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The role of donor organisations in promoting energy efficient cook stoves

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ABSTRACT

This article focuses on cooking energy and the role of donor organisations in the introduction and dissemination of improved stoves. After presenting some basic facts on cooking energy, the article discusses the cooking energy–poverty nexus and possible reasons for the often neglect of this topic in the context of development cooperation. Clean and efficient technologies for cooking are presented and a short introduction to different dissemination approaches shows the changes that occurred in the last years. The importance of public sector investments to increase the supply and use of clean cooking energy technologies in developing countries is analysed and underlined by GTZ's experiences in this field. The case study of Uganda finally demonstrates how cooking energy interventions work in the field and points out that investment pays off.

1. Introduction: Basic facts on cooking energy

Each human being needs food to live. Most of the daily food is cooked, baked, or processed in another way, which requires thermal energy. In industrial countries this need for energy is mainly met by electricity or gas. However, in many developing countries, biomass such as firewood, charcoal, agricultural residues, and dung, is used for cooking and baking. In Sub-Saharan Africa, biomass accounts for about 80–90% of the primary energy consumption of private households

According to estimations from the International Energy Agency (IEA), the number of people relying on biomass worldwide will in the future increase rather than decrease. Massive efforts in electrification and the subsidisation of LPG in the last years have not affected this situation on a global scale (OECD/IEA, 2006). Furthermore, even many grid-connected households still use traditional cooking devices, such as the three-stone fire, since they are familiar with them or can neither pay for the electricity bill nor can afford an electrical stove.

The main advantage of biomass fuels is that they are available in some form almost everywhere and can be burnt directly. They are usually cheaper than other fuels and when collected available at no monetary cost. Biomass is principally a renewable source of energy, if produced and used sustainably.

Very often biomass is burnt inefficiently in open three-stone fires and traditional cook stoves, which causes severe health problems in women and children and affects the environment.

Every year, smoke from open fires and traditional stoves causes death of approximately 1.5 million people according to estimations from the World Health Organisation (WHO, 2006a) (Fig. 1).

The non-sustainable burning of wood fuels is furthermore contributing to climate change through CO_2 and methane emissions. It is estimated that the traditional energy supply and use causes 3% of anthropogenic CO_2 emissions and 5% of the methane flows to the atmosphere (Holdren and Smith, 2000). The role of black carbon is recently stated as playing even a major role in global warming. Between 25% and 35% of black carbon or soot in the global atmosphere comes from China and India, emitted from the burning of wood and cow dung in household cooking and through the use of coal-based household heating (Ramanathan and Carmichael, 2008).

Increasingly, the unsustainable harvesting of trees for firewood and charcoal is contributing to deforestation especially in Africa. Almost 90% of the wood removals are used for fuel. Soil erosion and water loss can be of further consequences (FAO, 2007; The World Bank, 2009).

Dwindling resources lead on the one hand to additional workload mainly for women and children, as they have to spend more time on firewood collection. On the other hand, in regions where firewood has become already a commodity, prices rise and burden the household budget of poor families even more.

There is anecdotal evidence from GTZ Malawi that people stopped cooking food that needs more simmering, such as beans, or that food is only half cooked due to not accessible or affordable firewood. Many times these aliments would provide useful nutrients which are now lacking. Malnutrition is a severe consequence for poor families, and predominantly affects children's health.

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Fig. 1. Woman cooking on a three-stone fire, Uganda (Photo: Tim Raabe, GTZ).

2. Cooking energy and poverty reduction

Considering these disadvantages of traditional biomass use, increased access to modern, affordable and clean energy services, especially for the poorest and most vulnerable groups in society, is absolutely central to sustainable poverty reduction.

The UN Millennium Project takes account of this relevance and calls to "reduce the number of people without effective access to modern cooking fuels by 50% and make improved cook stoves widely available" (UN Millennium Project, 2005). According to GTZ calculations, to achieve this goal by 2015, every day, an additional 500,000 people have to get access to improved cooking energy. A cost–benefit analysis carried out by WHO shows that this is also economically reasonable. Making improved stoves available to half of those that are still burning biomass fuels and coal on traditional stoves would result in a negative intervention cost of US$ 34 billion per year and generate an economic return of US$ 105 billion per year (WHO, 2006b).

Households, small enterprises and social institutions benefit from various economical and social impacts of access to clean and efficient cooking technologies (GTZ, 2009b. Furthermore, the efficient use of biomass or the switch to other fuels reduces the pressure on forest resources and can contribute to the decrease of land degradation (GTZ, 2007).

3. Cooking energy—a neglected topic

Despite its relevance in combating poverty, cooking energy remains too often a neglected topic in development cooperation. National energy policies and poverty reduction strategy papers (PRSP) very often focus only or mainly on electrification and do not reflect adequately the energy–poverty nexus (UNDP, 2006).

On the international agenda the topic only recently is gaining momentum, especially under the framework of the carbon market. However, compared to other development topics such as malaria, HIV/AIDS, sanitation or water, access to modern energy for cooking has received extremely limited investment and political backing. In many countries, access to electricity gets much more attention and funding (OECD/IEA, 2006: 444).

Why is the issue of cooking energy so much under-evaluated, taking into account its impacts on the achievements of the Millennium Development Goals?

There are several reasons: Firstly, being a cross-cutting issue is often becoming a disadvantage: in many countries it is not clear which Ministry (e.g. Energy, Environment, Health, or Economy) would be involved, e.g. in setting up a stove programme. The same applies for donor organisations and their different departments. Secondly, in the past, a lot of stove programs failed due to their approach or the technology involved. The domain of cooking is a very traditional one in many societies. Technological change involves also behavioural change which is not easy to achieve. Last but not least, cooking energy is not considered a "sexy" topic among many politicians in developing countries nor in donor organisations.

The process of developing biomass energy strategies has shown that politicians are too often either not aware of the problems of traditional biomass use and possible solutions, or they simply deny its relevance, considering the use of biomass as a dirty old-fashioned cooking habit of poor people they do not have to deal with (GTZ, 2009a).

This leads to a paradox in the biomass sector. While biomass is used widely as a source of energy and is of high economic importance in many national economies (e.g. Tanzania, Kenya), political frameworks all too often do not reflect these factors sufficiently. Many countries prohibit the production of charcoal or have only an insufficient legal framework. Nevertheless, charcoal is one of the most used sources of energy for cooking in many peri-urban and urban settings. Influential groups profiting from this illegal or semi-illegal status are furthermore trying to keep the status quo (The World Bank, 2009; Mugo and Ong, 2006).

Given the fact that biomass is and will remain the most important fuel for almost one third of the world's population and considering its negative impacts on people and environment, the challenge is how to make its use sustainable and non-polluting.

Interventions usually focus either on the demand side, e.g. promoting the production and use of efficient cook stoves, or they deal with the supply side, e.g. in reafforestation and forest management programs.

The authors will focus in the following on the demand side.

4. Clean technologies for cooking

Efficient and clean burning cookers range from artisanal or semi-industrially produced clay and metal wood fuel stoves to solar cookers, heat retainers as well as cookers using plant oil, ethanol or biogas. Due to the availability of wood fuels, stoves for firewood and charcoal are the most common ones. An industrial production of efficient stoves has just started in the last years. However, in many cases these products are far too expensive for poor people. Little experiences exist with the export to other countries where sales structures for large quantities of stoves still have to be set up. Due to these constraints the authors focus on artisanal or semi-industrially produced stoves.

Improved woodstoves may take many shapes. However, two main technical principals are always the same: improved combustion and improved heat transfer to the pot. The best stoves optimise heat transfer and combustion efficiency at the same time. Increased heat transfer reduces fuel requirements, whereas increased combustion efficiency also decreases harmful emissions (Bryden et al., 2006) (Figs. 2 and 3).

5. Dissemination approaches

During the last decades many development projects have more or less successfully introduced improved stoves that burn biomass efficiently and thus reduce emissions and consumption of resources. However, scaling-up still remains the major challenge.

In the 1980s, dissemination strategies mainly focused on self-help approaches or distribution of stoves for free. Experiences have shown that these approaches were not always supportive for the construction of high quality stoves thus evoking a negative image of stoves that break easily, are not worth spending money on them and in consequence are not used.