# NATIONAL SCIENCE, TECHNOLOGY, AND INNOVATION COUNCIL (NSTIC)

**Project Theme:**

**Promotion of Innovative Energy Solutions**

**Project Title**

# Development of a Biogas Plant for Conversion of Solid Waste to Gas for Cooking and Heating in Kenema

**-A Demonstration Project-**


**Submitted by:**

**University of Sierra Leone**

**Njala University**

**University of Johannesburg (Consulting)**

**Industry Partners**


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## 1 Proposed Budget and Timeline

**Table 1: Budget and Timeline**

| Project Activities | Year 1 | | | | Year 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | **Q1 (Jan 2024-Mar 2024)** | **Q2 (Apr 2024-Jun 2024)** | **Q3 (Jul 2024-Sep 2024)** | **Q4 (Oct 2024-Dec 2024)** | **QI (Jan 2025-Mar 2025)** | **Q2 (Apr 2025-Jun 2025)** | **Q3 (Jul 2025-Aug 2025)** | **Total** |
| Materials and data collection equipment procurement | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $1,000 | $7,000 |
| Safety equipment for the Team Members and local staff | $3,000 | | | | $3,000 | | | $6,000 |
| Community sensitization Workshops and Training | $500 | $500 | $4,000 | | | $4,000 | | $8,000 |
| Prototype Development and Testing | | | $5,000 | $5,000 | | | | $10,000 |
| Biogas plant building construction | | | $5,000 | $5,000 | | | | $10,000 |
| Land use for biogas plant | | | $10,000 | | | | | $10,000 |
| Data Collection and Analysis | $1,500 | $1,500 | $1,500 | $1,500 | $1,500 | $1,500 | $1,500 | $10,500 |
| Public Awareness Campaigns | $1,000 | $500 | $500 | $500 | $1,000 | $500 | $500 | $4,500 |
| Local travel | $500 | $500 | $500 | $500 | $500 | $500 | $500 | $3,500 |
| International travels | $5,000 | | | | $5,000 | | | $10,000 |
| Dissemination via Journals | | | $3,000 | | | $3,000 | | $6,000 |
| Dissemination via international conferences | | $5,000 | | | $5,000 | | | $10,000 |
| **Total** | **$12,500** | **$9,000** | **$30,500** | **$13,500** | **$17,000** | **$9,500** | **$3,500** | **$95,500** |

**Table 2: Funding Support Already Received**

| Funding support already received | | | |
|---|---|---|---|
| Funding source | Funding amount [$] (excl. VAT) | Year in which funding received | Description of what the funding was / or will be, used for |
| University of Sierra Leone | 15,000 | 2023 | Office equipment, Use of University official vehicles, Staff time, lecture theatres for workshops |
| Njala University | 5,000 | 2023 | Office equipment, Use of University official vehicles, Staff time, lecture theatres for workshops |
| Industry Partners | 25,500 | 2023 | Technician salaries times 2 technicians, mobile power bank/generator for location with limited power availability, Draughtsman |
| **Total** | **$45,500** | | |

**Budget Motivation**

*Project Budget Summary*

The project is expected to run for around twenty-one (21) months and the budget is given in the budget table. The budget summary indicates the total cost of running the project, to include cost of travel, accommodation and cost of equipment use. These various cost items are motivated herein.

*Disbursement phases*

The budget is designed into 7 phases of 3 months each. The NSTIC and any other governmental and nongovernmental agencies supporting this project can disbursement funds in each phase as per the totals per phase given in the budget table.

*Staff time*

The team comprises 12 participants who are all Academics with duties associated to their respective roles at their universities. These Academics will devote time and effort to the project at a cost to their respective Universities.

*Cost of equipment and materials*

Some equipment used to examine and collect data at the installation site will need to be bought. For instance, the team will need a thermal imaging camera that captures precision changes in temperature at the demonstration site, a testo pocket vane anemometer for measuring air flow velocity and others.

*Cost of safety equipment*

Working in the provinces can be perilous with Team Members exposed to difficult terrain, poor sanitation, mosquitoes and other safety and health concerns. Safety equipment include a first aid kit, overalls, gloves, boots, helmets and safety glasses, umbrellas rain coats, and a mobile toilet, etc.

*Community sensitization events*

As part of the Government's policies, communities and stakeholders will need to be updated and motivated to support the project. Tus the team will hold regular community sensitization events in and around Kenema City.

*Prototyping and testing*

Close collaboration with local industry partners will facilitate the development and manufacturing of the biogas plant and gas cooking stove. Where facilities and technical capacity is not available in Sierra \Leone the international industry partner will build the system in South Africa for installation at the demonstration site.

*Biogas plant building and construction*

After securing suitable land in or close to Kenema city the Team will hire a well-established local construction company to build the plant structure in which the biogas plant will be constructed. This will be in the form of a mini company with detailed layout and facilities such as security fences to prevent theft and vandalism.

*Data collection and analysis*

From its launching date members of the Team will make regular trips to the demonstration site to collect data for their respective roles on the project. For instance, Prof Felixtina Jonsyn-Ellis and Mr Mohamed Dumbuya will collect solid waste samples from different parts of the demonstration city for microbiological analysis and environmental impact of contaminants generation from dump sites, respectively.

*Public awareness campaigns*

The Team will make use of facilities such as national media, TV, and social media platforms to inform the government and the public on the progress, gains, lessons learnt, challenges faced and benefit of the project to the country and its people.

*Local travels*

This project covers important areas of national interest, such as alternative energy generation, sanitation, and health as well as rural development. Thus, the team will travel extensively locally to various parts of the country for scenario setting, feasibility studies, data collection, awareness campaigns and building critical stakeholder support.

*International travels*

Team members will make some international travels as part of this project. For instance, some test works may have to be done in South Africa such as at the state of the arts lab facilities of the |University of Johannesburg.

Furthermore, Prof Kallon in South Africa will also need to travel to Sierra Leone from time to time to render consultancy services on the project.

*Dissemination via journals, conferences, and books*

This will form an integral part of the project, as findings at all stages of the project will be reported to the scientific and scholarly world via peer reviewed journals, accredited conference proceedings, book chapters and books. Some of these books may, in the future, be proposed as university test books for courses they cover, such as energy engineering, environmental sconce, microbiology, etc.

*Alternative funding sources*

The participating institutions will make contributions to the success of the project in kind. For instance, staff time will be covered, the institutions will make available their buildings and lecture theatres as host venues for some events, official vehicles will be made available to Team Members for local travels with petrol cost covered, etc. The Team will also organize fund raisers to generate more income to cover other cost of the project not covered by the NSTIC.