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**‘Commercialisation’ of Improved Biomass Stoves for Low Income Rural
Households**

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Since 2003, ARTI has been trying to commercialise a range of biomass fuelled cooking devices in Maharashtra state, on the west coast of India. Only those devices that satisfy basic criteria of reduction in indoor air pollution are included in the project. The current range of products included in the project is briefly described below.



1. Improved Laxmi Stove: This two pot hole fixed stove with chimney is an improved version of the Laxmi stove that was being promoted by ARTI and several other Technical Back up Units during National Programme on Improved Chulha. The stove has a metallic grate at the bottom of the firebox, with an air tunnel below the grate. This ensures adequate air supply to the fuel and better combustion. The inner dimensions are properly matched with the chimney to ensure good air flow through the stove body. The shape and size of the pot holes has been optimized to ensure minimum leakage of air and smoke around the cooking vessels. The chimney consists of three interlocking pieces, which can be easily dismantled, cleaned, and reassembled from within the house itself. The stove can be operated using wood sticks or woody biomass as fuel.



2. Sampada Gasifier Stove: This is a portable metallic stove. The fuel should be in the form of dry woody twigs or small blocks/chips of wood. The fuel is burned under a limited supply of air in a special fuel chamber, where it pyrolyses. The pyrolysis gas produced in this chamber is combusted by providing additional secondary air to it. For longer duration use, there is a provision for adding fuel through a side opening. The special feature of the stove is that charcoal is left behind in the fuel holder after the stove operation. Thus, the stove not only delivers clean cooking but also produces a valuable by product in the form of charcoal.



4. Vivek Sawdust Stove: This is a portable metallic stove specially designed for using sawdust and other powdery biomass as fuel. The fuel needs to be packed in the stove, around a metallic cylinder. The cylinder is then removed leaving an L shaped cavity in the packed biomass. A small burning stick of wood is inserted through the inlet near the bottom. The exposed layer of biomass in the vertical tunnel ignites, and the heat is utilized for gasification of the inner layers. The pyrolysis gas comes

into the tunnel and rises up, igniting just under the cooking pot placed on the pot holders. Due to its optimal design, the stove produces a clean blue flame. One full charge of fuel (about 2-3 kg sawdust) keeps the stove burning for about 2 hours.



3. Sarai Cooking System: This is a portable stainless steel device operating on the combination of principles of steam cooking and retained heat cooking. This has been hailed as one of the cleanest ways of using charcoal for household cooking. In the medium sized system, just about 100-125 gm of charcoal is sufficient for cooking dal, rice, and a vegetable or meat for a family of 5 persons. The charcoal to be used can either be ordinary wood charcoal, or charcoal left over in a wood burning stove, or char briquettes made from agricultural waste. The Sarai system comes in two sizes – the medium size is for a family of 4-5 persons, whereas there is a large size for a family of 8-10 persons. In case, rice is the prime food, it is recommended to go for the large size version even for smaller family sizes.



5. ARTI Biogas System: This is a floating drum type biogas system made of plastic. The feedstock consists of material having high nutritional value, such as waste grain flour, left over food, food waste, non-edible fruits, seeds and rhizomes, spoiled vegetables and fruits, spoilt milk, non-edible oil cake, etc. The standard model consists of a digester of 1000 lit, and a gas holder of 750 lit. This system can produce about 800 lit of biogas every 24 hrs, using just 1 kg of feedstock. This will keep the biogas burner on for about 2 hrs, adequate to cook a meal for a family of 4-5 people. The system can be scaled up to utilize larger amount of feedstock, and to satisfy larger cooking requirement.

From the descriptions above it can be seen that there are two types of products.

Off the shelf products:

These are stoves with limited utility and are easy to introduce in existing commercial channels in rural areas. The cost to the consumer is of the order of Rs.600+ (i.e., USD 15+). This is affordable for the middle income rural households. The fuel of choice for most of these households is LPG. They are being forced to revert back to biomass fuels due to scarcity and increasing price of LPG. These families generally use the stoves as supplementary devices for lowering the consumption of LPG. The devices are contributing to reduction in indoor air pollution, as in the absence of these devices, the households would have reverted to the more polluting traditional biomass stoves.

Products to be installed on location:

There are two products in this category – the improved Laxmi stove and the ARTI biogas system. The total expense of the ARTI biogas system is about Rs.10,000 (i.e., USD 250) and is therefore affordable only for the rich households in rural areas. Generally, these are households that would prefer to use LPG, but are unable to do so, more due to scarcity and unavailability than due to affordability. Other rural users of ARTI biogas technology are

small hotel owners, or hostels, or NGOs in rural areas, where the biogas replaces fuel wood and/or LPG.

The improved Laxmi stove, which is similar in looks and operation to the traditional biomass stove, costs about Rs.400 (i.e., USD 10). This is the only product in the current range, which is affordable to rural poor and also blends with their lifestyle. The targeted households for this stove are currently the most severely affected by indoor air pollution. For these households, the affordability of the stove is a critical decision making factor, and also a barrier for implementing a purely commercial strategy.

The semicommercial strategy that is being employed currently is described below.

Rural artisans who are already in the business of making cement articles or traditional stoves or earlier versions of improved stoves are being trained in the manufacture of improved Laxmi stove. Under the project, a network of NGOs has been established mainly for raising the level of awareness about indoor air pollution and its health impact, among the rural population. Another important task assigned to the NGOs is educating government and nongovernment donor agencies regarding indoor air pollution in rural homes and the solution to the problem in the form of improved stoves, and to assist the rural artisans in creating a market for the improved Laxmi stove. There are various activities of these agencies through which financial assistance is offered to rural poor households interested in switching over to improved stoves. Two of these are briefly described below.

Clean village competition:

Currently, a very popular concept in rural Maharashtra is the 'clean village competition'. In this contest, a village is rated on the basis of various activities undertaken to avoid pollution in the village. Substantial cash prizes are awarded to the top scoring villages at the block level, district level, as well as state level. The concept was initiated in Maharashtra, and has now been taken up by the central government for implementation all over the country. Thus, a village has a chance to win an award at the national level too. One of the parameters for awarding marks is the proportion of households using clean cooking devices. In order to gain the maximum marks, the village councils are keen on ensuring that maximum number of households in the village switch to clean cooking devices, and some funding is made available through the funds earmarked for women and child welfare.

Adopting villages:

Several donor organizations such as Rotary club, Lions club, local educational trusts, big NGOs like Art of Living Foundation, etc., adopt villages for development activities. In such villages, improved Laxmi stove can be introduced as a means of income generation as well as a means of reducing the drudgery of women. In this case too, at least part of the cost of the stoves may be borne through donations, for the poorest households in the village.

The agencies implementing such programmes feel safer about placing bulk orders with NGOs rather than individual artisans or businesses. The NGOs can also assist in user training and awareness generation to ensure that the beneficiaries use the improved stoves partially or

fully funded for them. Thus, the NGOs in the network take up the orders and pass on to trained artisans in the vicinity of the village.

This is a commercial model in the sense that the trained artisans sell the stoves and earn a small profit from each stove installed. However, there is a non-commercial welfare component as the consumer gets the stove at zero price or less than market price.

At the same time, the artisan continues to sell the stoves in the open market through exhibitions, weekly markets, etc. It is our experience that generally the buyers in the open market are repeat buyers who would like to replace older models of improved stoves with newer models. Thus, there is sustainability built in into the strategy.

It is expected that as the use of improved Laxmi stove becomes a common practice, more and more sales will occur in the open market. However, the welfare component will continue as long as there are poor households in rural areas.

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