

# Inkawasi Tres Hornillas Stove

Peru



## Type

Built-in household rocket stove for three sunken pots with single combustion chamber and chimney

## Name

"Inkawasi Tres Hornillas" stove = Three pot-holes stove

## Fuel

Fuelwood

## Country of origin / Dissemination area

Peru

Developed in 2010 by Ing. Jose Humberto Bernilla (GIZ) based on the 'Inkawasi Pichqa' stove to accommodate three sunken pots. Disseminated in the area of Cajamarca where another model with three pot-holes is already in use. Simplified design based on commercially available 6-hole bricks. As part of the national campaign 'Medio Millón de Cocinas Mejoradas por un Perú sin humo' nearly 200 "Inkawasi tres hornillas" stoves had been built for 'A Peru without smoke' by 2010. The target is 3,000 stoves by the end of 2011.

## Users

Rural, peri-urban households, so far only in the Cajamarca department

## General description

Fixed, built-in high-mass stove:

- Single rocket combustion chamber out of commercially available bricks (Six-hole-bricks), insulated by air-gaps
- Loose metal shelf for fuel support
- Only one inlet for air and fuel
- Prefabricated ferro-cement slab with pot-holes for three sunken pots
- Metal chimney with brick base and removable cap

The stove-design is based on the "rocket principles" with a grate for primary air below the fuel and a tall insulated combustion chamber. The chimney creates horizontal airflow around the sunken pots for optimal heat-transfer and guides the flue gases out of the kitchen. The pot-holes accommodate pots with a diameter of 26 cm, 25 cm and 22 cm. Each pot rests firmly on two horizontal metal rods.

## Stove dimensions

Dimensions for an average stove:

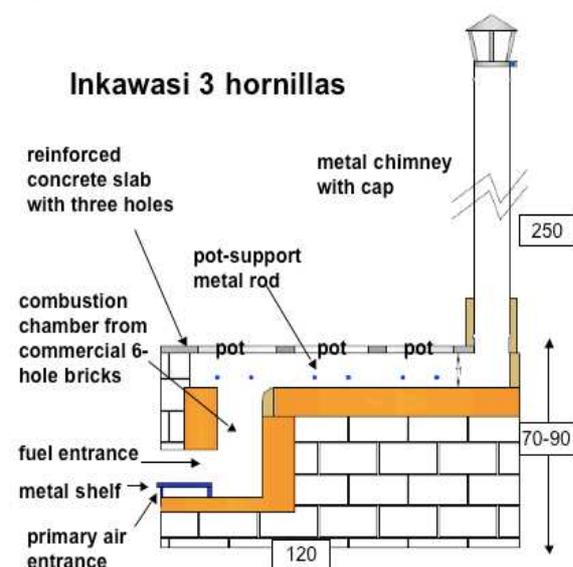
- Length: 120 cm
- Width: 65 cm
- Height: 70-90 cm
- Chimney height: 250 cm

## Estimated lifespan

More than five years. The shelf needs replacement after one year.

## Materials used

**Combustion chamber:** 14.5 x 14.5 cm, from commercial six-hole brick = "ladrillo pandereta"



**Stove base:** Mud, adobe, fired bricks or stones, whatever is locally available

**Stove body:** Adobe or fired brick, with mud or cement mortar

**Concrete Slabs:** 3 cm thick, reinforced with electro-welded wire-mesh ½” squares

**Pot rests:** 12 mm reinforcement bar

**Chimney:** Metal tube (diameter: 12 cm) from galvanised sheet with protecting cap, which can be detached for cleaning. Base covered with adobe for heat protection

## Performance

High potential to reduce indoor air pollution through chimney, if properly maintained: CO by 99%, PM by 99%. It boils 5 litres of water in 27 minutes. In the laboratory it saved 70% of the firewood compared to an open fire, figures from the field are not yet available as the dissemination only started in 2010.

## Production / Supply

The stove is built by trained local installers. The metal kit (shelf, pot rests and chimney), the slab and the commercial bricks for the combustion chamber and stove body are provided by the installer. The households provide the material for the base. The slabs and the metal kit are manufactured by local providers.

## Price (2011)

Total material costs (combustion chamber, concrete slab, grate, rods, and chimney): around 35.00 € excluding mud, bricks, mortar and ash provided by the beneficiary. The installers' salary is 5.00 - 15.00 € depending on the area.

## Strengths and weaknesses

### Positive

- + Accommodates three pots at a time

- + Efficient stove with great potential to reduce indoor air pollution if the chimney is maintained properly
- + Prefabricated parts allow high quality and fast installation
- + Enhances local production
- + Very safe (35 out of 40 points)



- + High degree of users' satisfaction
- + Allows people to cook upright

### Negative

- Relatively expensive
- Prefabricated parts are dependent on local infrastructure to provide them and on construction skills to install them.
- If shelf remains covered by hot fuels it can wear out faster

### Available documents

- How to use and maintain my improved stove (Como uso y mantengo mi Cocina Mejorada)  
<http://www.cocinasmejoradasperu.org.pe/infografia/usomantenimiento.pdf>
- Manual de Capacitación e Instalación de Cocinas Mejoradas – Inkawasi.  
[https://energypedia.info/images/4/47/GTZ-manual\\_instaladores-Cocina\\_inkawasi\\_familiar-Peru-small.pdf](https://energypedia.info/images/4/47/GTZ-manual_instaladores-Cocina_inkawasi_familiar-Peru-small.pdf)

Source of pictures: GIZ Peru/SENCICO/ C.Roth  
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