

Kibindu Gasifier and Solar Hybrid Mini-Grid



Why to choose this solution?

Rural electrification is a critical challenge in developing countries, and Tanzania is no exception. Kibindu Village is located in the Chalinze District of the Coast Region and has a population of about 10,000 people. Up to and including the year 2015, diesel generators were the main sources of electricity for the villagers. The solution provided is to facilitate generation of electricity through a hybrid mini-grid system and to develop a distribution network. Kibindu mini-grid is a hybrid system of biomass gasifier system (20kW/32KVa) and solar PV (20kW). The gasifier uses maize cobs as a feedstock to generate electricity. The village has the potential to supply 40 tonnes of maize cobs per season. The Kibindu mini-grid can supply electricity to more than 200 households, SMEs, and institutions. Kibindu mini-grid is a renewable energy-based system supplying reliable and clean electricity to villagers who previously had to rely on wicked lamps, candles, and diesel generators for lighting and for productive activities.

Savings per day or production:

Customers receiving their power from the mini-grid realize significant savings in comparison to the costs to them for diesel generators, formerly their only major power source. Savings of time and money have also been realized by local government officials at village and ward offices, as they are no longer traveling to town for stationery and printing services. Social services have improved, and time frames for executing business services have been shortened.

Cost in money and in own time to construct:

Installation of the two systems (gasifier and solar) and the distribution network (grid) cost about USD 200,000.

Lifetime:

About 15 to 20 years for the solar panel and the gasifier; three to four years for solar batteries.

Maintenance needed:

For the gasifier, maintenance of the combustion engine is needed in case tar accumulates. For the solar part, maintenance requirements are relatively easy; even more so for the batteries.

Resources needed in use:

Biomass, in this case maize cobs; and solar energy.

Problems and limits:

With biomass gasifiers, too much particulate matter, tar, or other residues decreases the lifetime of the combustion engine and makes frequent maintenance necessary. The main strategy to address this challenge is to equip gasifier systems with a gas filter. This raises the costs, requires frequent cleaning of the filter system, and often produces much carcinogenic waste, especially in the case of wet stripping of the gas. Sometimes obtaining gasifier feedstock is a challenge.

Where and how can you get it or make it?

This system is installed in Kibindu village, Chalinze District, Coast Region in Tanzania.

Skills needed to produce, install, maintenance, use:

Skilled technicians are required for installation, maintenance, and operation of the gasifier as well as of the solar hybrid mini-grid system.

How to use it:

<https://www.youtube.com/watch?v=IsHP45imXj0>

How to maintain it:

<https://www.youtube.com/watch?v=WLV-FgxRx4g>

Climate effect (if any):

Electricity generated from the hybrid mini-grid in Kibindu has reduced the use of fossil fuels and thereby has helped to lower the village's CO₂ emissions. Emissions that would have resulted from decomposition of maize cobs are avoided through conversion of waste to energy. Solar power is renewable energy.

Where it is used and how many users are there?

Used by more than 1,000 people in Kongwa villages in Matombo, Biro village in Morogoro region and Kibindu village in Coast region.

Why is it successful?

The rate of rural electrification is still low in the country (only about 17%). Demand for sustainable energy for both domestic and business purposes is growing rapidly.

If you can make it, a short description, typical problems, materials needed:

Not relevant.

How to make it (if possible):

https://www.youtube.com/watch?v=IHuD5rOiv_M

How is it delivered and by whom?

Actors: SESCOM company, Husk Power Company of Tanzania (developers), USAID development partner/donor, Kibindu villages (customer/users), REA, EWURA, Ministry of Energy, District and village authority. Part of the installation costs were covered by USADF Power Africa Grant. The system is managed by SESCOM and Husk Power; maintenance and operational costs are charged in customer bills through a pay-as-you-go system.

Successful financial model

Grant funds covered capital costs. Operational costs are recovered from payment of electricity bills.

What policies and strategies helped the success?

The first and second generation Small Power Producers (SPP) Frameworks developed by the government of Tanzania, 2008 and 2015.

More info:

Read more: <http://www.tatedo.org/medias/news-articles/43-kibindu> and <https://www.retc.co.tz/post/Industrial-Visits-for-September-2019>

Sources:

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