FROM WASTES TO ENERGY

FRANCIS HARAWA

Dung. A lot of it. That's what they are trying to use for cooking and lighting homes at Nderu, a rural village near Nairobi.

The biogas project was originally set up as a demonstration unit for the United Nations Conference on New and Renewable Sources of Energy, which was held in Nairobi in August last year. Now attempts are being made to build a community biogas plant which will supply methane for lighting homes and for cooking, although at first many villagers did not believe that their waste could do so. The project (which will cost about 200 000 Keynan shillings [$Cdn 27 000] is being financed by the United Nations' Habitat organization and Kenya's Ministry of Energy.

According to H.S. Hanuman, a United Nations expert on biogas from India, the project uses animal waste from pigs, cows, and chickens. Before the plant was set up, a survey was done to establish how many cows, pigs, and goats were available in the area, and to determine how much the villagers were spending on buying charcoal and wood. There are now plans to increase the pig, cow, and chicken population in the area.

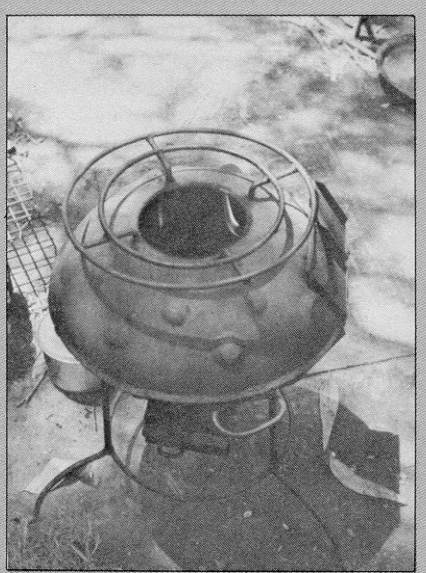
The villagers have already built four tanks for digesting the animal waste, each capable of producing 35 cubic metres of gas per day. An average family is expected to use about 10 cubic metres per day. A pipeline is being built to take gas to the 30 homes

HOT SAVINGS ON STOVES

EPAJJAR OJULU

"One kilogram of waste paper can bring two litres of water to boiling point in five minutes and maintain boiling for 40 minutes. One kilogram of wood can bring four litres of water to boiling point in 12 minutes and maintain vigorous boiling for five hours."

To the average person this kind of information may seem almost mythical. But to Kinyanjui Miringu, a researcher in the Nairobi University's Department of Architecture, Design and Development, there is no myth about it. It simply states the efficiency of his new cooking device that brings economy, efficiency, and convenience to the average family and is fast becoming a great success among the cross section of Kenyans who have had access to it.



According to Kinyanjui, the idea of a new-style *jiko* (cooking stove) first came to mind when the city of Nairobi was faced with a series of electricity blackouts.

Kinyanjui thinks that one solution to the increasing shortage of fuelwood lies in improving the efficiency of the cooking devices available.

He claims that the superior performance of this new stove is due to its ability to exploit all the energy available in wood, charcoal, and biomass. Firstly, the Kimathi Jiko (as it has been tradenamed) "minimizes misuse of the fuel through misdirection." Because of its shape, the jiko's heat is controlled and directed only to the desired location, immediately under the cooking vessel. The jiko also avoids wasting the smoke from the fire — this smoke consists of highly useful gases which are not usually burned, therefore resulting in an additional energy loss. In this new jiko, the smoke is reprocessed and burned to produce further heat. This is particularly important where the fuel is animal waste, which emits a lot of gas in the form of smoke.

Another important feature of the Kimathi Jiko is that burning conditions can be controlled so efficiently that the wood, while creating enough heat for cooking, can, if necessary, be turned into charcoal for future cooking purposes.

The main design features contributing to increased efficiency, according to Kinyanjui, are:

- The twin control of the entrance and exit of the air required for combustion. This also enables precise regulation of the intensity of the fire while cooking, thus avoiding the energy waste often experienced in open-fire or open-stove systems — particularly when cooking is finished.
- The Kimathi Jiko is completely enclosed, thus enabling retention of heat for a longer time around the cooking pot, and also facilitating baking and broiling. It also has a hot water jacket which makes use of the fire's heat to warm water that can be drawn off for other uses. The water jacket also prevents heat loss via the metal sides of the stove and allows the stove to be handled easily even while burning.
- The jiko also allows for greater combustion of the gases from the wood and charcoal fuel, for greater fuel efficiency.

Kinyanjui says laboratory tests carried out at the Kiambu Institute of Science and Technology in Kenya have shown his jiko uses about 35 percent less fuel than the traditional metal stove now in use in Kenya.

Another boon for users is that the cost is not high, mainly because the materials used are obtained locally from scrap metal. If mass production of the stoves occurs, Kinyanjui forecasts a unit price of around 200 Kenyan shillings ($Cdn 27).

Epajjar Ojulu is Editor-in-Chief, Uganda Times, *Kampala, Uganda.*

in the village: 26 have been connected so far. Only six homes are now actually using the gas, as leakages in one of the tanks delayed the project. Construction of extra tanks is expected to be completed soon, adding the needed capacity to serve all the households.

It takes 40 days for the dung, which is mixed with water at a ratio of 4:5, to start producing gas. The dung is first mixed with water into a slurry and passed into an unheated tank, which has to be kept at a temperature of between 30–35°C to achieve optimum operation. The heat is achieved by building most of the tank underground and painting the gas-containing upper portion black so that it absorbs the sun's heat. A type of bacteria which operate without oxygen then turns the slurry into methane.

At the moment, the people of Nderu are not paying for the gas, but it is estimated that once the project is handed over to the community, they will pay about 150 shillings a month. This will result in some savings, as many families presently pay more than this for their monthly energy requirements — mainly fuelwood and charcoal. Once the project is handed over to the community, each member of the community will be expected to provide the dung for the biogas plant from their livestock. They will also be required to keep a log of how much waste they have supplied, so that at the end of the month, they can be allocated an appropriate amount of the dry manure which is the by-product of the digesters.

Mr Hanuman says that the manure from the biogas digesters is a more effective fertilizer than manure obtained from a compost pit since it contains twice the amount of nitrogen. The manure is in the form of humus which is capable of retaining humidity during dry spells. The other advantage of manure from the biogas digester is that it contains no weed seeds. These are all digested in the process.

The idea of turning waste into energy is not new in the developing world. Seven million digesters are said to be in use in China, almost all of them in one province, and are used primarily for producing fertilizer. In India, the main object is energy production from cow dung, which is also commonly burned as a fuel in rural areas.

Many problems remain to be overcome in the campaign to convince villagers to produce their own methane gas. The majority of villagers in Africa, for instance, have strong cultural objections to using human waste from their pit latrines to generate the energy which they then use to cook their food and light their homes. However, in the near future, it might not be a matter of choice or taste. As reserves of fossil fuels run out, the price of oil and other sources of energy are rising well beyond the means of the average farm family.

Francis Harawa is Editor of the Malawi News, *Blantyre, Malawi.*

NO HEALTH FOR ALL

ARTHUR SIMUCHOBA

The World Health Organization's (WHO) target of "good health for all" by the year 2000 has been described as unrealistic by a Kenyan doctor, Dan Kaseje.

Speaking at a science-writer's workshop at the University of Nairobi's School of Journalism in February, Dr Kaseje said that although it was better to have a target than not, the size and extent of the health problem in the world was too great to be eradicated by the year 2000.

Dr Kaseje, who works with the Department of Community Health at Kenyatta National Hospital, said that the methods being used in many developing countries to achieve this target are usually inappropriate. For health services to cover everybody in the world, he said, they must be available and acceptable to the local populace. They must also be affordable, accessible, and attractive.

At the moment health coverage in developing countries is poor, Dr Kaseje said. He gave the example of Kenya where, he said, only about 15 percent of the large rural population has access to medical care.

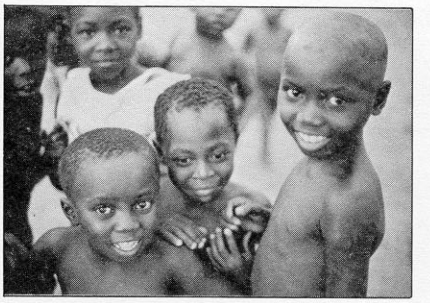
Mortality rates in Kenya, especially among mothers and their infants in the 1–5-year age group, are still very high. Out of every 2000 children born in Kenya, 200 die by the age of two, he said. The rates are lower in more developed urban centres.

The medical service systems in many African countries, he said, are in most cases still the same as when they were inherited from the colonial rulers, and are "inappropriate for the present reality". He said that in most cases African governments tended to strengthen these same inherited systems rather than change them.

Dr. Kaseje emphasized that if health for all was to be realized in these countries, the medical service delivery system had to be different from the hospital-based "western-colonial" model. What is required in these countries was a system with a bias towards rural health, he said.

Unfortunately, according to Dr. Kaseje, there was little commitment to this in many African countries. "All that has happened in rural health is talk," he said. As a result, the inappropriate inherited system proliferates, with most of the budget being spent on either building new, or maintaining old, centralized hospitals.

Dr Kaseje doubted whether ministries of health really existed in many African countries. Referring to



Kenya he said, "We do not have a ministry of health, but rather a ministry of disease. We wait for people to fall sick and then rush an ambulance to collect them."

However, Kenya had tried to correct the situation, he noted. In 1970, the central government took over the running of rural health centres from municipalities and district councils. This was after it was established that 90 percent of the country's population lived in the rural areas.

The country was divided into rural health units in 1973. These units were meant to enhance services to the rural people. Rural health centres are the headquarters for a number of dispensaries while schools are also used as service points for mobile units.

There are six rural health training centres, one in each province, where health workers are being retrained to give them the orientation necessary for working in rural areas. There are also three rural health demonstration centres in each district where the retrained staff are posted before being finally assigned to a rural clinic, Dr Kaseje said.

At the moment Kenya is concentrating on mother care and family planning, he said. But, unfortunately, about 80 percent of Kenya's health services are still in the urban areas, leaving only about 20 percent for the rural areas where 90 percent of the people live.

Dr Kaseje suggested that Kenya should take seriously the option represented by community-based primary health care, as outlined by the WHO in 1978 at a conference in Alma Ata, USSR.

The one problem with this program, however, is affordability. The fact that it is community-based should not mean that the government should surrender its financial responsibilities to the community, because rural communities will not be able to afford it, he concluded.

Arthur Simuchoba is Features Editor of the Times of Zambia, *Lusaka, Zambia.*