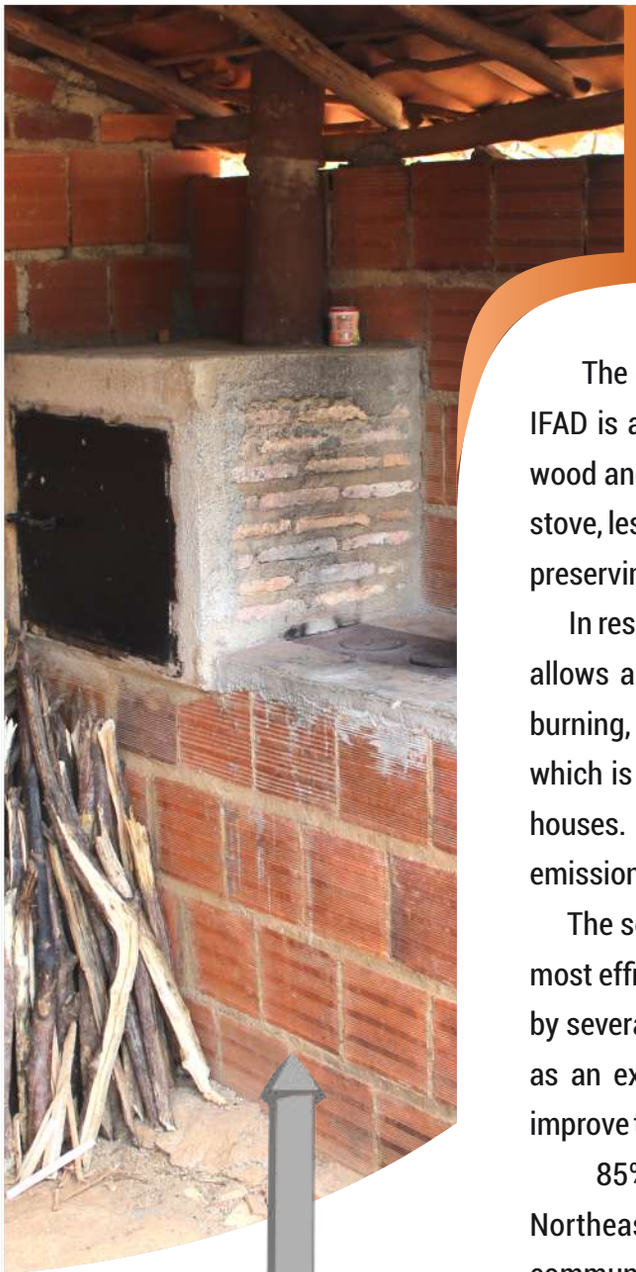
DIGITAL PORTFOLIO

ECOSTOVE

IACOC
Compromisso com o desenvolvimento socioeconômico do Semiárido paraibano
PaqTcPB Fundação Parque Tecnológico da Paraíba
UFCG Universidade Federal de Campina Grande
INSA Instituto Nacional do Semiárido
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E INOVAÇÕES
PÁTRIA AMADA BRASIL GOVERNO FEDERAL
FIDA Investindo nas populações rurais

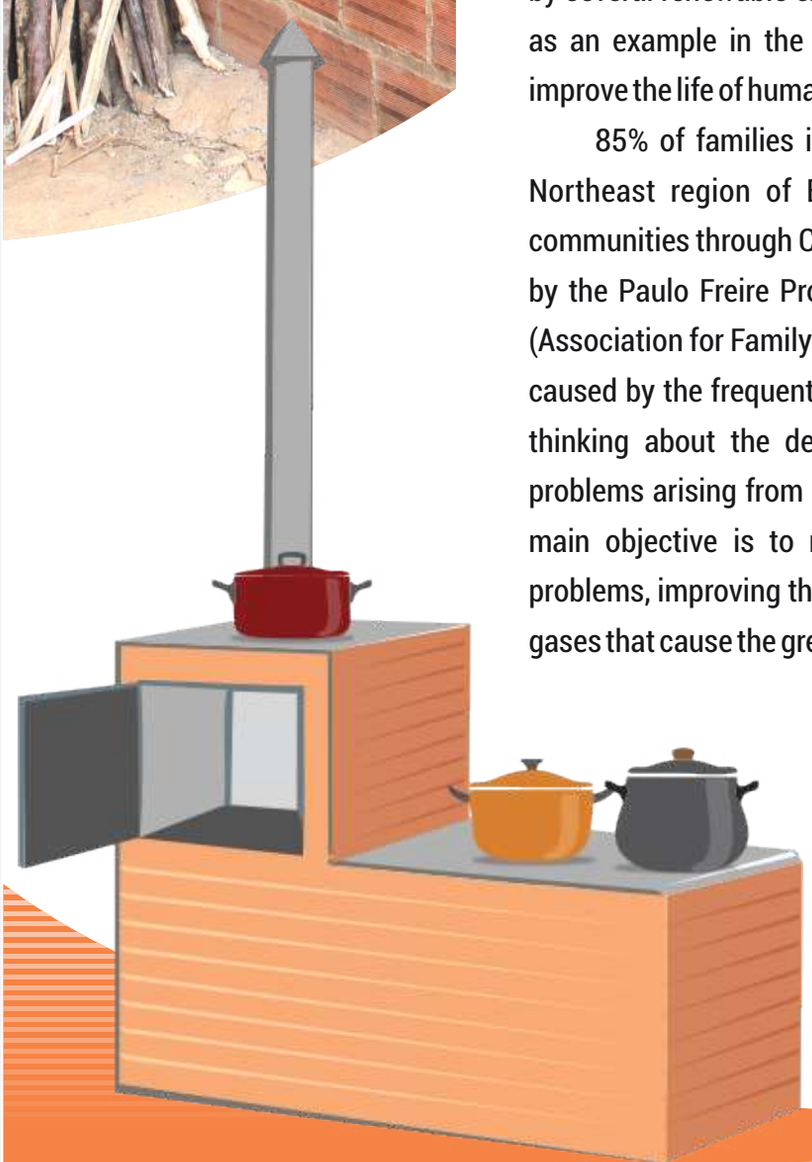


The ecological stove or ecostove (ecofogao) used in projects financed by IFAD is an improvement on the traditional wood stove, which consumes less wood and has an oven attached. For the use and preparation of the ecological stove, less financial resources and less natural resources are used, in addition to preserving one of the peasant traditions, the foods prepared in the wood oven.

In respect to the traditional wood stove, the closed chamber of the ecofogao allows a production process with more heating, making better use of wood burning, becoming more efficient and with a minimum of smoke production, which is expelled through a ceramic chimney to the outside of the roof of the houses. This reduces the consumption of firewood and, besides that, the emission of smoke.

The social technology of eco stoves / ecological stoves is presented as the most efficient alternative to traditional wood stoves. This technology was used by several renewable energy projects and the strengthening of family farming, as an example in the Paulo Freire Project (PPF) in Ceará, to facilitate and improve the life of human being in the countryside and to preserve more nature.

85% of families in the rural area use firewood for cooking food in the Northeast region of Brazil. The model of ecological stoves installed in communities through CETRA (Center for Labor Studies and Worker Assistance) by the Paulo Freire Project is based on the eco stove developed by AS-PTA (Association for Family Agriculture and Agroecology) to reduce harmful effects caused by the frequent use of conventional wood stoves. This is important in thinking about the deforestation of native vegetation and the respiratory problems arising from the inhalation of the smoke released by the stove. The main objective is to make the use of wood sustainable, avoiding health problems, improving the quality of life of families and avoiding the emission of gases that cause the greenhouse effect.



Most wood stoves used for cooking have low energy efficiency, generally less than 10%. Because it is incomplete, the burning of firewood enhances emissions of carbon dioxide, sulfur dioxide, carbon monoxide, nitrogen dioxide, in addition to particulate organic compounds to which exposure causes respiratory diseases.

Thus, the spread of the use of sustainable technologies began about applying and improving a technology for the social inclusion of populations with less financial conditions. Social technologies can be defined as techniques, products and methods multiplied, tested and proven, as part of the solution of a social demand and its respective capacity for solution and transformation, within the community.

Aside from the need for proper management for firewood extraction, the way of preparing food on these stoves requires special attention, since they cause damage to health, due to the high rate of smoke emission. Another concern related to the use of wood stoves is the situation of women who devote around 18 hours a week in the search for firewood for the preparation of food, exposed to situations that bring life risks in accidents.

Thinking about the environment, traditional ways of cooking food involve a high consumption of vegetable fuels such as firewood and charcoal, resulting in incomplete combustion, where gases are emitted that aggravate the greenhouse effect and other products that contribute to global warming. In addition, about 30% of the wood consumed is collected in an unsustainable manner, resulting in emissions equivalent to 2% of global CO_2 emissions and deforestation causing loss of local biodiversity.

As a factor that promotes the adoption of the ecofogao (eco stove), it stands out its greater efficiency in relation to the traditional wood stove because it uses less wood and is more ecological from the point of view of emission of toxic and greenhouse gases, becoming a ideal technology for the sustainable coexistence of the farmer with the environment. Considering that the stove is one of the most used and important objects in our house (as it is where family food is prepared every day), some farmers point out that they prefer to use the wood stove to cook over the gas stove, because they say that the food is much tastier and they still don't have to spend money buying gas. This fact makes the advantage of the eco stove even more relevant in relation to the traditional wood stove.

On the other hand, the farmers or their children face some difficulties to continue using their wood stove, because getting the wood requires heavy and tiring work, even being dangerous. Lately, women have to walk farther and farther to gather a bundle of firewood. If it is hard work to go far, even worse is having to bring the weight to the door, a process often done manually and even with the help of children. The most serious of all is that this activity is contributing even more to reduce the forests and native vegetation, repeatedly for days. Using firewood harvested in large quantities damages the balance of the ecosystem and the population that lives and depends on that location.

There are positive and negative points of the Ecofogao technology. Being positive are: when the equipment eliminates the exhaust of smoke that, before, circulated inside the kitchen and even in the house; uses less wood and consequently contributes to preserving the environment; emits less toxic gases to the atmosphere, reducing the greenhouse effect; it brings an economic benefit as it reduces the consumption of cooking gas (LPG-Butane); decreases the risk of occupational accidents in management;bavoids exhaustive work in extracting wood from the environment and does not give smoke a taste for food, as it uses a chimney to throw the smoke out of the house. The negative points are that, unfortunately, it still uses wood to generate heat; produces soot and CO_2; it still carries risks of burns and requires maintenance of cleaning the soot in the chimney when it clogs.

COST OF INSTALLATION

IFAD, through the Paulo Freire Project in Ceará, invested through Productive Investment Plans in social technologies that enabled, in an agroecological way, the sustainable and social development of production practices (agricultural and non-agricultural) for household consumption and commercialization, thus generating income and live well with the country human being. In this sense, productive investments for the implementation of ecological stoves were financed.

Investimentos produtivos

232

Fogões Ecológicos

Valores dos Investimentos

266.800,00

Reais

Comunidades

09

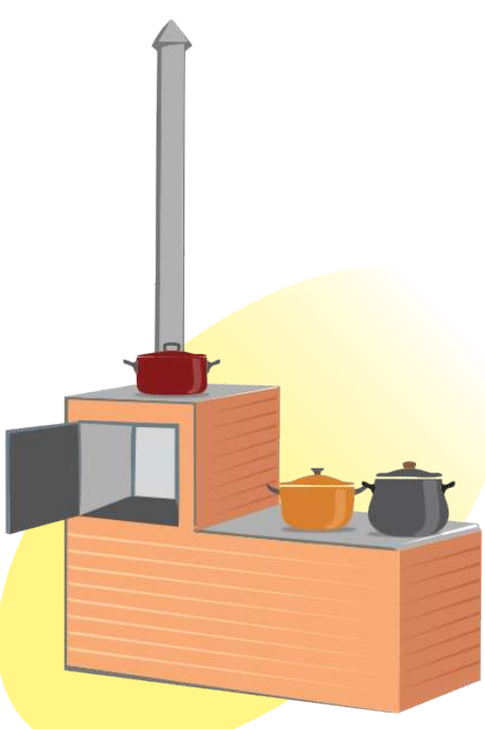
A implantação de um fogão ecológico pode custar em torno de: **R$ 1.150,00**

Os valores variam de acordo com a tabela de preço dos materiais e mão-de-obra.

TOTAL QUANTITY INSTALLED AND NUMBER OF BENEFICIARIES

Installed Quantity: **994** | Number of beneficiaries: **2982** | Municipalities: **27**

To build an ecological stove 2 meters long, 50 centimeters wide and in height ranging from 80 to 90 centimeters, we need, on average, the following materials:



- Between 300 to 350 solid manual bricks. It will depend on the size of the brick shape
- 10 cans of masseur or saibre clay
- 1 bag of cement
- 20 cans of sand to fill the hollow part of the stove
- 1 Oven built with 16 plates 40 cm long, 40 cm deep and 35 cm high. When ordering the oven at the locksmith, it is good to order two grids: the first 2 cm high, so that you do not place the food directly on the plate and the other half in the oven. Finally, it is important for the locksmith to build rods above 5 centimeters in height.
- 3 clay shackles 50 cm long and 100 mm in diameter for the chimney - To finish the chimney, use a spreading knee or a zinc hole.
- Mining plate with 3 mouths.
- One liter of colorless varnish or resin for finishing the stove.

A. MAINTENANCE COSTS

According to users, the maintenance in the ecofogao is minimal and varies according to the use and the way of handling with the firewood in the combustion chamber. Another accessory that requires care is the chimney, that must be cleaned every 6 months due to the accumulation of soot that can clog and make the smoke go back into the house. Maintenance can be carried out by the beneficiary himself, according to the need and use of the ecofogao, where it is usually necessary to repair the cracks in the masonry caused by heat and in the chimney that can detach from the masonry. Also, and less frequently, in the iron parts (plate and oven) due to the greater durability of the material. It is connected to maintenance by use, since some beneficiaries also have a gas stove.

The cost of maintenance varies according to the part that damaged, varying from R $ 15.00 to 300.00, as stated by a user who received the training to build the eco stoves in the communities.

B. TECHNOLOGY LIFE TIME

The Ecofogao's social technology has a useful life of more than 10 years, but none of those that have been visited have this time of use. This useful life was analyzed as it is made of masonry, iron and ceramics. According to testimonials from users and builder, this period may vary more or less depending on the care, care and maintenance with your equipment. With the Ecofogao everything is very much related to its use and care by the user.

C. ENVIRONMENTAL IMPACTS

Studies and research in comparison with the conventional wood stove showed that the Ecofogao presented a saving of 53.4% in the consumption of wood. Ecofogao produces more heat with less firewood and charcoal, thus protecting the environment. The consumption of wood per family fell from 270 to 135 kilos per year, a reduction equivalent to 50%.

The main difference from the conventional stove to the ecofogao is the use of firewood, where the amount used is greater and the wood is more exposed, emitting more soot. The conventional has no oven and heats less, the combustion chamber is more open and emits more smoke and soot, polluting the kitchen and the environment more.

The studies showed an increase in efficiency of 64% in the Ecofogão compared to the conventional stove and also indicated that the Ecofogao used between 53 and 57% less firewood than the conventional stove. As a consequence, it reduced the work of collecting and storing firewood at home.

The testimonies of the relatives refer that Ecofogao can work with secondary vegetation, rest of wood and alternative materials such as corncobs, coconut husks, sticks and thicker bark. It was also visible that the Ecofogao produces less smoke than normal.

D. SOCIAL IMPACTS (ON WOMEN AND YOUNG PEOPLE, FOR EXAMPLE)

In addition to being a demand for environmental preservation, the use of Ecofogao is also a matter of public health, since most women and children, who are conditioned to housework and are users of the conventional wood stove, sicken with respiratory problems due to the inhalation of the soot expelled. Studies say that breathing smoke in these cases is equivalent to smoking two packs of cigarettes a day. In Brazil, there are 21 deaths per year due to smoke aspiration.

Improving the quality of life of families by reducing soot that causes damage to health, especially that of women and children, is also associated with a decrease in the workload to search for firewood in the forests.

In view of these observations, we conclude that the distribution and use of this Ecofogao social technology in the semi-arid region must bring positive impacts to the environment and improve the quality of life of rural families.

Another benefit is economic. The consumption of cooking gas decreased due to the greater use of the agroecological stove: the gas cost R $ 75.00 per month for the family and, today, half a canister is more than enough to handle the kitchen.

E. ADAPTATION TO THE REALITY OF FAMILY AGRICULTURE

The ecological stove has the objective of avoiding smoke inside the house, improving the heating providing quickness in the preparation of food, burning the wood completely, being resistant avoiding the appearance of cracks, being suitable for work due to the technically recommended height and surface, and also look good and satisfy the whole family.

For the benefited families, the equipment brought many advantages, especially for health, due to the reduction of smoke and soot, in addition to not dirtying pots and kitchen walls. Ecostoves also allow financial savings for families by reducing the use of firewood, gas and coal.

Families in the Brazilian semiarid region use cooking gas, coal and firewood as fuels to cook. This was confirmed in the field visits carried out. The use of one or the other depends on the type of food that will be prepared, on the availability and price of each type of fuel, and on the economic situation of the family at all times.

The Paulo Freire Project aims to reduce poverty and raise the standard of living of family farmers in 31 municipalities in Ceará, through social and economic inclusion in a sustainable manner. Rural communities have some of the lowest Human Development Indexes (HDI), a criterion adopted by the International Agriculture Development Fund (IFAD), and the project's priority audience are young people, women, people and traditional communities.

CO_2 EMISSION ANALISYS

The reduction of CO_2 emissions with the ecofogao was calculated in comparison with the traditional wood stove. The ecofogao has the advantage of using less wood, producing less soot and smoke. With this, ecofogao is the best alternative for cooking food using firewood, reducing the emission of CO_2 by 58.4%.

Gás	Fogão a lenha tradicional tCO_2e	Ecofogão tCO_2e
CO_2	22,17	9,23
CH_4	1,65	0,68
N_2O	0,26	0,11
Total	**24,08**	**10,03**

SOCIAL TECHNOLOGY TRL

The degree of technological maturity - TRL - of ecofogao is classified between grades 8 and 9 because the real system was developed and approved through successful operations. TRL 9 is achieved when the element is integrated into the final system and in operation.

It is noticed, through the studied concepts, that the levels of technological maturity of an element are not delimited in relation to the activities carried out. In addition, it is worth noting that the same element can present different levels of technological maturity, as it depends on its application and the final system to be integrated.

PATENTS

Ecofogao was the pioneer in the development of the ecological wood stove in Brazil and its history comes from PROLEÑA, an NGO in Central America that was a global pioneer in the development of the ecological wood stove. The development of the ecological wood stove came from the observation of Rogério Carneiro de Miranda, a forest engineer.

Thus began in 1994 the first steps in the development of the ecological wood stove. Currently, an ecological wood stove has a high energy efficiency, with the transformation of wood into more energy and less smoke.

From 2003 back in Brazil, he started to develop the company Ecofogao Indústria de Fogões Ltda which adapted the Ecostoves to Brazilian conditions, with better materials, new models and new applications such as oven and coil.

Patent application number at INPI: PI 0303647-2 A2

Consulta à Base de Dados do INPI

[Início | Ajuda?]

» Consultar por: Base Patentes | Finalizar Sessão — Anterior 2/2

Depósito de pedido nacional de Patente

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(51) Classificação IPC: F24C 1/08
(54) Título: FOGÃO DE LENHA ECOLÓGICO, EFICIENTE E SEM FUMAÇA

(57) Resumo: "FOGÃO DE LENHA ECOLÓGICO, EFICIENTE E SEM FUMAÇA". O fogao em questão visa a modernizar o uso da lenha para cocção doméstica com uma forma mais eficiente de combustão e proveer melhores condições de trabalho para a cocção sem a contaminação direta de fumaça e fuligem no interior da cozinha ou morada. Adicionalmente permite um aproveitamento optimo da energia térmica gerada com um forno para assados caseiros e um sistema de serpentina para aquecimento de agua. Todo o conjunto é costruido de uma forma compacta e portátil, permitindo o facil transporte e instalaçao. O fogão em questão é constituido de uma camara de combustão em forma de 'L' (A) imersa em um ambiente de isolante térmico (C), uma chapa de ferro fundido (D), uma chaminé (F), tudo estruturado por cantoneiras(H) e laminas galvanizadas ou anti-corrosivas (I). Adicionalmente este fogao poder ter um forno (E) e um sistema de serpentina (G) para aquecimento de agua acoplado alredor da camara de combustão, ou sobre a chapa, ou mesmo na base externa da chamine.

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(72) Nome do Inventor: Rogerio Carneiro de Miranda

DID YOU KNOW...?

DRYING CLOTHES

In the community of Santa Luzia, farmers used to dry the clothes washed near the Ecofogao due to the heat emitted by the iron plate and, curiously, the clothes do not smell like smoke. The reason is that because the Ecofogao does not let the smoke escape except through the chimney, where the exit stays out of the roof. Therefore, drying clothes close to the Ecofogao leaves no smell of smoke.

ECOLOGICAL STOVE REDUCES THE EMISSION OF POLLUTES UP TO 82%

According to Envirofit®, ecological stoves reduce fuel consumption by up to 60% and reduce pollutant emissions by up to 82%. Envirofit calculates that, over a five-year life cycle, its stoves will provide a reduction in CO_2 emissions of around 17 million tons, equivalent to the estimated annual consumption of more than 1 million cars. 3 billion people around the world still cook over an open fire (small fires directly on the floor) or rudimentary, highly polluting stoves.

Realization:

Partners:

Sponsor: