

## Energy-Efficient Cookers for Kitchens in India



Construction of combustion chambers: The efficient cookers project replaces polluting liquefied petroleum gas (LPG) cookers with climate-friendly biomass cookers.

### Project Summary

With the carbon offset project “Energy-efficient biomass cookers for institutional kitchens in India”, myclimate and Nishant Bioenergy are looking to make a contribution to climate protection and to sustainable development in different regions in India. Energy-efficient biomass cookers as well as biomass pellets are being produced and distributed in order to displace liquefied petroleum gas (LPG), thereby reducing the CO<sub>2</sub> emissions. Moreover, the project has several benefits for the locals involved in the supply chain of the project.

### Project Benefits

The project leads to a reduction of CO<sub>2</sub> while making a significant contribution to sustainable development in the region:

- The farmers from whom biomass will be sourced profit from an increase in income.
- The community benefits from labour generated in rural areas, since the jobs remain with the poor.
- Cost savings are being enabled, as the price of biomass pellets is lower compared to LPG, which can lead to fuel cost savings of more than 50 per cent compared to commercial LPG.
- An innovative Indian technology from a local social entrepreneur is being supported and spread.



## Facts and Figures

**Project location**

**Project standard**

**Project type**

**Emission reductions**

**Situation without project**

**Project start**

Different states of India

Gold Standard CDM



Biomass/biogas



Energy efficiency

412,042 t CO<sub>2</sub>e (over ten years)

Use of fossil fuels (LPG cook stoves)

July 2013 (start of crediting period)

## The Project Country

Today, India counts as the third-largest economy in the world in terms of purchasing power and is expected to grow to 60 per cent of the size of the US economy by 2034. Experiencing such a booming economy brings several challenges, which India will have to face in the coming years. Among those is the population explosion. This puts disquieting pressure not only on the economic infrastructure of the nation, but also raises the issue of environmental sustainability. With its high population density, stressed ecological systems and substantial dependence on natural resources, the country is very vulnerable to climate change.

**“The potential for pellet stoves in India is immense.”**

Using LPG for cooking is common practice in the commercial sector in India. Up to now, there have been no easily accessible alternative fuels available in India and there is a strong dependency on LPG.

Ramesh Kumar Nibhoria, a mechanical engineer and founder of Nishant Bioenergy, sees a great opportunity and a high demand to create a significant impact: “The potential for pellet stoves in India is immense. LPG stoves are on every street corner. There, as well as in schools, colleges, hostels, company canteens and hospitals, food is cooked in huge utensils – with gas processed from petroleum. If we replace the LPG stoves with



Map of India: the project's central office is located in Chandigarh.



myclimate CEO, René Estermann, cooking on the biomass cooker “Earth Stove”

pellet stoves in just some of the streets and other institutional kitchens, we will be at a million units.” LPG is the most commonly used fuel for cooking in urban areas in India. One LPG stove emits 9.69 tonnes of CO<sub>2</sub> per year. The present project, which will be implemented

Indicator	India	Switzerland
Total area (in km <sup>2</sup> )	3,287,263	41,285
Population (2011)	1,241,491,960	7,907,000
GDP in USD per capita (2011, nominal)	1,489 USD	83,383 USD
Energy use per capita (kg of oil, 2010)	566 kg	3,349 kg
CO <sub>2</sub> emissions per capita (2009)	2 t	5 t
Fossil fuel energy consumption (% of total, 2010)	73 %	52 %

India vs. Switzerland (source: World Development Indicators, World Bank [2012])

in different states of India, will tackle the problem of high-cost fossil fuel cooking with the promotion of the climate-neutral biomass-pellet-fuelled “Earth Stove” to replace LPG stoves as a fuel cost reduction alternative along with a local and reliable supply chain.

## Project implementation

It was in the summer of 2009 that the discussions between Nishant Bioenergy and myclimate started regarding the funding of the project. Nishant Bioenergy (established 1999) is a pioneering Indian company, leading the way in the production of efficient biomass cook stoves. Ramesh and his team are highly committed to sustainable development and were rewarded with the prestigious Ashden Award in 2005 for their technology. These long years of experience and technological competencies have also enabled Nishant Bioenergy to develop the Earth Stove technology, which is key to the present project.

**“It’s about making the project marketable.”**

In order to make the project work as a whole, the implementers had to manage one specific challenge, which was the development of a pellet supply chain. The realisation of the pellet supply chain was critical to the success or failure of the project. This is due to two reasons. On the one hand, a sufficient and comprehensive supply chain of pellets was still lacking at the time. On the other hand, the availability of and easy access to pellets is the key factor for potential clients to switch from non-renewable fossil fuels to renewable biomass pellets. René Estermann, CEO of myclimate, sees the challenge as follows: “It’s about making the project marketable and facilitating the breakthrough of the Earth Stove.” For that purpose, myclimate supports the project by enabling the sale of the Earth Stove with a 25 per cent price reduction. In December 2011, the first contract between a pellet producer and Nishant Bioenergy was signed.

## About the Earth Stove

The production and distribution of the so-called Earth Stove promotes the use of climate-friendly biomass pellet cook stoves and fosters the replacement of LPG cook stoves in institutional kitchens in India. Fossil-fuel-based thermal energy is thereby being replaced by renewable energy, which allows energy to be generated in a sustainable way. In addition, it reduces the associated CO<sub>2</sub> emissions coming from the combustion of fossil fuels. The project activity aims to sell 4,200 Earth Stoves with savings on average of 41,204 tonnes of CO<sub>2</sub> per year. But what are the benefits of the stove?



Ramesh Kumar Nibhoria, founder and owner of Nishant Bioenergy



Balwinder Singh, owner of the pellet factory



Biomass will be processed into pellets.



Pellets being produced under high pressure.



The completed biomass pellets packed in bags

## The Situation Before the Project

As mentioned before, the so-called baseline scenario is the usage of LPG for cooking in institutional kitchens, roadside eateries, colleges, schools, hostels, restaurants, canteens as well as hotels.

## The Features of the Earth Stove

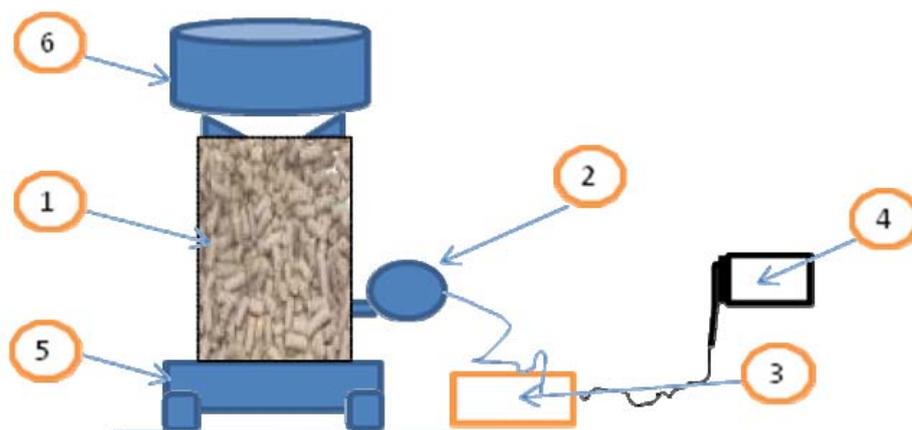
The Earth Stove allows locals to be less dependent on LPG and to receive a real sustainable alternative. For that, the supply of pellets plays a crucial role. The biomass fuel pellet technology is a densification technology where post-harvest biomass is processed (dried/shredded/pulverised) and compressed into 10–12 mm pellets. The hot pellets that are coming out of pellet machines are cooled and packed into 25-kilogram bags. These highly compressed biomass fuel pellets enable the use of the Earth Stove. With years of experience in the production of biomass cook stoves, the design of the Earth Stove model has been perfected by Nishant Bioenergy and is now less prone to wear or to operating problems. The biomass cook stoves are being manufactured for a long service life with minimum maintenance needed. With proper maintenance and repair services, the Earth Stove can last more than 15 years. With regard to emissions, a significant reduction can be achieved, as the use and combustion of fossil fuels is reduced. To be precise – one stove saves twelve tonnes of greenhouse gas per year.



The situation before the project: transportation of non-renewable LPG in tanks

## And this is how it works (see model below)

At the outset, the stove's combustion chamber (1), which is duly lined with high-temperature fire cement, is filled with the biomass fuel pellets. 50–100 grams of fire starter (paper/cardboard/oil-soaked cloth) is placed on top of the pellets. As the fire starts, the direct current (DC) blower (2) gives primary and secondary air within a few seconds. Once the top of the fuel bed is lit, it releases volatile gases, which are burnt by primary air, and consequently smokeless combustion starts. The utensil (6) is placed on the stove for cooking. The DC blower receives 12 V of power from the alternating current (AC) to DC convertor (3), which is attached to the grid's AC power of 220 V (4). This AC to DC convertor (3) is also attached to a 12 V DC 7 Ah battery so that in case of a grid power failure the stoves' air blower automatically receives power from the battery. After some time, the fuel pellets disintegrate into ash and fall into the ash chamber (5), which holds the ash from 5-6 working hours.



1. Combustion Chamber
2. DC Blower
- 3 AC to DC Convertor

4. AC main supply
5. Ash chamber with ash gate
6. Utensil

## Financing the Project

In terms of finance, 25 per cent of the carbon finance of myclimate goes to Nishant Bioenergy. The biomass cook stoves are being subsidised and therefore they can be sold to beneficiaries with a 25 per cent reduction in the sales price. 75 per cent of carbon credit funds is invested in the support, development and training of pellet producers.

## The Pellet Supply Chain: Who's Involved and how They Benefit

There are numerous benefits that arise thanks to the project, in addition to the reduction of CO<sub>2</sub>. For instance, the project creates more than 600 jobs. As there are several operating levels, each of which involves different people, their respective benefits shall be outlined below.

### Nishant Bioenergy

Nishant represents the project implementer as well as the project coordinator, thereby carrying out the stove production and giving franchises for specific regions to the pellet producers under agreement. Nishant Bioenergy supplies pellet plants on a turnkey basis only to franchisees. In order to support Nishant with regard to a scale-up of the project and to allow for stove subsidisation, Nishant receives 25 per cent of the carbon credit revenues. Jaspal Singh, manager at Nishant, says: "Being a manager at Nishant allows me to be economically independent and to do something for the environment." Sucha Singh "Foji", a welder, produces parts of the Earth Stove. He has been working with Nishant for four years now and is happy to work eight hours a day (six days a week), to get paid for overtime and to get a double salary on Sundays. He received training and trains new employees.

### Pellet Producers

The pellet producers are responsible for the production and sale of the biomass pellets and feed the demand of distributors (called green entrepreneurs). They can sell stoves, but they also provide a great deal of key information about pellet production as well as sales employment to Nishant Bioenergy's carbon branch. 75 per cent of the carbon revenues are shared with the pellet producers to enable them to sell fuel pellets at lower rates to the green entrepreneurs. Balwinder Singh has established a pellet factory in Bela Batheri in North India. His 15 employees produce



Jaspal Singh, manager at Nishant Bioenergy.



Sucha Singh "Foji", welder at Nishant Bioenergy.



Bukhu Mahado, Laborer at the pellet factory.



Shoba and Urmila Devi, farmers.



Ramesh Kumar Nibhoria and Green Entrepreneurs with pellet bags.

around ten tonnes of pellets per day. “For the pellet production, we use waste from agriculture, including by-products from agro-processing industries like milled rice, ground shell, corn or rice”, Singh says. Bukhu Mahado, a labourer at the pellet factory, says “I’m happy to work here. There are no health effects at the workplace.”

### Farmers / Local Village People

Additional biomass, like elephant grass and reeds that grow as weed in the fields, is collected and sold to pellet producers by small farmers and native people – mostly women. This biomass used to be burnt before the implementation of the project. Women receive 15 francs for one tonne of biomass, which equates to a yearly income of 500 francs – a most welcome extra income. “For the first time we have our own income, which we can save for our family’s needs or our own house”, the farmers Shoba and Urmila Devi say.

### Green Entrepreneurs

The 90 or so green entrepreneurs work as resellers in their local areas. These agents are responsible for the supply of Earth Stoves and biomass pellets. They are also responsible for the maintenance of the stoves. Most of them have two to four people employed with them.

### End Users

As mentioned above, the target group of the project are roadside eateries and kitchens in different institutions. These end users benefit from the lower price of the stoves thanks to carbon finance. Also, there are sustainable and low-cost pellets available from various

**“Thanks to the project I could establish my own enterprise.”**

local pellet producers. This is possible due to the well-developed fuel supply chain and the established service network in the various areas. “My motivation for buying the Earth Stove was fuel savings. But also, there’s no smoke when cooking on it!”, Munish Kele, Friend Sweet Shop, says.

## Gold Standard: Environmental and Socio-economic Benefits

myclimate intends to have the high-impact carbon offset project registered by the Gold Standard Foundation – an independent carbon offset standard. Projects under the Gold Standard have to fulfil strict criteria regarding the involvement of local stakeholders per-

taining to the project development process and on the documentation of environmental and socio-economic impact. To be eligible under the Gold Standard, projects must employ renewable energy and/or energy efficiency technologies/measures. Furthermore, the Gold Standard requires proof that they have a positive impact on the economy, health, welfare and environment of the local community. Arranged by myclimate, the Gold Standard verified, among other things, the production processes, working conditions and the environmental impact. “The result couldn’t be better; the Gold Standard is the highest award a carbon offset project can get worldwide”, René Estermann, CEO of myclimate, says.

## Monitoring Methodology

A prerequisite for a carbon offset project certified under the Gold Standard is the existence of a stringent monitoring plan of the parameters used for the emission reduction calculation and of the sustainability indicators. A project-specific data management system has been created by Nishant Bioenergy. The databank consists of all the information and values relevant for the monitoring. Every pellet producer is registered and receives its own login. They have to feed data to the databank on a regular basis and are checked by



The identification plate on the Earth Stove.

Nishant. On each stove there is an identification plate with a specific identification number, and the stoves’ GPS coordinates are uploaded along with data on the pellets used every month.

#### Contact:

myclimate – The Climate Protection Partnership  
Sternenstrasse 12  
CH-8002 Zurich  
Switzerland

[www.myclimate.org](http://www.myclimate.org)  
[info@myclimate.org](mailto:info@myclimate.org)  
Tel.: +41 (0) 44 500 43 50  
Fax: +41 (0) 44 400 43 51