

# Institutional Rocket Stove (IRS)

## Ethiopia



### Type

Portable institutional rocket stove used for single pot with or without chimney.

### Name

Institutional Rocket Stove (IRS).

### Fuel

Firewood.

### Country of origin / dissemination area

Ethiopia.

Based on rocket stove principle, IRS production guideline was developed by GIZ Energy Coordination Office (ECO) in 2008.

Ethiopia launched the stove in January 2010.

As of September 2011 over 300 IRS's had been sold in the ECO intervention regions of Ethiopia (Addis Ababa, Amhara, Dire Dawa, Harari, Oromia, SNNPR and Tigray regions).

### Users

Mainly used in urban and peri-urban areas, by institutions such as colleges or universities, school feeding centres, hospitals, prisons, hotels or restaurants, company canteens, orphanages and other institutions where large scale cooking takes place.

### General Description

The stove is generally meant for any type of food preparation that is done on pot including cooking and boiling. It can also be tailor made to handle pan for frying.

The portable stove features a small combustion chamber unit made of a set of ceramic liner units. The combustion chamber and the loose pumice around it, which is used for insulation, are contained in a rectangular metal box. At the top, a sheet metal shield around the cooking pot – the skirt - forces the gases of combustion to scrap against the side of the pot. It thus transfers heat to the pot, enhancing the efficiency of the stove.

Different sizes of the combustion chamber and other parts of the stove exist depending on the size of the pot, ranging from 10 litres through more than 200 litres. The corresponding cross-

section of the square-shaped air/fuel inlet ranges from 11cmX11cm to 22cmX22cm.

At the air/fuel inlet is a swinging fuel shelf that supports firewood, lifting it off the fire-bed in the combustion chamber. This way the fuel shelf divides the inlet into two sections where the one below the shelf is used for directing primary air into the chamber and the one above is for firewood and secondary air inlet. Firewood is continuously fed and freely burns in the chamber without grate.

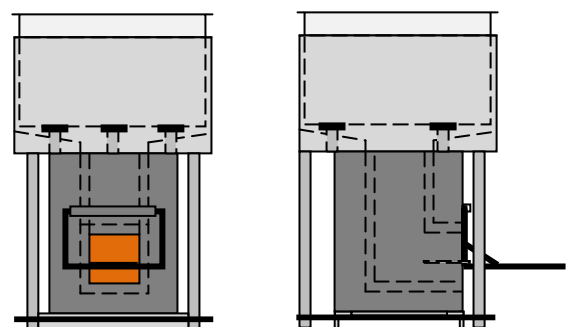
The different parts of the stove are joined together and supported by three metallic legs. A circular base-ring and angle-iron framing transmit the whole stove weight to the ground.

### Stove dimensions

An example IRS without chimney stove size for a 50 litre pot:

- **Pot**  
Pot diameter: 50cm  
Pot height: 27cm  
Pot volume: 53 litre

- **Stove**  
Skirt diameter: 524cm  
Skirt height: 255cm  
Combustion chamber size: 15cmX15cm  
Combustion chamber box size: 45.3cmX31cmX31cm



Picture: IRS with pot (drawing with hidden lines (broken lines); front view and left side view)

## Lifespan

The ceramic liners can stand harsh inside conditions (high temperature with physical abrasion) in the stove for more than a year and the metal parts even more, for at least three years. If the liners fail, they can easily be replaced with new ones.

## Materials used

- **Stove body:** The external stove body (skirt and box) is made of sheet metal of mild steel material with 1.5-2mm gauge. Steel materials of round bar of 12mm diameter for the base ring, squared tubes of 40mm size for the legs as well as angle-iron of 40mm for the base frame are also used.
- **Combustion chamber and other parts:** Ceramic liner is of clay origin with different additives. Loose pumice is used as insulation. A small amount of cement is required to mix with fine pumice and spread on the top plate of the stove.

## Efficiency

Laboratory tests showed thermal efficiencies in the range 40-50% depending on the size and how cold or hot the stove is. Generally the efficiency tends to increase with size. Fuel savings, compared to three stones open fire or enclosed stoves, as much as 70% have been recorded.

## Production / Supply

The stoves are produced by local small scale enterprises that have basic metal processing facilities including measurement, cutting, grinding and welding tools. Ceramic liner is produced by local potters.

Producers of both main units are selected and trained by ECO before they could become a producer.

Stoves are built on demand to fit the sizes of the cooking pot.

## Price

Current price (2011) varies between ETB 800.00 (EUR 35) and ETB 4,500.00 (EUR 190)

depending on the size of the stove and cost of raw materials.



## Strengths and weaknesses

### Positive

- + Efficient (up to 70% fuel saving) as stove is built for each individual pot
- + Clean (reduces smoke)
- + Safe cooking (reduced risk of burns)
- + Fast cooking
- + Portable
- + Replaceable parts
- + Employment opportunities because of local production
- + Local raw materials

### Negative

- Relatively expensive
- Relatively complicated to produce (stove dimensions depend on pot dimensions; dimensions of each stove need to be calculated; no fixed size stove)

## Available documents

- Production manual  
[https://energypedia.info/index.php/File:Giz\\_CIRS\\_Manual\\_eng.pdf](https://energypedia.info/index.php/File:Giz_CIRS_Manual_eng.pdf)
- User guideline  
[https://energypedia.info/index.php/File:IRS\\_user\\_guide\\_english.pdf](https://energypedia.info/index.php/File:IRS_user_guide_english.pdf)

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