

# *Charcoal in Malawi.*

## *A clean, sustainable energy source????!!!*

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Promotion of clean cooking in Malawi

December 20, 2014

### 1. Introduction

Malawi charcoal production, valued at \$41.3 million a year, has been illegal since the independence in 1966. The trees lost to illegal charcoal production, approximately 15,000 hectares of forestland each year, are most often taken from public reserves and are rarely replanted. Thus the production is tolerated and producers usually only have their bags and tools confiscated. At checkpoints the transporters might have to pay a fee (bribes) now and then.



In principle we do not advice to use charcoal; it's environmentally better to burn wood directly using the high-efficient woodstoves. However, in the urban regions the use of charcoal is traditionally and socially determined. In order to decrease the charcoal usages in these areas, it is more appropriate to promote high efficient charcoal stoves. Combined with a more efficient, environmentally friendly charcoal production method approximately 75 % of the wood reserves can be saved!!!

### 2. Charcoal in urban regions

***The rural poor have no other source of income and  
the urban poor have no other source of energy.***

A study published in 2007\* states that the charcoal business is one of the largest in Malawi; if the product was exported, the annual foreign exchange income to the country would fall somewhere between that of tea (Malawi's 2nd-largest export after tobacco) and sugar (3rd-largest in 2006). While the majority of the HH's in the rural region rely on wood in the urban areas of Malawi charcoal is more commonly used. The result of this study shows that at in 2007 about 90 % of the charcoal is used by the four largest urban centres (Blantyre Lilongwe Mzuzu and Zomba).



Charcoal is a vital energy source for the urban poor. Low-income households have a higher per capita charcoal consumption, while three-quarters of their total household energy expenditure is spent on charcoal or wood. Among more affluent households electricity is the main source of energy, however these households also use charcoal in significant amounts: the difference in expenditure on charcoal between low-income and high-income households was found to be small\*.

\*"Charcoal the reality", a study of charcoal consumption, trade and production in Malawi. ISBN: 978-1-84369-678-0

A few facts from this report:

- About 100,000 people owe their livelihoods on charcoal.
- Annual usage of charcoal in the major urban regions in 2007 was 230,000 metric tons, which requires 1,400,000 m<sup>3</sup> wood (15,000 ha woodland annually; which was at that time about one-third of the annual deforestation). In view of the overall population growth the current figures will be approximately as follows: 325,000 metric ton charcoal; 2,000,000 m<sup>3</sup> wood (21,000 ha woodland).
- The annual expenditure on charcoal in the urban regions was nearly 4 times the expenditure on electricity.
- The major part of the charcoal production is in fact illegal.
- Traditional earth kilns are the standard which means an efficient ratio of not more than 15 %.

In the absence of any genuinely viable alternatives that can operate at commercial scales – despite a variety of interesting hobby-level options supported over the years, charcoal will continue to be produced and consumed in Malawi for many more years. The questions are quite simple: “How to utilize the available charcoal more effectively” and “How do we want to produce this product to meet this market demand in a better manner?”

### 3. The cost structure and the economics of the charcoal business.

According to the data gathered in 2007 there were about 100,000 people involved in the charcoal business, including 50,000 producers, 15,000 bicycle transporters and 35,000 traders (wholesale and retailers). The analysis of the cost structure shows that the producer gets about 30-35 %, the transporter 20 % and the traders about 25 % of the final cost price.

### 4. High efficient environmentally friendly charcoal stoves using 60-65% less charcoal.

Traditional charcoal stoves use about the same amount of energy as the three-stone fire to complete a task (not counting the energy-lost in making the charcoal) and produce up to two times more carbon monoxide.

Available high efficiency charcoal cookstoves:

- CH-2200: standard product; will be in due time replaced by the Econochar .
- CH-5200: larger pots fits on this stove. This family-size stove is very popular in Tanzania where, about 4000 stoves are being sold on a monthly basis, one expects that this figure is still growing.  
(in view of this high number of stoves sold annually carbon subsidy could be obtained in Tanzania).
- Econochar: launched recently by Envirofit as their cheap alternative.

Estimated consumer prizes (included VAT)

	USD	MKW
CH-2200 charcoal	44	20,000
CH 5200 charcoal	68	33,000
Econochar charcoal	31	15,000

Prices in 2015 are expected to be slightly higher.

Due to the effect of the carbon subsidy final cost price in Tanzania is considerably lower:

CH-2200: 23.5 USD; retailer: 26.5 USD; customer: 30.4= 12.000 MKW

CH-5200: 27.6 USD; retailer: 32.4 USD; customer: 37.3= 14.500 MKW

## Performance

### CH-2200:

More than 50% fuel reduction over a typical or traditional type stove! The CH-2200 boasts ultra-low carbon monoxide and particulate emissions – up to a 63% carbon monoxide reduction over a typical or traditional type stove and passes the WHO standard for 60 minute CO exposure limits.

### CH-5200:

The CH-5200 Charcoal Stove incorporates the same combustion efficiency as the CH-2200, but accommodating larger, family-size, pots used in much of the world.

### Econochar:

The Econochar is the most cost efficient clean charcoal stove. The Econochar cooks quickly and efficiently for large families on a small budget. With a support bar that can safely accommodate large cooking pots (onto 13 l pots) and an ash drawer for easy lighting and cleaning the Econochar is a stress free charcoal cooking solution for urban and peri-urban living.



## Performance improvement versus traditionally Jiko “coalpot” (charcoal)

	Thermal efficiency % improvement	Charcoal % reduction	CO % reduction
CH-2200 charcoal	282 %	65 %	58 %
CH 5200 charcoal	241 %	58 %	49 %
Econochar charcoal	233 %	57 %	62 %

Reduction in cooking time of the Econochar stove versus the CH-2200 is about 25 % PM (particulate matter) emission during charcoal burning is negligible and thus not included in the table.

## 5. Return over investment

An average household in the urban region uses for their daily meals about 3 kg of charcoal which costs about 300 MKW (another source mentioned 4-5 kg per day at MK 70 per kg). A simple calculation shows that even the highest investment for an unsubsidized CH-5200 family-sized charcoal stove is earned back in 4.5 months.

## 6. Marketing the charcoal stoves

About 150,000 HH's owe their live hoods on charcoal, this means that 0.5 and 1 million people depend upon income generated by the charcoal business. The dissemination of high efficient charcoal stoves will have an effect upon the income of these people. However, the process will happen gradually and thus there will be no direct need for a compensation. People might find jobs in the marketing of the stoves.

Initially during the first pilot we plan to sell only several hundreds of different types of stoves. The goal of the pilot will be to establish which of these 3 stoves is the most favourite one and what will be the amount people willing to pay for it. Preferably during the pilot small businesses and "private" persons are involved. From the beginning we plan to allocate part of their profit to the dissemination of woodstoves in the rural communities (Social Enterprise; let the rich pay for the poor). In a later stage general traders like Shoprite, Farmers World, Solar Corporation etc....might become interested as well.

## 7. The charcoal production

The efficiency of the "earth-mound kiln technique" is reported to be only about 10 to 15 % which means that maximum only 15kg of charcoal can be gained from 100kg of wood (oven-dry). These low yields not only accelerate deforestation but cause atmospheric pollution through smoke, carbon monoxide and methane. It should be noted that the greenhouse effect of methane is about a factor of 20 more than the greenhouse effect of carbon dioxide!!. Relatively low-cost masonry "retorts" might be one of the approaches to reach a 35-40 % efficiency. Compared to the traditionally earth-mount kiln this retort system reduces the emission of harmful volatiles into the atmosphere to about 75 %. Furthermore the construction allows the use waste wood or residual biomass for drying and initiating the carbonization process. The production of wood vinegar during the first phase of the carbonisation process is also possible. Wood vinegar has useful applications in the traditional agriculture. About 7 years ago the cost price of an excellent performing retort-based production unit was about USD 1000. Price will be higher nowadays and thus donors have to become enthusiastic about the idea of starting pilots in various regions in Malawi.

## 8. Charcoal; a renewable forest product

It has been stated that, when using efficient charcoal stoves combined with optimized production procedures charcoal could be considered a renewable forest product that would give the Malawian clean efficient energy at affordable prices. Malawi's Forest Governance Learning Group has been lobbying for its decriminalisation in an attempt to capture the considerable rents generated by this trade and to foster sustainable livelihoods for those communities which depend upon it. Only after legalization of the production effective replanting programs could be established.

(In Rwanda an effective replanting program is functioning by using eucalyptus trees as one of feed stocks).

## 9. Short term planning

During my recent visit to Malawi I have identified a number of entrepreneurs who plan selling charcoal and woodstoves early next year both in Lilongwe and in Blantyre.

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