



THE UZERE BIOGAS DIGESTER PROJECT Delta State, Nigeria

A case study by the Biotec Development Network & R20 Regions of Climate Action



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PROJECT PARTNERS

The **Delta State Ministry of Environment's Climate Change Department** is a government agency poised towards assessing the vulnerability of its local communities to the impacts of climate change and promoting the development of a low-carbon and climate-resilient economy in the State. The Department is coordinating the Delta State Territorial Approach to Climate Change (TACC) programme that has carried out numerous quick-win (pilot) projects including biogas digesters and bio-sand water filters.

R20 Regions of Climate Action (R20) is a coalition of partners led by regional governments that work to promote and implement projects designed to produce local economic and environmental benefits in the form of reduced energy consumption and greenhouse gas emissions; strong local economies; improved public health; and new green jobs. These local actions can help the world achieve our shared global environmental and economic goals. R20 is the official Delta State TACC international consultant and assisted with the selection and implementation of several pilot projects (biogas, solar water heating, water filter). R20 also developed, in collaboration with local experts, the Delta State Integrated Territorial Climate Plan (ITCP). The ITCP includes a climate change strategy and five-year action plan for the State.

The Biotec Development Network (BDN) is a non-governmental organization based in Nigeria that seeks to contribute to the development of renewable energy in the country. The BDN's missions is to provide safe and affordable energy for rural and urban dwellers through environmentally friendly technologies, such as converting organic waste to energy.



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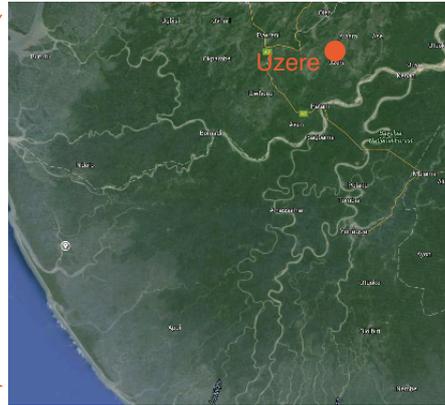
Objectives of the Project

- To promote a carbon-neutral technology that is appropriate for the region;
- To deliver an affordable and cost-effective energy solution for cooking;
- To build the capacity of the beneficiaries and local community to maintain the technology themselves; and
- To contribute to the reduction of deforestation.

INTRODUCTION



Delta State, Nigeria
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Uzere Community, Delta State
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The Uzere Community in Delta State, Nigeria is one of the largest oil producing communities in the country. Oil exploration in Uzere began in 1957 with two oil fields and 43 oil wells, now producing 53,000 barrels of crude oil per day. But despite the presence of a well established oil industry, and therefore the availability of this fossil fuel, most of the rural population depends on burning fuelwood.

Because of its accessibility and affordability, fuelwood is the main source of energy for cooking. The consistent use of wood in the rural communities of Delta State is by and large applicable to all communities in Nigeria. The rate of its consumption exceeds any afforestation programme of the federal, state and the local governments. The over dependence on forest wood as a domestic source of energy has greatly impacted the environment, leading to deforestation, high carbon emissions and health-related issues from inhaling harmful smoke.

To address this issue, the Delta State Climate Change Department of the Ministry of Environment under the Territorial Approach to Climate Change (TACC), initiated a pilot project to provide biogas technology to rural households in Uzere community. The biogas digesters use agricultural waste and food scraps from the kitchen for the generation of clean, safe, reliable, and environmentally friendly energy.

IMPLEMENTATION



Stakeholder consultations and selection of beneficiaries

Several consultative meetings were held with the community members to discuss needs and explain the benefits of the technology. Following a study undertaken to identify the households that would participate in the project, 10 were selected.

Key selection criteria included:

- Availability of the family to participate in the intervention, and provide the required support. This was a crucial step to ensuring that the beneficiaries have and maintain ownership of the project.
- Number of members in the household. Households with more members were prioritized so as to have greater impact.

Awareness workshops

Two awareness workshops were jointly coordinated by the Ministry of Environment and the Biotec Development Network team. The workshops were designed to discuss with the community, in greater depth, the wide-ranging benefits of the project.

Key topics covered were:

- The need for biogas technology and its benefits;
- The harmful impacts of burning fuelwood for energy, deforestation, and climate change; and
- The negative impacts of exposure to smoke from burning fuelwood on pulmonary health.

Role distribution among stakeholders

The household members were actively involved in the development of the biogas plants. Rather than being observers to the project's deployment, the beneficiaries worked side-by-side with the project team to ensure its success and sustainability.

Construction of the biogas digesters was undertaken by the BDN team as well as 10 community youth volunteers who were specially trained by the BDN. The community youth volunteers participated in all phases of the construction, which took two months to complete.

Local Liaison Officers were consulted to provide guidance on selecting the beneficiaries.

The Biotech Development Network (BDN) coordinated and implemented the project, in addition to providing technical training to the volunteers.

The Delta State Ministry of Environment monitored the project, and provided financial and political support.

R20 Regions of Climate Action provided technical support and is helping the BDN to fundraise so that the project can be replicated in other communities that could benefit from it.

10
volunteers



97
lives
impacted



BDN engineers and youth volunteers hard at work building a biogas digester



The methane generating plant has a digester capacity of 1 cubic meter, with daily gas production of 0.85 cubic meters. The maximum intake of waste per day is 5kg for solid waste and 20 litres for organic waste water.

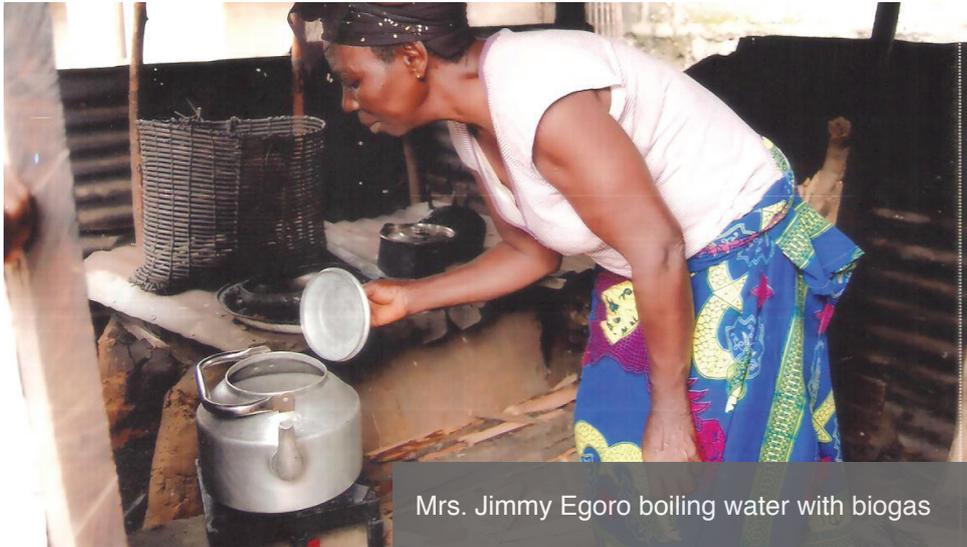
The digester consists of a gas holder drum, floating over a concrete digester tank, and built underground in order to avoid temperature fluctuations within the digester.

The gas holder is constructed using a mild steel pan (2 mm thick). A water seal is used to prevent gas leakages within the gas holder region.

The main feedstock used for the plant is agricultural waste, food scraps and other biodegradable materials. The waste is simply mixed with organic waste-water from the kitchen in a bucket, and poured into the digester inlet through the pre-treatment tank.

The biogas produced is gradually collected in the gas holder as the waste decomposes, and a hosepipe is used to channel the gas to a special biogas stove in the kitchen where the methane is destroyed and heat is generated for cooking. A gate valve is applied along the delivery gas pipe that is used to open and shut the flow of gas and regulate the flame.

Effluent from the plant is virtually odourless and has a high content of nitrogen, phosphorous and potassium, which is used for soil conditioning and manure improvement at the farm.



Mrs. Jimmy Egoro boiling water with biogas

Energy Production

The large quantities of agricultural and food waste that are generated in the community are transformed into energy for cooking and heating, thereby replacing the need for firewood. Each digester can produce on a daily basis about 800 liters of biogas for four hours of cooking, using 25 kg of biodegradable waste.

Economic benefits

- Household energy costs are significantly reduced, as families no longer need to purchase fuelwood. The monthly cost savings per household for energy is N6,214.
- The labour required for the collection of firewood from the forest and transportation can be channeled into other productive work.
- The replacement of chemical fertilizers with bio-slurry reduces farming expenses, with annual savings of up to N91,000 per household.

As a result of the construction training provided by the BDN team to the youth volunteers, the project created new employment possibilities for the rural youths.

Health benefits

With indoor air quality considerably improved, the beneficiaries are at lesser risk of contracting lung infections from excessive exposure to smoke.

Environmental benefits

- Reduced pressure on forest resources (2,758.8 kg of forest wood per year per household). Contribution to the protection of the carbon-sink function of forests;
- Reduction of greenhouse gas emissions. At the project level, it is estimated that the carbon emissions avoided by the 10 rural household biogas digesters could amount to **3,010 tons of CO₂ per year**.
- The bio-slurry that is produced by the digesters is high quality organic fertilizer that restores soil quality and improves the soil's water retention capacity due to the presence of humus.

QUICK FIGURES per household



QUICK FIGURES all 10 households

3,010 tons of CO₂

**emissions avoided
(approx.)**





SUSTAINABILITY & REPLICABILITY

Ensuring that positive results from a project are long lasting is crucial to the success of a project. To this end, the 10 community youth volunteers have been fully involved and engaged in the construction of the biogas digesters, and have received training on maintenance and operating the plants.

This project is the first of its kind in Delta State and Nigeria in general. The Biotec Development Network team will continue to organize technical training on biogas technology deployment, capacity building, entrepreneurship and technical training for volunteers, community-based organizations (CBOs) and other non-governmental organizations. The regular training and refresher courses on the technology, as well as the use of local materials, will enable other community members to come up with their own designs and disseminate the technology to others.

NEXT STEPS

- Project partners to explore financially sustainable ways to replicate and scale up the project throughout the Niger Delta and Africa (eg. through the use of carbon credits); and
- R20 to showcase this project at COP21 as part of an initiative to promote local actions and generate support from national governments.



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