

Improved Cook Stove (ICS) Development: A Case from Nepal

Background:

In Nepal, biomass energy: fuelwood, agri-residue and animal dung is used for cooking and heating purposes. Use of traditional stoves such as "*agenu*" (*open fireplace*) and "*chulo*" (*rudimentary stoves*) consumes more fuel wood and increases the burden on women. Women are mainly responsible for cooking and collection of biomass, mainly fuelwood from the forest. Use of biomass energy and low-grade biomass fuels lead to excessive levels of indoor smoke/air pollution. Women and children in particular are exposed to the smoke emission. This is one of the reasons for higher rates of infant mortality and morbidity and other unhealthy living conditions. Release of incomplete carbon gas and other harmful particles in the atmosphere due to poor combustion of biomass fuels in rudimentary stoves results in the emission of Green House Gas (GHG). More than 80% of the energy needs are met by fuelwood thus exerting immense pressure on the forest resources of the country with negative impacts on environment.

In order to achieve reduction in indoor smoke / air pollution and increased fuel efficiency and protect the forest resources and environment, Improved Cook Stove (ICS) development and dissemination activities were initiated in Nepal from early 1950s with the introduction of some Indian models *Hyderabad* and *Magan* stoves. Since then, a number of Improved Cooking Stove Programs (ICSPs) have been promoted in rural communities of Nepal. In early 1970s, the focus was on improving the fuel efficiency of stoves. During 1980s, interest and efforts were revived when the National Planning Commission (NPC) included ICS in its development plan as an attempt to address the pressing fuelwood problem. The government's concern for fuelwood conservation was also reflected with the inclusion of ICS dissemination efforts as an important component of Food and Agriculture Organization (FAO) of the United Nations assisted Community Forestry Development Project (CFDP) in 1981. Besides, other donor organizations as well as International Non-Government Organizations (INGOs) initiated promotion and dissemination of ICS in various regions of Nepal with a top-down and supply-driven approach.

With the combined effort of the government and NGOs, basically through the community forestry development project, about 57000 ceramic prefabricated models of ICS were disseminated in different parts of the country. However, the prefabricated model turned out to be not as appropriate as substantial breakage occurred during the prolonged and difficult transportation process in hills and mountain areas. Thus, ICS efforts in Nepal during 1980s delivered mixed results and limited successes.

Improved Cook Stoves Development in 1990s:

The development of mud brick stove by Research Center for Applied Science and Technology, Nepal (RECAST) in early nineties relaunched the stove program.

Indeed, since early 1990s, new initiatives for ICS dissemination create new stoves design, which can be built completely from cheap readily available local materials. The target-oriented approach was abandoned and replaced by a subsidized bottom-up and demand-driven approach.

ICS was promoted and disseminated by various organizations with different financial arrangements such as with and without subsidies, equity participation by users etc. ICS became an important and integral component of development initiatives and was supported by quite a number of programs, donor agencies and promoting/disseminating organizations. The collective efforts of over 25 such organizations together promoted about 40,000 improved stoves of various types (mud, metallic) in different districts of Nepal¹.

In 1995, ICS network supported by Asia Regional Cookstove Program (ARECOP) and managed by Centre for Rural Technology, Nepal (CRT/N) was established. The network is aimed at bringing together various organizations working in ICS promotion and dissemination and expanding the utilization of ICS. The network

¹ *Inventory of ICS in Nepal 2000, CRT/N*

has concentrated its effort in bringing uniformity among approaches of various organizations involved by advocating a bottomup and subsidiless approach.

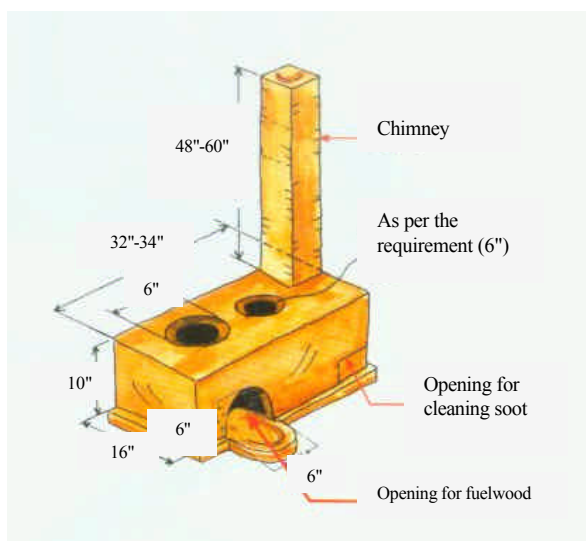
His Majesty's government of Nepal (HMG/N) provided policy guidelines to encourage development and application of energy saving devices as well as promotion and dissemination of alternate energy technologies from 9th plan (1997–2002). HMG/N set a target of promoting 250,000 ICS during the plan period through the collective efforts of government, non-government organizations and the private sectors. However very little of the target was achieved. Within the present 10th five-year plan (2003-2007) HMG/N has further emphasized ICS dissemination with target to install 250,000 ICS as well as the development of research and development activities. (*10th Five-Year Plan , HMG/N*)

The National ICS Program:

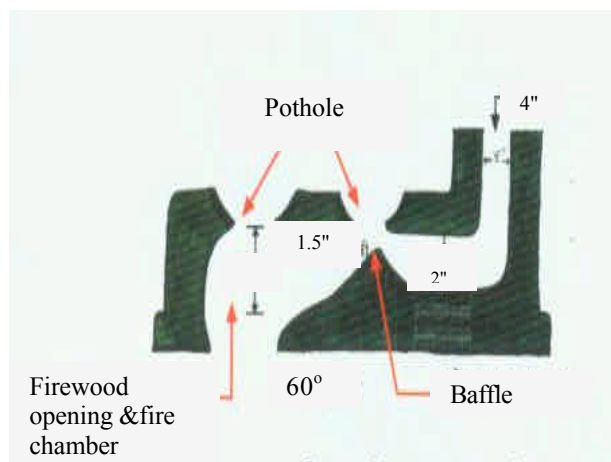
Within the framework of the 9th plan, the National ICS program has been initiated in Nepal from early 1999 with the support from Energy Sector Assistance Program (ESAP) of DANIDA and Alternative Energy Promotion Center (AEP) of the HMG/N.

Many district level NGOs and CBOs like the Centre fir Rural technlogy (CRT/N) implement this programme.

The general objective of this program is to establish a sustainable framework and strategy to make available technically and socially appropriate ICS in rural communities based on local capacity building and income generation. This program has been currently promoting ICS in 33 mid-hill districts of the country. The type of ICS promoted is made up of 3-part mud/earth, 2 parts straw/husk and 1 part animal dung. The whole structure is plastered smooth with the same mud mortar. ICS has two fire openings for cooking pots, one behind the other.



Technical Specification of Two Pot Hole ICS



There is no need to blow the fire. It utilizes the heat, generated by burning fuelwood, more by the deflection of the flames and heated air inside it which travel to the second opening with the help of an in-built baffle located just below the second opening, before the hot air exits out of the chimney, which is made of un-burnt clay bricks that can be made in the village. The iron plates are fitted on the potholes for pots. The potholes are round in shape; the pot bottom fits tight on them. It can be made in different sizes and capacities to suit the family size and pot size. It can have one or more openings for pots/pans.

ICS can even be used for space heating by adding a cast iron/mild steel plate put tight over the pot holes for the pots or by putting a metal pipe around the space/room to make the pots or by putting a metal pipe around the space/room to make the hot air pass



Basanta Thapa is one of the very successful promoters of Arghakhanchi district. He had to leave his studies due to poor financial conditions of his family and look for sustaining his family's livelihood. He received the promoters training under the National ICS program. Up until now, he has installed 302 ICS and has earned NRs 69, 000 (1US\$=NRs 70). In addition to the ICS he has been promoting ICS with fan and back boiler, which has been well appreciated by the community. He has been traveling outside his villages to install ICS and aware people on its benefits. He says he will continue installing ICS as an important source of his livelihood. Seeing his enthusiasm and motivation other promoters are also following in his footsteps.

(Source: Centre for Rural Technology, Nepal 2005)

around the room through the pipe before going out through the chimney. Nowadays, use of ICS for water heating by attaching a back boiler on the side or around the chimney pipe is increasing in the mid hills and mountain regions of Nepal. The materials required for the construction of ICS are locally available and includes stones/bricks, mud/earth, straw/rice husk, iron plates/ rebar/sheet, animal dung.



In addition to the domestic ICS, promotion of institutional improved cook stoves in hotels, teashops, schools, hostels, and barracks is being carried out.

In Nepal, women are mainly responsible for cooking activities and collecting firewood. Studies have shown that ICS has efficiency of 15-25% and fuel wood saving is 30-35% thus favoring the drudgery reduction of women as ICS cuts down their cooking time and hardship in collection of scarce fuel wood. Women and their children are generally exposed to indoor air pollution. The indoor air pollution due to the combustion of biomass fuel is the main cause of Acute Respiratory Infection (ARI), Chronic Obstructive Lung Diseases (COLD), eye infection and pneumonia in women and children. Studies have shown that with the use of ICS human exposure to pollutants in the kitchen environment has been reduced by an average of 69% carbon monoxide concentration, 53% Total Suspended Particle (TSP) Concentration and 63% HCHO (Formaldehyde) Concentration². The majority of the women using ICS have responded that they had asthma and eye burning due to traditional stoves but also that the situation has improved after installation of ICS and they don't suffer from burning eyes and breathing problems.

The materials required for the ICS construction are locally available and the users have to bear the cost of iron rod and installation charge only. The cost varies depending on the place although it is generally around 200-300 Nepalese rupees (1 US \$ = Nepalese rupees 70.). This amount includes the cost of iron rod, which ranges from 80 to 100 Nepalese rupees as well as the labor cost, which ranges from 100 to 200 Nepalese rupees. The labor cost includes the cost of mud, brick preparation and ICS installation. There has always been difference in approaches among various organizations involved in ICS promotion and dissemination. Some organizations provide direct subsidy for ICS installation. The National ICS program has avoided 'direct end-user subsidies'. The total cost of the stove installation is borne by the users themselves. There are other indirect subsidies in the form of awareness campaign, trainings, monitoring and evaluation, human resource development, which have been crucial for ICS demand-generation in the community.

ICS Program Implementation Strategies:

- The success of the National ICS program has been achieved thanks to its proactive and flexible strategy, which has been implemented as follows: The major thrust of the program is on information-dissemination and awareness -aising through initiation workshops, demonstrations, school orientation activities and campaigns such as poetry, debate or song competition.
- The program is implemented through network of local-partners organizations that facilitate ICS utilization through trained promoters. The involvement of local organization in dissemination process is ensured from decision-making, to monitoring and implementation of ICS program.
- Local community members are trained as promoters for ICS installation. More precisely, women, people from disadvantaged group and financially weak background are particularly trained as promoters. These

² Status of Improved Cookstove Technology in Nepal, ITDG 2000

promoters are trained in all the aspects of ICS installation and monitoring, enhancing their economic opportunities. In some cases, ICS construction has been the major source of income generation. The sustainability of ICS has also been enhanced as these local promoters are responsible for regular monitoring of the performance of the stove.

- The emphasis given on monitoring and evaluation has been very crucial for the sustainability and success of the program.
- In addition to ICS installation, the National ICS program has been promoting the concept of kitchen management. Improving the overall kitchen environment is essential to have a broader impact on the life, especially of women. The concept of kitchen management includes improved kitchen ventilation, overall management of kitchen wares, maintaining hygiene, waste-water drainage systems and waste management. The concept of kitchen management is thus increasing the kitchen efficiency as well as reducing hardship of women.

Problems and Solutions:



ICS is a simple technology based on scientific concepts and easy to operate. Users do not face any severe technical problems during its operation. The problems may arise if ICS promoters do not adhere to the technical specification during installation or if users neglect regular maintenance.

In the Nepali context, users clean the cook stove and plaster with the mud daily. This tends to change the pothole size and decrease the efficiency of stoves. Some of the typical problems encountered in the stoves are smoke backfiring because of wrong placement of chimney outlet, lack of regular cleaning of the chimney and slow cooking in the second pothole. However, the promoters always provide orientation on probable problems and their solution to the users. Users are also provided with the manual on

operation and maintenance of the stove. Moreover, promoters regularly monitor the operation, check stoves efficiency and solve remaining problem.

Progress Status:

From its initiation in May 1999 to the end of June 2005, the National ICS Program has disseminated about 125,000 ICS serving the same number of households in 33 mid-hill districts. The combined effort of national ICS Program and other organizations led to a dissemination of 200,000 ICS in the country by the end of June 2005. One should remember, however, that it remains a meager number compared with the 2 million wood-burning households located in the rural areas.

The National ICS Program exemplifies the success of ICS dissemination program. The lessons learned from this program can be incorporated in other programs:

- Demand generation from the community members themselves is very important for acceptance of the technology and its sustainability. This can only be achieved through effective information campaigns and awareness-development activities.
- Involvement of local organizations in ICS dissemination and their building-capacity is essential for mass scale-up of ICS without too much external supports.
- Development of technical service providers or promoters at local level creates an opportunity for self-employment at local level. It will continue to provide the monitoring and technical back-up, essential to the mass distribution of ICS.
- A flexible and proactive implementation, the integration of other rural development activities and the follow up and monitoring process is fundamental for sustainable ICS dissemination.

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