

**Minutes of Clean Cooking Seminar**  
**16<sup>th</sup> February, 2012**  
**TERI, New Delhi**

TERI in close collaboration with the Stockholm Environment Institute (SEI) and Department for International Development (DFID) organized a seminar '**Clean cooking – Consumer Choice and Market Development**'. The seminar considered the market development and consumer choice aspects of stove dissemination to a varied audience of representatives from research organizations, the government, stove manufactures and grass root level organizations.

### **Opening Remarks**

The seminar was opened by Dr. Leena Srivastava, Executive Director TERI, who stressed on how there are still gaping holes in clean cooking energy solutions and these need to be addressed. An important issue to understand is consumer choice, which will aid in devising solutions that can be tailored to tackle cookstove adoption obstacles. Such workshops, she emphasized are a positive step in the right direction and provide an opportunity for multi-level stakeholders to come together and form concrete collaborations.

### **Overview of Clean Cooking Initiatives**

The first half of the day was moderated by Dr. Veena Joshi, Embassy of Switzerland and focused on the overview of clean cookstove initiatives, technical concerns and consumer choices of the same.

#### **A. Overview of the Clean Cooking Challenge**

Prof. S Bhattacharya, President of International Energy Initiative started the session with a presentation capturing the 'Overview of the Clean Cooking Challenge'. He laid emphasis on the number of deaths that can be attributed to indoor air pollution in India, estimated as 488,200, which is a very alarming number. All income groups are impacted and in fact, higher income groups sometimes consume more biomass for cooking than the lower income groups. Even though according to the IEA, the proportion of people without access to clean cooking energy will decline from 39% in 2009 to 33% in 2030, 53% of the Indian population will remain without access to clean cooking energy in 2030. In order to tackle this head on India needs to invest \$ 0.8 billion per year over and above the IEA New Energy Policies Scenario. People of the lowest income groups are least likely to switch to clean cooking energy because they are unable to afford it. However, income generation is not enough; awareness of its benefits is needed as well. More emphatic efforts need to be made to ensure that clean fuel is available even to the poorest. It is necessary to support and promote the UN initiative of 'Universal Access to Energy by 2030'.

- 488,200 deaths annually due to indoor air pollution in India
- Higher income groups in fact consume more bio-fuel than lower income groups
- 53% of the Indian population will remain without access to clean cooking energy in 2030
- Income generation is not enough; awareness of its benefits is needed as well

## B. Status of Clean Cooking Programmes in India

Dr. B. S. Negi, MNRE added to these points in his presentation on the 'Status of Clean Cooking Programmes in India'. By chronologically tracing the efforts made so far he stressed how the cook stove initiative was a major program in the Ministry of New and Renewable Energy (MNRE) and this was transferred to states because progress was slow. In 2009, a national biomass cookstove initiative was set up to provide cleaner energy solutions, especially to the lower income segments in India. This initiative is different in that there is a focus on developing cost-effective cookstoves and business models for cookstoves. In the last 4 to 5 years, there have been several new models out in the market, but most of them are not tested and certified by BIS with respect to their performance parameters. Standards have been revised and a core group has been set up to check with the stakeholders to see how to take these models forward. For the natural draft designs, 50% of the cost of the cookstove is provided as support. For the forced draft, INR 700 is given as support. A major problem is that although there are 15 to 20 cookstoves in the market, only 4 to 5 meet the existing standards. There needs to be a bigger market so that the government is not overly dependent on the few available models. Dr. Negi expressed interest in procuring 3000 cookstoves from TERI. This is important in that MNRE has taken a collective decision that the forced draft is going to be the chief technology that will be promoted. MNRE is currently in the process of providing incentives to manufacturers.

- In 2009, a national biomass cookstove initiative was set up to provide cleaner energy solutions
- Under the initiative the support given: natural draft - 50% of the cost of the cookstove and for the forced draft - INR 700.
- MNRE has taken a collective decision that the forced draft is going to be the chief technology that will be promoted.

Mr. Sunil Dhingra, TERI pointed out that the lack of attention to other forms of fuel for clean cooking energy such as gasifier or biogas should also be looked into. Efficiency will become higher by opening up options to other fuels. These changes can only take place when emphasis is laid on them at the policy level.

Dr. S. Bhattacharya, IEI emphasized that there is a need to address availability and cost of biomass stoves. The parameters that need to be tested are thermal efficiency, emissions and total suspended particulate.

### C. DFID-TERI Initiative on Cookstoves in the Context of Large Scale Dissemination

Dr. Shan Mitra, DFID discussed the ‘DFID-TERI Initiative on Cookstoves in the Context of Large Scale Dissemination’ emphasizing the need to raise the profile of clean cooking energy awareness. It is an important issue because it provides development benefits to the poor and is also tied to climate change issues. In the past it has been seen that subsidy driven approaches have not been successful- lack of a viable business model, the top-down approach and lack of demand are some of the issues for this. DFID has partnered with TERI to address these obstacles. DFID is providing TERI with the resources to research, pilot and build partnerships in rural areas in order to: build rural awareness, work with technology developers to improve technology while bringing down costs, and address consumer needs. An important function of this initiative is to back up the activities with research that can be used for replicable initiatives. The target set for Large Scale Dissemination (LSD) is 100,000. These initiatives will be gauged to understand how they can be taken to a larger scale, with the emphasis being on market creation. We need to take these lessons and apply them to other models to find the best fit for large-scale commercialization.

Dr. Mitra brought to the attention of the audience how TERI is collaborating with Duke University and USAID in implementing a project to gauge what triggers from the market generate demand for improved cookstoves. This is an important issue and will aid in devising future large scale dissemination plans.

- Need to raise the profile of clean cooking energy awareness.
- Previous failure of cookstove initiative – top down approach, incorrect subsidy method and a lack of business models.
- DFID is providing TERI support to address these obstacles – develop sustainable models that are replicable.
- TERI is also partnering with Duke University with support from USAID in implementing a project to understand what drives people to adopt improved cookstoves.

Francis X. Johnson, SEI commented on the cost aspect, pointing out that the consumer’s willingness to pay is a huge consideration, the question is how to balance having a small number of expensive cookstoves, versus having a large number of stoves that are only marginally better.

Dr. Negi, MNRE pointed out that there are 4 approved stoves and 1 pending rice-husk based cookstove, which is still being tested. The costs are linked to the different segments of society. For example, the natural draft may be the best option for the remote and poor. So in terms of cost sharing for the cookstoves within the community, people are willing to pay as much as INR 350. For the forced draft stoves, the higher income segments of society will be targeted. The implementing agency needs to identify the users and their ability to financially undertake the clean cooking technology with only a subsidy of INR 750.

#### D. Community Preferences and Choices

Mr. Abhishek Kar, TERI took the discussion on consumer choice further in his presentation on 'Community Preferences and Choices'. He brought out that though dissemination is an important aspect, it is only the beginning of the work plan; adoption being the end goal. In order to make this transition, the users preferences must be assessed, user trials must be undertaken and the market-value chain must be understood. These things change a lot depending on the region and other socio-cultural conditions. Once there is an understanding of what people want, the next step is to test what we perceive to be ground realities. In all this the response time is a critical aspect in getting people to adopt cookstoves because there is always a risk that they might revert to old practices.

Experience has shown that affordability is the highest priority for users because the alternative (mud chulla) is free. The second highest priority is the time spent on cooking and ease of usage ranks third. From the user feedback conducted by TERI, it was found that forced draft stoves were better than natural draft ones, with the exception of the ability to burn multiple fuels. A forced draft stove is a bit more fuel-specific and people want to use a free and/or convenient fuel source.

- Dissemination is the beginning of the work plan and adoption the end goal.
- User response takes time.
- User preference and market value chains also vary regionally and must be carefully considered.
- Experience has shown that the most important factors are – affordability, time spent on cooking and ease of cooking.

Discussions after the presentation stressed that unless there is a partnership with an awareness program, adoption will be difficult. Also, sales monitoring is required to see if there is misuse or discontinued use. A local resource technical team is required to give specific support; active support from an NGO at the grassroots level is required for sustained usage and change in the cooking regime.

#### E. Technical Issues Related to Cookstove Dissemination

Consumer needs issues can only be addressed when there is a good understanding of the technical concerns of improved cookstoves and how they can be tweaked to address users' needs without compromising efficiency. Mr. I. H. Rehman, TERI laid emphasis on this point in his presentation on 'Technical Issues Related to Cookstove Dissemination'. He stressed that in the case of cooking energies, the strong link with cultural practices poses a challenge as does the fact that technology lags behind social change. The non-monetization of fuel or stove poses another huge challenge for building a market around integrated cookstoves. Stove designs need to take into account different fuels and the application of these. There needs to be more focus on technology- what is being used to benchmark the technology? What does 'improved' even mean? In rural areas, going through the energy ladder is necessary, but benchmarking and standardizing is also

important, especially in collaborations. It is not only about arriving at a standard, its interpretation and the application is also important.

User feedback and technology improvements can feed into this process. Whether it's a ranking system or labelling etc., there needs to be more focus on emissions reduction and thermal efficiency. Natural draft stoves have a falling efficiency rate and hence there seems to be no point in pushing natural draft stoves. In order to set a benchmark, we should attempt to keep the efficiency at 30% and set this as the benchmark- designs can work around that.

The materials and power aspects of research and development is important. An innovative way to address this concern, for example, is by using solar energy or coupling it with other technologies, such as lanterns and cookstoves. Getting rid of electricity requirements has prompted research on thermoelectric generators. Other alternative materials that can be explored are: forced draft technology using pre-fabricated cement for the outer body, galvanized iron, castable material, refractive material. Making a menu of options that reduce cost by capitalizing on local materials is key to development in technology and meeting users' needs.

- Technological development must keep abreast with social change – the interpretation of user feedback in technology development is central.
- In rural areas going through the energy ladder is important, but benchmarking technology is also important.
- Using solar charging units for stoves and other technological add-ons, such as lanterns must be considered.

#### F. Standards, Certification and R&D

Taking up the issue of establishing standards Prof. R. Prasad, IIT Delhi made a presentation on 'Standards, Certification and R&D'. He stressed that water boiling tests are common but there is lack of standardization on its use. The Kitchen Performance Test is the closest to reality- showing in the kitchen that the stove is saving fuel. However, the drawback is that measuring emissions becomes difficult because it is not a controlled environment.

It is important to understand and learn from past mistakes- the new government initiative started in 2009, has mandated IIT and TERI to come up with a new technology, and the aim is to create 150 million stoves in the next 15 years. The Global Alliance for Clean Cookstoves is creating a Lima Consensus on the standards for cookstoves. The meeting was held at the end of February and is set to take this standard forward. Prof. Prasad opined that the earlier standards are very similar to the Lima standards; it is mainly a matter of presenting the data in a new way. If raw data is available, the presentation can be changed to look at the new standards, but this is an ongoing process. It is important to note however that Indian standards are quite usable and as long as these are met, it will be satisfactory. However, there is a huge lack of testing facilities in India- at present there are only 4 facilities in operation.

- Lack of standardization for the water boiling test.
- Measuring emissions becomes difficult with the kitchen performance test.
- New government initiative is to create 150 million stoves in the next 5 years.
- GACC is to come up with the new Lima Consensus for standardization of IC.
- Lack of stove testing facilities in India, currently there are only four.

## **Household Economic Analysis with a Special Focus in Cookstoves**

The second half of the day was chaired by Mr. I. H. Rehman, TERI and focused on ‘Household Economic Analysis with a Special Focus on Cookstoves’.

### **A. Articulating the Market for Clean Cooking: Consumer Choice Issues and Methods for Analysis**

Francis X. Johnson, Stockholm Energy Institute, made a presentation on ‘Articulating the Market for Clean Cooking: Consumer Choice Issues and Methods for Analysis’. He stressed that the energy consumption of many developing countries mirrors that experienced in European countries at comparable stages of growth and development (i.e. at early stages of industrialization in the 1700s), so the question of efficiency is to accommodate for an inevitable increasing consumption the world over.

In order to work towards this the SEI has been devising methods to map user needs and concerns with cookstoves. A user-centred approach to understanding the market can reveal preferences that might not be otherwise understood, categorizes the issues and devise solutions accordingly. Quantitative approaches can rely on econometric models and forecasting studies in order to provide estimates of households’ actual willingness to pay for cleaner cookstoves. The variation and complexity in behavioural aspects requires use of both qualitative approaches and quantitative approaches. Addressing the issues at the appropriate levels allows for a more appropriate approach, which is what we must work towards.

- Energy needs of many developing countries currently mirrors energy concerns of developed countries in the 1700s.
- Complexity of behavioural issues requires a combination of both quantitative and qualitative methods for assessing user needs and adoptions.
- The foremost issue is to be able to understand different household’s ability to pay for ICs.

### **B. Household Energy Economic Analysis: Stated Preference/Discrete Choice Approach**

Dr. Takeshi Takama, Japan International Cooperation Agency, took the issue further with his presentation on ‘Household Energy Economic Analysis (HHEA): Stated Preference/Discrete Choice approach’. The focus of his presentation was the methodology that allowed for estimating and/or predicting market preferences. The logic of the methodology being that holding all things constant, most people will prefer to take the lowest cost option, but then adding other qualities, such as emissions, a trade off is needed between different factors.

The methodology was used in a prior cookstove study in Ethiopia and showed that the utility of a consumer for a given type of cookstove depends more heavily on product-specific attributes rather than socio-economic factors such as income. The product attributes are independent and more universal in nature, and also can be changed in the short-term. These features are relatively easy to experiment with, and can be used for product design while non-technical factors such as gender, class and health, are used for market segmentation cannot be changed. Literature reviews show that there is a heavy focus on the non-technical factors and that more research needs to be done on product characteristics because they lend themselves to creating better product design.

Further, research shows that the subsidy on fuel is itself not likely to change the market behaviour as much as a change in the starting cost of the technology. This information is useful because it is able to aid in coming up with a portfolio of trade-off factors in order to see which factors make for a better product design.

- Methodology used for estimating/calculating market preferences of ICs.
- Methodology applied in Ethiopia and showed: product specific attributes outweighed socio-economic factors.
- Product attributes are diverse but can be more easily changed than socio-economic factors.
- Change in the starting cost of the technology will impact consumer choice the most.

### C. Understanding the results from the application of household economic analysis.

Stanzin Tsephel, BORDA, Bangalore, who had partnered with Dr. Takama in utilizing the Household Energy Economic Analysis Methodology, put forth his thoughts in his presentation 'Understanding the results from applications of HHEA'. The presentation focused on understanding and interpreting results and how they either support or discredit the energy ladder/fuel stacking theory. Dr. Tsephel explained in his presentation that as income increases, both phenomena coexist. When income is low, total energy consumption is low because of the affordability issue of fuel. As income increases, so does energy consumption. Eventually energy demand decreases because efficiency increases (and not because usage decreases). This results in a partial switch (energy ladder), because traditional, inefficient fuels are still used, but in addition to this, other forms of fuel are purchased (fuel stacking). As income increases, the proportion of dependence on traditional fuels decreases and this shows that fuel stacking and energy ladder are complementary phenomena.

- HHEA supports the analysis of the energy ladder co-existing with fuel stacking
- Low income, low energy consumption – affordability issue
- High income, high energy consumption – ability to buy more fuel
- High income over time, proportion of dependence on traditional fuel decreases

## **Way Forward**

The final session sought to take the discussions of the seminar and work out a way of approaching the cook stove problem in a sustainable and collaborative manner. Mr. I H Rehman, TERI steered this session which emphasized that the sensitivity of different elements, price and non-price attributes are extremely useful in the future where people are to make choices between 10-15 things. Right now, there is a limitation because there aren't so many options. So it might not be so obvious how the role of these attributes come into play.

The message taken forward to the end user is very important to lead to any kind of sustainable adoption of the technology. Sensitizing and awareness-generation need to start before showing the product. To make this a reality a host of actors must work together from research organizations, funding organizations, manufacturers and grass root level organizations. We need to work together to build the strength of manufactures in India so that more technology options can emerge to suit user's needs. A comprehensive view that takes account of technology options, user needs, perceived behavioural reactions and market developments must be taken account of in order to promote improved cookstoves in a sustainable way. In order to achieve this goal collaboration between organizations, manufactures, research organizations and technology developers must take place in a resilient way to work towards the possibility of providing efficient energy access to those that need it the most.