

### Any conflicts of interest (including any family relations to GOAL staff) involving a tenderer must be fully disclosed to GOAL particularly where there is a conflict of interest in relation to any recommendations or bids put forward by the tenderer.

### GOAL will not be liable in respect of any costs incurred by respondents in the preparation and submission of tenders or any associated work effort.

### GOAL will conduct this tender, including the evaluation of responses and final awards in accordance with the detail set out at in the Evaluation process. Tenders will be opened by at least three designated officers of GOAL.

### GOAL is under no obligation to accept the lowest or any other bid received in response to this tender and reserves its right to reject any or all the bids(part/full) including incomplete bids without assigning reason whatsoever.

### GOAL reserves the right to split the award of this contract between different bidders in any combination it deems appropriate, at its sole discretion.

### The tenderer shall seek written approval from GOAL before entering into any sub-contracts for the purpose of fulfilling this contract. Full details of the proposed subcontracting company and the nature of envisioned engagement of sub-contractor/s into this contract shall be included in tenderer’s bid.

### GOAL reserves the right to refuse any subcontractor that is proposed by the bidder.

### GOAL reserves the right to negotiate with the bidder who has submitted the lowest Bid that fully meets the technical requirements, for the purpose of seeking revisions of such Bid to enhance its technical aspects and/or to reduce the price.

### Information supplied by respondents will be treated as contractually binding. However, GOAL reserves the right to seek clarification or verification of any such information.

### GOAL reserves the right to terminate this competition at any stage.

### Unsuccessful tenderers will be notified.

### GOAL’s standard payment terms are by bank transfer within 30 days after satisfactory implementation and receipt of documents in order. Satisfactory implementation is decided solely by GOAL.

### This document is not construed in any way as an offer to contract.

### GOAL and all contracted suppliers must act in all its procurement and other activities in full compliance with donor requirements. Any contract(s) that arise from this ITT may be financed by multiple donors and those donors and/or their agents have rights of access to GOAL and/or any of its suppliers or contractors for audit purposes. These donors may also have additional regulations that it is not practical to list here. Submission of an bid under this ITT assumes Tenderer acceptance of these conditions.

### **Terrorism and Sanctions:** GOAL does not engage in transactions with any terrorist group or individual or entity involved with or associated with terrorism or individuals or entities that have active exclusion orders and/or sanctions against them. GOAL shall therefore not knowingly purchase supplies or services from companies that are associated in any way with terrorism and/or are the subject of any relevant international exclusion orders and/or sanctions. If you submit a bid based on this request, it shall constitute a guarantee that neither your company nor any affiliate or a subsidiary controlled by your company are associated with any known terrorist group or is/are the subject of any relevant international exclusion order and/or sanctions. A contract clause confirming this may be included in an eventual purchase order based on this request.

### GOAL requires all contracted suppliers and sub-contractors to observe the highest standard of ethics during the procurement process, selection and contract execution of goal’s contracts, and refrain from fraud and corruption. GOAL has zero tolerance for fraud, bribery or corruption in any form and will reject any bids if the organization determines that the bidding company, any of its personnel, or its sub-contractors, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question.

## Quality Control

3rd party companies may be contracted by GOAL to carry out random quality inspections of work carried out by the contracted party. The cost of the quality control inspections will be covered by GOAL.

GOAL may choose to visit vendors' premises, including sub-contractors (if any) to perform additional checks as part of the evaluation process. Vendors will be notified in advance of a visit.

## Submission of Tenders

Tenders must be delivered in the following way:

1. Electronically with your financial and technical offers in separate emails to [tenders@goal.ie](mailto:tenders@goal.ie) and in the subject field state:
   1. ***ITT FRT-LGM-35295 Supply of Carbonization Equipment***
   2. ***Name of your firm with the title of the attachment***
   3. ***Number of emails that are sent e.g. 1 of 3, 2 of 3, 3 of 3.***

**All documents attached to emails must be in PDF or scan form. Any excel or word documents must be accompanied by a PDF or scan version of the document.**

Links to share drives will not be accepted unless it is necessary due to file size. All documents submitted via links to shared drive must not be modified after the closing date and time for the receipt of bids (timestamp must clearly indicate that they haven't been modified). Documents submitted via links to a shared drive that have been modified after the closing date and time will not be accepted.

**OR**

Physical bids- please submit in a sealed envelope marked ITT Supply of Carbonization Equipment with the words ‘*not be opened before the deadline 16th January 2025 – 11.00am by the tender committee’* with your financial and technical offers inside in two separate envelopes marked Financial Offer and Technical offer marked as Financial Offer and Technical Offer to the Tender Box c/o GOAL Sierra Leone Head Office, 6 The Maze Off King Street, Freetown, Sierra Leone.

Please note that the GOAL office will not be open during weekends or public holidays.

* **Proof of sending is not proof of reception, either electronically or with post/courier/other physical service. Late delivery will result in your bid being rejected. Envelopes found open at the tender opening will be rejected. All information provided must be perfectly legible.**

## 5.6 Tender Opening Meeting

Tenders will be opened as per Section 2 Proposed Timelines above at the following location:

**GOAL Sierra Leone Head Office**

**6 The Maze, Off King Street, Freetown, Sierra Leone**

One **authorised representative** of each tenderer may attend the opening of the bids. Companies wishing to attend are requested to notify their intention by sending an e-mail at least 48 hours in advance to the following e-mail address: [procurementfreetown@sl.goal.ie](mailto:procurementfreetown@sl.goal.ie) . This notification must be signed by an authorised officer of the tenderer and specify the name of the person who will attend the opening of the bids on the tenderer's behalf.

Bidders are invited to attend the Tender Opening Meeting at their own cost.

# Evaluation Process

## Evaluation stages

Tenderers will be considered for participation in the Contract subject to the following qualification process:

|  |  |  |
| --- | --- | --- |
| **Phase #** | **Evaluation Process Stage** | **The basic requirements with which bids must comply with** |
| *The first phase of evaluation of the responses will determine whether the tender has been submitted in line with the administrative instructions and meets the essential criteria. Only those tenders meeting the essential criteria and do not fall under any of the listed exclusion criteria will go forward to the second phase of the evaluation.* | | |
| 1 | **Administrative instructions** | 1. **Closing Date:**   Bids must have met the deadline stated in section 2 of these Instructions to Tenderers, or such revised deadline as may be notified to Tenderers by GOAL. Tenderers must note that GOAL is prohibited from accepting any bids after that deadline.   1. **Submission Method:**   Bids must be delivered in the method specified in section 5.5 of this document. GOAL will not accept responsibility for tenders delivered by any other method. Responses delivered in any other method may be rejected.   1. **Format and Structure of the Bids:**   Bids must conform to the Response Format laid out in section 7 of these Instructions to Tenderers or such revised format and structure as may be notified to Tenderers by GOAL. **Failure to comply with the prescribed format and structure may result in your response being rejected at this stage.**   1. **Confirmation of validity of your bid:**   The Tenderers must confirm that the period of validity of their bid is not less than 90 (ninety) days. |
| **2** | **Exclusion criteria** | NOT APPLICABLE |
| **3** | **Essential Criteria** | Minimum mandatory requirements of specification or contract performance.   * 1. Business Registration documents   (Company Registration, Memorandum and Articles of Association, Power of Antoney, Trade Licenses, updated Tax Clearance Certificate; Foreign bidders can submit the equivalent based on their country of origin).   * 1. Minimum warranty period of 1 year for all the products. |
| *Each bid that conforms to the Exclusion and Essential Criteria will be evaluated according to the Award Criteria given below by GOAL.* | | |
| **4** | **Award Criteria** | Tenders will be awarded marks under each of the award criteria listed in this section to determine the best value for money bids.   * 1. Quality:      + - Specification compliant with applicable ISO/EU standard. Please submit relevant documents evidencing this.        - Ability to offer After Sales Service (Training end users after installation, providing user manuals in English and any other added value). Confirm this in writing        - Previous experience with supply of similar products with confirmed evidence of delivery like goods received notes (GRN)/ product receipt.   2. Lead Time for delivery. The shortest possible timeframe. Indicate the period within which you can deliver   3. Price. Indicate your best and final offer |
|  | **Due Diligence Checks** | Successful bidder/s will be screened in line with Anti-Terrorism and Sanction checks. GOAL will not contract with bidders who do not pass those checks as per clause 5.3.20 of this document.  References and other checks will be completed, and quality assessed.  In-depth review of financial accounts and other documents submitted will be completed; bidder is judged to have requisite financial stability and legal status. |

## Tender Evaluation

GOAL is committed to the highest standards of fairness and equality across our organisation and ensures impartiality in tender evaluations. GOAL will convene a comprehensive evaluation team which may draw from diverse expertise including Finance, Logistics, Programmes, Donor Compliance and Internal Audit, as well as 3rd Party technical input.

During the evaluation period clarifications may be sought by e-mail from Tenderers. Clarifications may include testimonials from customers in support of particular aspects of a tender, whether such aspects are contained in the original submission or in subsequent responses to requests for clarification. Deadlines will be imposed for the receipt of such clarifications and failure to meet these deadlines may result in the disqualification of the tender or loss of marks. Responses to requests for clarification shall not materially change any of the elements of the tenders submitted. Unsolicited communications from tenderers will not be entertained during the evaluation period.

**Award Criteria**

**Quality: 10%**

**Delivery: 10%**

**Price: 80%**

All prices must be in Sierra Leone Leones (SLE) and a comprehensive and clear breakdown of prices must be shown as part of the financial offer. During the analysis of bids, if bids were not submitted in the required currency, we will convert all bids in Sierra Leone Leones at the prevailing FX rate shared by GOAL Finance Team for the date of bid opening.

Prices offered will be evaluated on full cost basis (including all fees and taxes)

Marks for cost will be awarded on the inverse proportion principle (shown below):

Score = points available x (lowest price offered/ bidder offer price)

**All financial offers must be made on the basis of ‘best and final offer’.**

# Response Format

All bids must conform to the response format laid out below.

By responding to this ITT, each Tenderer is required to accept the terms and conditions of this ITT. Should a Tenderer not comply with these requirements, GOAL may, at their sole discretion, reject the response.

If the Tenderer wishes to supplement their response to any section of the ITT specifications with a reference to further supporting material, this reference must be clearly identified, including section and page number.

## Submission Checklist

|  |  |  |  |
| --- | --- | --- | --- |
| **Line** | **Item** | **How to submit** | **Tick attached** |
| 1 | Appendix 1- Company Information | Complete, sign, stamp and submit titled ‘Company Information’. |  |
| 2 | Appendix 2.1- Technical Offer | Complete, sign, stamp and submit titled ‘Technical offer’. |  |
| 3 | Appendix 3 - Financial Offer | Complete, sign, stamp and submit titled ‘Financial offer’. |  |
| 4 | Minimum warranty period of 1 year for all the products | Complete, sign, stamp and submit titled ‘Financial offer’. |  |
| 5 | Two years of Financial Accounts (Balance sheet and Income Statement for 2022 to 2023. | Submit copies of Financial Accounts (Balance sheet and Income Statement for 2022 to 2023. |  |
| 6 | Business Registration documents  (Company Registration, Memorandum and Articles of Association, Power of Antoney, Trade Licenses, Tax Clearance Certificate). Foreign bidders can submit the equivalent based on their country of origin. | Submit copies of certificate of business registration / certificate of incorporation. |  |
| 7 | Letters of recommendation from at least three INGOs or corporates who have been previous clients | Submit copies of letters of recommendation from at least three INGOs or corporate companies who have been previous clients |  |
| 8 | Executive Summary and Work Plan (part 3.3) | Submit copies of Executive Summary and Work Plan |  |
| 9 | Additional Value Features. | Submit copies of Additional Value Features. Additional Value Features, including documents evidencing compliance to ISO standards and other recognised International Standards |  |

# Appendix 1 – Company Information

|  |  |  |
| --- | --- | --- |
| Company Name |  | |
| Registered address of the prime Tenderer |  | |
| Year Established |  | |
| Please state the name of any other persons/organisations (except your company) who will benefit from this contract (GOAL compliance matter) |  | |
| Parent company |  | |
| Ownership |  | |
| Do you have associated companies? Tick relevant box. If YES – provide details for each company in the line below. | Yes/No | |
|  | |
| Associated company details (if applicable) |  | |
| If successful, do you agree to work under GOAL’s Terms and Conditions of contract (attached as Appendix 4). | Yes/No | Comments/Attachments |
|  |  |
| If successful, do you agree to sign the contract as per GOAL’s contract template (attached as Appendix 8) | Yes/No | Comments/Attachments |
|  |  |
| If successful, do you agree to abide by GOAL’s Supplier code of conduct for the delivery of goods/services/works?  (attached as Appendix 5) | Yes/No | Comments/Attachments |
|  |  |
|  |  |  |

**Turnover figures entered the table must be the total sales value before any deductions.**

‘Turnover of related products’ is for companies that provide items or services in multiple sectors. Please enter information on turnover of items or services that are similar in nature to the items or services requested under this tender.

|  |  |  |
| --- | --- | --- |
| **Trading year** | **Total turnover** | **Turnover of related products** |
| **2023** |  |  |
| **2022** |  |  |

Note that winning bidder/s will be required to submit further information as part of supplier registration process before finalisation of contract award.

|  |
| --- |
| By submitting a bid under this Invitation to Tender (**ITT) FRT-LGM-33315 Supply of Carbonization Equipment** the bidder hereby asserts that the following statements are correct at the time of submission; and further undertakes to inform GOAL of any changes in status of these matters. |
| The bidder is not bankrupt or is being wound up, neither are its affairs are being administered by the court nor has entered into an arrangement with creditors or has suspended business activities or is in any analogous situation arising from a similar procedure under national laws and regulation.  The bidder is not the subject of proceedings for a declaration of bankruptcy, for an order for compulsory winding up or administration by the court or for an arrangement with creditors or of any other similar proceedings under national laws and regulations.  Neither the bidder, a Director or Partner, has been convicted of an offence concerning his professional conduct by a judgement which has the force of res judicata nor been guilty of grave professional misconduct in the course of their business.  The bidder has fulfilled all its obligations relating to the payment of taxes or social security contributions in Ireland or any other state or country in which the tenderer is located or doing business.  Neither the bidder, a Director or Partner has been found guilty of: fraud, money laundering, corruption; convicted of being a member of a criminal organisation; nor of serious misrepresentation in providing information to a public buying agency  The bidder has not contrived to misrepresent its Health & Safety information, Quality Assurance information, or any other information relevant to this application.  That all data subjects have specifically consented to the use and storage of their data by GOAL for the purpose of analysing the bids and awarding a contract under this tender; and further understood that the personal data may be shared internally within GOAL and externally if required by law and donor regulations; and may be stored for a period of up to 7 years from the award of contract. |

I confirm that my bid has a validity of [ ] days. *If your bid does not have this validity, please state what bid validity you offer.*

I confirm that the bid and the costs provided to accompany it are an accurate reflection of the costs that will be charged to GOAL according to the information provided in this Invitation to Tender; and that there are no other costs associated. I also confirm that I have the authority to sign on behalf of the company that is bidding.

|  |  |  |  |
| --- | --- | --- | --- |
| Signed: |  | | |
| Print name: |  | Position: |  |
| Company Name: |  | Date: |  |
| Address: |  | | |

# Appendix 2.1 - Technical Offer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Item Description** | **Specification** | **Additional Specs/Sizes** | **Unit Of Measurement** | **Quantity** | **Warranty Period** |
| 1 | Carbonization Equipment | Horizontal fed, suitable for faecal sludge, 2 tons capacity per batch (Minimum), preferably continuous type with provision of filtration system for emitted gases and main fuel gas system. | Easy loading and unloading of the materials to be carbonized  Voltage = 380V, 50 - 60Hz  Power = 15kW  Capacity = 400 – 500kg/h  Diameter of raw material <= 30mm  Inner furnace temperature = 350 - 500°C  Carbonized pipeline temperature = 500 - 700°C  Effective volume = 7m3 | Set | 1 set |  |

**User manual should be made available.**

# APPENDIX 2.2- TERMS OF REFERENCE

**Carbonization Furnace (Continuous carbonization furnace)**

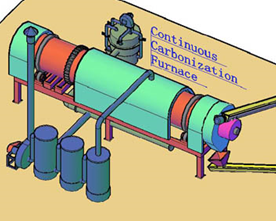
**Introduction**

It is ideal equipment for high-temperature distillation and anaerobic carbonizing of carbon-containing biomass materials (diameter< 15mm) such as dry sludge, sawdust, peanut shell, rice husk, coconut shell, palm shell, wood block, straw and bark under certain conditions. The carbonization furnace is a horizontal structure, and the carbonizing process is a rotary motion carbonizing.

Traditional charcoal carbonization furnace cannot realize continuous carbonizing of bulk amount of such material resulting in low economic benefits; the carbonizing process will release a lot of smoke and dust, causing air pollution, which is not in line with environmental protection policies. Continuous carbonization furnace adopts the advanced technology of circular combustion, and the combustible gases such as carbon monoxide, methane and oxygen produced during carbonizing process are recovered and purified. It not only solves the problem of environmental pollution caused by heavy smoke generated in carbonizing project in traditional charcoal carbonization furnace, but also achieves self-sufficiency, solves the problem of heat energy required by equipment, and makes up for the deficiency of traditional carbonization furnace, which meets the requirements of environmental protection and the concept of sustainable development.

**Specifications of carbonization furnace**

* 1m× 12m single drum
* 15KW 400-500kg/h



**Loading**

**Offoading**

**Main technical parameters of carbonization furnace**

Type: Dry Distillation

Moisture content of raw material: <25%

Voltage: 380 V; 3 Phase

Power: 15kW

Dimension of the Main Machine: 1.0 m X 9.0m

Inner Furnace Temperature: 350-500 °C

Carbonized Pipeline Temperature: 500-700 °C

Effective Volume: 7m3

**Working principle of carbonization furnace:**

When the carbonization furnace works, the materials are firstly burned in the gasification furnace. After being sprayed (refers to the process of injecting a liquid or gaseous substance into the furnace to enhance the carbonization process), cooled and purified, the flue gas generated in the pipeline becomes combustible gas (carbon monoxide, methane, ethane, etc.), which is used as the heat of initial carbonization to heat and carbonize the raw materials in the carbonization furnace (such as machine-made core rods, waste logs, bark, coconut shells, household garbage, etc). When the temperature reaches 300 degrees Celsius, the carbonization furnace begins to carbonize raw materials and produce smoke; After spraying, the flue gas becomes combustible gas, which is cooled and purified by the cooling and purification system, and continues to carbonize, and then the gasifier stops working.

The carbonization furnace process for dry sludge involves several steps:

# Step 1: Pre-Treatment

Dry sludge is pre-treated to remove any large objects or debris that could interfere with the carbonization process.

# Step 2: Feeding

The pre-treated dry sludge is fed into the carbonization furnace through a feeding system, which can be **manual** or automated.

# Step 3: Drying

The dry sludge is heated to remove any remaining moisture, typically to a temperature of around 100°C (212°F).

# Step 4: Pyrolysis

The dried sludge is then heated to a higher temperature (typically between 300-800°C or 572-1472°F) in the absence of oxygen, causing the organic materials to break down into volatile gases, liquids, and solid char.

# Step 5: Carbonization

The pyrolysis process continues, and the temperature is maintained for a period of time, allowing the solid char to undergo carbonization. During this step, the char is transformed into a more stable, carbon-rich material.

# Step 6: Cooling

The carbonized material is then cooled to a temperature that allows for safe handling and processing.

# Step 7: Discharge

The carbonized material is discharged from the furnace and can be further processed or used as a product, such as biochar.

# Step 8: Gas Treatment

The volatile gases produced during pyrolysis are treated to remove pollutants and contaminants. The treated gases can be used as fuel or released into the atmosphere.

# Step 9: Maintenance and Monitoring

Regular maintenance and monitoring of the carbonization furnace are essential to ensure optimal performance, safety, and product quality.

**The main features of carbonization furnace**

1. An easy and manual feeding (loading) of biomass
2. Must have the feature of carbonizing faecal sludge.
3. Equipped with a rotary drum carbonization host to meet the production requirements.
4. Energy saving and environmental protection, make full use of the gas generated by raw materials, and purify the circulating spontaneous combustion for machine heating.
5. An easy and manual emptying (offloading) of carbonized biomass
6. High production efficiency and high output.

**The purpose:**

The purpose of this carbonization machine is to carbonize the dry sludge to be used to produce briquettes. The dry sludge comes from the Fecal Sludge treatment plan which is then processed to convert to energy products. Briquettes will therefore be produced out of this dry sludge coming from the Fecal Sludge treatment plan. Carbonization of this dry sludge is a key step to make the sludge fit for conversion to energy products.

# Appendix 3 - Financial Offer

The cost must be inclusive of material and installation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Item Description** | **Quantity** | **Unit Cost (USD)** | **Total Cost (USD)** |
| **1** | **Carbonization Equipment** | **1 set** |  |  |
|  | **TOTAL COST** |  |  |  |
|  | **GST 15%** |  |  |  |
|  | **GRAND TOTAL COST** |  |  |  |

**NOTE: The prices should be inclusive of all applicable duties and delivery up to Goal Sierra Leone.**