

Improved Basic Earth-Mound Kiln (IBEK)



Why to choose this solution?

The Earth Mound Kiln (EMK) is one of the oldest and most commonly used kilns in East Africa. EMK has average efficiency of 8-15%. Carbonization time is 8 days, during which the kiln requires continuous attention, and cooling time is 24-48 hour on average. The quality of charcoal produced is rather low. The Improved Basic Earth Mound Kiln (IBEK) has efficiency of more than 25%, carbonization takes only 4 days, cooling takes 24 hours, and the quality of charcoal produced is relatively high.

Savings per day or production:

IBEK has an efficiency of about 20-25%. It requires half the time required by the traditional BEK to produce charcoal. IBEK yields large pieces of charcoal with no leftovers, requires only 4.5 kg of wood per 1 kg of charcoal, and raises the calorific value of produced fuel to more than 31kJ/kg. For traditional EMK, in contrast, 7kg of wood are required to produce 1kg of low-quality charcoal of calorific value of 26kJ/kg.

Cost in money and in own time to construct:

IBEK is a temporary structure; the size of the kiln varies from a few cubic metersâ€™ capacity to over 100 cubic meters. One iron sheet to make the chimney is required, the price ranges from TSh 15,000 to 18,000 (USD 6.50 to 7.75). Another cost in time, effort, is labour, to construct, to load, to monitor, and to clear away the kiln. Given the reductions in number of days required for carbonization and in the amount of wood needed, the IBEK is a vast improvement over the traditional BEK in terms of labour costs.

Lifetime:

Carbonization takes four days and cooling takes 24 hours, then off-loading follows.

Maintenance needed:

During carbonization, one must monitor the process every two to three hours to ensure that the kiln is well covered throughout and that no air is getting into the kiln through its walls. Soil is used to cover any emerging openings in the structure of the kiln.

Resources needed in use:

One corrugated-iron sheet is needed to make a chimney. Wood, grasses, and soil, all locally available, complete the building materials. The IBEK requires little capital investment once one possesses the necessary common hand tools (axes, machetes, hoes, rakes, shovels, digging forks), which are usually already at hand from other daily industrial and agricultural activities of the rural population. Labour is required to form the

chimney, to construct the kiln, to shepherd the process, and to unload the kiln.

Problems and limits:

More time is consumed while preparing and organizing wood in the kiln to minimize void space. A large amount of small pieces of wood is required to make the apron. More grasses are required, as the more efficient design requires the entire piles of wood to be covered completely.

Where and how can you get it or make it?

The IBEK design is applied in Tanzania's coastal and southern areas, but mainly is used in Kilosa in the Morogoro region.

Skills needed to produce, install, maintenance, use:

Arrangement of logs, chimney placement, and kiln covering requires a trained person. Monitoring of the carbonization process and charcoal off-loading need a short introduction only.

How to use it:

How to maintain it:

Climate effect (if any):

Each ton of charcoal produced and consumed in Tanzania using traditional methods generates nine tons of CO₂ emissions; IBEK reduces emissions considerably. The IBEK is designed such that the chimney plays an important role in reducing air pollution by serving as a smoke filter. It works well, reducing the emission of harmful volatile substances into the atmosphere by as much as 75%.

Where it is used and how many users are there?

Used in Tanzania by more than 100,000 charcoal producers every year.

Why is it successful?

IBEK uses a relatively smaller quantity of wood, and less carbonization time (hence, less monitoring time) to produce charcoal in the same quantity as the traditional method. Moreover, the IBEK yields large pieces of charcoal with no leftovers.

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

Wood is needed to make charcoal. A metal sheet and minimal metal-working skills are required to make the chimney. A large amount of earth and grass is needed to achieve full coverage of the other material input, wood.

How to make it (if possible):

Video is being prepared to be uploaded later.

How is it delivered and by whom?

The IBEK has been incorporated into a sustainable charcoal-production model, which involves development of a village land-use plan with land demarcation for each village's forest reserve. The village prepares a forest-management plan and by-laws for managing the village forest reserve. The forest-management plan designates areas for sustainable charcoal production equal to 10% of the village's total forest land. A Village Natural Resource Committee (VNRC) is established to oversee and to manage the village forest land.

One of the tasks of the VNRC is to approve requests from charcoal producers and to ensure that they follow sustainable charcoal production methods, including use of IBEEKs rather than traditional BEKs.

Successful financial model

This model facilitates transformation of forest that, earlier, was regarded as general land, into village land. Thus, the model gives villagers the right to own, and to benefit from fees and royalties from, forest adjacent to them. Money previously collected by the central government remains in the village. The decision on how the revenue accrued will be used is made by the village assembly. In most cases, villagers use the money for community-development projects and for forest management costs, such as patrols.

What policies and strategies helped the success?

The Tanzania National Forest Policy advocates for Community Based Forest Management and benefit-sharing. Charcoal regulations and village by-laws support these improvements.

More info:

www.tatedo.or.tz

Sources:

TaTEDO, Mbezi Juu, Mpakani Road, Goba, House No GOB/KZD/883, P. O. Box 32794, Dar es Salaam, Tanzania. Tel: +255 738-201498, E-mail: energy@tatedo.or.tz

When was the case uploaded?

2020-09-04

*Case from Catalogue of Local Sustainable Solutions
in East Africa. Read more and see partners at
localsolutions.inforse.org*