

Diesel as a household fuel for rural areas

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Diesel fuel is normally used in automobiles, tractors and trucks and is considered a dirty fuel since these vehicles emit smoke and particulates. It has not been considered for use as a household fuel primarily because of its cost and also unavailability of cooking and lighting devices running on it. However recent work done by the Nimbkar Agricultural Research Institute (NARI), a rural NGO in Maharashtra, has shown that it can be an excellent and clean fuel for cooking and lighting in rural households when used in a newly invented device called [Lanstove™](#) (lantern plus stove).

NARI's diesel-powered lanstove simultaneously provides excellent light (equivalent to that from a 200 W electric bulb) and cooks a complete meal (including bread like *chapatti* and *bhakari*) for a family of five. Besides it can make 10 liters of water potable. Thus one device provides excellent light, clean cooking energy and drinking water.

Diesel lanstove has been tested for the last two months in five unelectrified rural huts in western Maharashtra. It has shown excellent results with users commenting that it does not produce smoke or smell like their existing biomass-powered chulha and gives excellent light compared to the presently used hurricane lanterns, tin wick lamps and even solar lamps. The carbon monoxide (CO) levels (measure of how good the combustion is) from these lanstoves are less than 3 parts per million (ppm), whereas those from regular chulhas are between 250-400 ppm or 80 to 130 times more than that from the lanstove. Thus lanstove is an extremely clean device equivalent to LPG stove for cooking.



Diesel lanstove testing in a hut

Previously NARI had developed this [lanstove to run on kerosene](#) and had tested it in 23 unelectrified huts for one year.¹ However unavailability of kerosene for rural poor (it is normally diverted on large scale for adulteration of diesel) hampered its growth. Hence NARI thought it prudent to run it on diesel which is available in plenty and everywhere. Besides diesel has similar fuel properties as kerosene and hence it was easy to modify the kerosene lanstove to run on diesel. Also in terms of energy density liquid fuels are way ahead of gaseous and solid fuels thereby making the storage of fuel less bulky.

In order to alleviate the problem of availability of kerosene for rural poor, Government of India (GOI) had proposed selling kerosene in open market and not through the Public Distribution System (PDS) shops. But that would have meant setting up new kerosene pumping stations. Diesel is already sold in present petrol stations and hence it is easily available.

Normally kerosene and diesel are considered to be dirty fuels. Hence their use for rural households has not been looked at favorably. Every fuel is dirty. It is the way it is burnt that makes the fuel clean or dirty. Thus liquid petroleum gas (LPG), compressed natural gas (CNG) or ethanol become clean fuels only because of excellent combustion technologies available for them. Lanstove allows diesel to burn very cleanly.

Lanstove has been designed so that diesel is stored in a slightly pressurized (4 kg/cm²) ten liters cylinder from where it flows into the combustor and burns very cleanly. This detachable cylinder can be filled up and pressurized in the diesel pump stations. This filling of diesel in cylinder will be similar to getting an LPG cylinder changed. Our data shows that for a family of five, lanstove will require about 20 liters of diesel per month. Thus one full cylinder will last for 15 days. Our data also shows that on large scale manufacturing, lanstove (including the cooking utensils) will cost around Rs. 4000/- only.

However for diesel lanstove to spread on large scale in rural areas an enlightened policy by GOI is needed to make it available at cheaper rates to poor people. Our data shows that it should be made available to BPL families through their UID (Aadhar) card at the subsidized rate of Rs. 30/liter. The regular users of diesel will pay the open sale price while the BPL families will pay the subsidized price through the Aadhar card.

With this diesel subsidy the lanstove's running cost will be equal to having subsidized LPG for cooking and subsidized electricity for lighting.

According to the latest census figures (2011) there are about 35,000 villages in India which have never been electrified.² These villages should be the first to be given the lanstove so as to improve the quality of life of their inhabitants.

With selling price to rural poor at Rs. 30/liter the total subsidy bill for diesel for 35,000 villages will come to be about Rs. 12,600 crores. This is less than one-third the subsidy given presently for LPG (Rs. 40,000 crores/year) and which mostly goes to middle and upper class Indians. With diesel subsidy given to rural poor, around 21 million rural households (10.5 crore people) will immediately benefit with excellent light and clean cooking technology.

Electricity-based lighting is the most efficient but it is difficult to see how in near future electricity can be made available throughout rural India. According to 2011 census around 300 million people are without electricity even after 65 years' of independence.² Various NGOs, foreign agencies and even GOI departments are therefore promoting solar-powered light emitting diode (LED) lanterns. These lanterns are costly, produce light equivalent to that from a 40 W bulb, are difficult to maintain because the lead acid battery in them fails easily and are energy guzzlers in their production (solar cells consume more energy in their manufacture than they will ever produce in their lifetime). Besides solar lanterns cannot cook !

Recently it has also been shown that LED light is harmful to the eyes and produces irreparable damage to retina.³ On the other hand light from **lanstove has a continuous visible spectrum and is like daylight and hence easy on the eyes.**

The critics of diesel or other fossil fuel-based lanterns contend that it's burning contributes to harmful earth-warming greenhouse gases. However the fact remains that in the last 15 years the average earth-air temperatures have remained constant!⁴ Furthermore a recent scientific study suggests that earth-warming is caused mostly by Chlorofluorocarbons (CFCs) emissions rather than those of carbon dioxide.⁵ Thus there is a need for rich nations to put their house in order.

The poor cannot wait indefinitely for getting cheap renewable energy technologies for lighting and cooking. They need devices now to improve their quality of life and I feel an excellent diesel combustion device like lanstove will go a long way in doing so. The best strategy, therefore, is to rapidly develop technologies which make the existing fuels burn efficiently and in an environmentally safe manner.

There are extensive efforts world over to produce diesel and kerosene-like fuels from agricultural residues so as to make them renewable. I hope these efforts are also undertaken in vigorous manner in India which produces huge amounts of agricultural residues and has a very large demand for diesel and kerosene as a household fuel.

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