

	ceramic stove	Handeledo	Handeledo w/hood
1st preference fuel	wood	wood	wood
2st preference fuel	nothing	waste	waste
View factor	1		
ideal height	1		
convective efficiency	no		
pot inside the stove	2	4	4
Fuel Economy Improvan	1	1	1
No. of simul used pots	no	yes	yes
chimney/hood necess.	less priority	2	3
Smoke exposure	no	3	3
Accident/fire hazards		461	414
points		0	0
Stove moving	no		
Water boiling	yes	yes	yes
Cooking	yes	yes	yes
Baking	no	no	no
Heating	yes	no	no
Lighting	yes	yes	yes
Grilling	no	no	no
Smoking	no	no	no

Fig. 4. The evaluation sheet presents three possible technical solutions.

gram is divided into five major components:

- data entry;
- definition of the requirements; definition of intervention, solution and function level;
- conceptual design of principal solutions (develop overall functions and part-functions, select possible combinations for the overall function and part-functions and concretise conceptual solutions);
- variant evaluation and presentation (enter KO criteria, evaluate and compare technical and economical criteria of selected principal solutions) – Fig. 4 presents an example of three possible technical solutions for a situation;
- final adaptation (manual) (compare prioritization of

solutions, modify KO criteria).

The weighing of the program data in the evaluation and therefore the adaptation to various project purposes is done with the help of the entered preferences of project objectives and user wants.

Copies of the program can be obtained from: HEP, Haushaltsenergieprogramm, Dr. Agnes Klingshirn, Dag-Hammarskjöld-Weg 1-5, Postfach 5180, 65 726, Eschborn, Germany. ■

Notes:

1. HEAT GmbH, Household-Energy-Appropriate Technologies, is a consulting firm working as a technical advisory group for the multiregional "Household Energy Programme (HEP)" in GTZ.

Integrating women in energy assistance: which way forward?

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ALMOST ALL THE Western donor agencies are very concerned with responding to "women's needs" in the

planning and implementation of development projects. Some donors have special units not only to organise women's projects but increasingly also to make sure the needs of women are attended to in "mainstream" projects, for example by developing checklists against which to assess a project's likely impact on women, or as an aide-memoire to planners to think about women's interests when designing the project. All the DAC countries of the OECD have indeed agreed to prepare such instruments (OECD, 1990), which undoubtedly are useful in creating better working habits, and this is a good initiative. However, the existence and even the use of such guidelines will not seriously change the way development assistance

works with regard to women if they are simply applied to the same types of development interventions that we have been using in the past. To really help women¹, it is necessary to rethink the types of projects supported, with a more basic understanding of what women need.

Within the energy sector there has been some attention to women in the past. This has concentrated on the woman as household-cook. Numerous stove programmes can be observed, many of them now rather successful in providing stoves which women seem to like, because they reduce the amount of fuelwood needed, or because they reduce the cooking time needed, or because they reduce the amount of choking smoke which women have to put up with daily. Biogas plants and solar cooker programmes are also primarily aimed at reducing drudgery for women (though also of course, like stove programmes, at conservation of biomass resources). There are also many social forestry schemes, which, even if planned by forestry departments rather than energy departments, are often carried out with a view to helping women by increasing household firewood supplied. All of these efforts are valuable in themselves.

However, biomass fuels are not the only energy source used by women. A typical rural woman's day in Africa includes large amounts of time spent on portage – of firewood, but also of water, of inputs such as fertilisers to the fields, and, less well known, of harvested crops to the home place and sometimes even to the collection point (McCall, 1987; Kaira, 1983; Bryceson and Howe, 1992). Literature on this does not seem to have been generalised, but there are many individual studies which amply demonstrate the point (Table 1). The heavy work involved expends no fuel but plenty of energy, yet no donor energy programmes have yet taken it up. "Ah, but that is transport," you can almost hear the energy specialists saying – but transport is not a sector which gets much development assistance and in any case it is not usually concerned with such local level problems. Is it not time the energy sector recognised the need and the challenge and started funding bicycle-and-trailer or wheelbarrow projects for women? Or even more radical, what about helping to set up women's transport cooperatives? Or paying for piped water supplies not on health grounds, but to increase the efficiency of women's energy use? Innovation is urgently required here; it is an energy concern.

Then you have food preparation. This is an enormously heavy task involving hand-pounding of grain with a large pestle and mortar. Preparation of food for three meals a day can each take a couple of hours even before the actual cooking starts, and it is always the work of women, often working in twos. In many Asian countries, and in larger settlements in Africa, there are commercial mills, and it can be observed that women would often rather walk for half a day carrying a sack of rice and paying for it to be milled than to stay at home and do it themselves; such is the tedium of this work. In smaller places there is no such opportunity and human energy is pouring needlessly, and drearily, away. Agenda 21 has made a strong point about the importance of energy conservation for sustainable de-

velopment, but energy planners still take the narrow view and interpret energy as *fuel*. Taking these other activities under the wing of energy would be very positive for women and they could even partially be solved if "traditional" energy solutions, to some extent rural electrification, could replace human energy, although probably more than just the provision of electricity would be needed. In this general area, there have been a few "appropriate technology" projects for small oil-crushing devices and such like, but not generally under the energy budget and, more importantly, not as a sustained effort. If one looks at the experience of improved woodburning stoves it is clear that many many years of effort in the field are needed before even the most general lessons are learned and acted upon, and it is only reasonable to expect similar investment and time would be needed in energy-saving food preparation technology.

Programmes for household cooking technologies and other small-scale alternative energy devices are supported by a large number of donors but their share in terms of overall energy spending is very small, less than 2% of the energy development budget averaged over the DAC countries from 1979-82, according to the ILO (n.d.), although it may be a little higher today. The vast bulk of energy assistance goes to the formal sector, to construction or improvement of power plants and transmission lines and to studies relating to exploration for fossil fuel. (The World Bank for example spends 80% of its current energy budget on conventional energy projects.) Now it may be absurd to start talking about the need to involve more women in the design and management of power plants, although it may be noted that in places, such as the Philippines, rural women's groups are actively fighting against construction of power plants (which primarily supply Manila), because they reduce the productivity of local ecosystems (particularly bays where fish breed) on which the women depend. Since sustainable development became an issue, donors have given more attention not to construction as such but to conservation in power plant design and to institution-building to increase the efficient use of electricity, coal and oil throughout the economy; but less money than ever is going into extending electricity to rural areas (a few micro-hydro installations in mountainous areas, and a handful of stand-alone systems

Table 1. Tonne-kilometres transport per annum, able-bodied women and able-bodied men compared for villages in Tanzania and Ghana

Task	Village in Tanzania		Village in Ghana	
	Women	Men	Women	Men
Fetching water	29	2	12	1
Fetching firewood	28	2	5	1
Harvested crops	6	4	13	8
Crops to grinding mill	17	2	2	0
Crops to market	6	1	14	2
Total tonne/km/annum	85	11	46	1

Source: Diagram in [Bryceson and Howe, 1992]

based on PV or biomass apart) since the aim is to reduce or slow the demand, not increase it. Donor reluctance to fund rural electrification may also be rooted in earlier disappointing experiences when it was discovered that contrary to expectations, electricity did not boost economic production but was mainly used for household consumption. It is most unfortunate for rural women that electricity as a substitute for their energy in many tasks is not considered as important by the planners as electricity to encourage rural industries. To fight the case we need to know what the impacts of electrification are, with and without the availability of end-use devices such as grinding machines, and to what extent it makes a significant difference to women in rural areas. What are the probable impacts – positive and negative – on their lives? Much is made, in project proposals etc, of the expected benefits to children of electric light – apparently they will study harder at night and do better in their exams and thus benefit themselves, their families and the nation – but what will the women do? Will they take up sewing and ironing clothes for the family or for trade late into the night (and is that a good thing or a bad thing)? Will they go out to women's meetings instead and attend literacy classes, or even sit in front of a TV? Will it open up their opportunities or reduce them? For while the supply of electricity to formerly dark villages must surely be a general blessing it is equally surely not gender insensitive and field studies to see what is actually happening where electricity has been made available are urgently required. As with other technologies, we may have given up too soon with rural electrification. In investigating this general area, we also need to know *which* women are doing what and *which*

women are benefiting while others do not, for if there is fault to find in the work done by the women-in-development movement, it is that it has ignored the class distinctions that certainly exist between women.

If we are serious about integrating the needs of women in energy development programmes, projects such as those mentioned above need at least to be considered. Energy sections in the donor agencies and in ministries in developing countries should not wait for the women-in-development units to come to them. They should take the initiative and demand the support of such units to help them solve the many as yet unresolved problems of energy without delay. ■

References

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Notes

1. Many feminists would argue that in order to really help women one must intervene not simply to provide for women's practical needs, as described in this letter, but rather to fight for their strategic needs in terms of legal assistance, and general rights to credit, education and free speech and even by macro-economic intervention. Undoubtedly this is so, but there is still room for improvements within the traditional framework of development assistance using projects as the vehicle.

Biomass generation in mixed tree plantations

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1. Introduction

Afforestation programmes have been taken up all over India to meet the increasing demand for fuel and pulpwood. Generally, these programmes rely upon monoculture plantations involving specific species. Plantations of teak, casuarina and eucalyptus are frequently used by foresters and farmers. Such plantations yield wood in quick cycles to meet the urban/industrial demand for fuel and pulpwood. However, monocultures are unlikely to meet

the varied biomass needs of villagers like fodder, manure and small timber besides fuel. The long term sustainability of monoculture plantations is another issue with no clear-cut answers.

Three arguments may be advanced in favour of a mixed tree plantation.

- a) The biomass needs of villagers are varied and it is essential to consider a variety of trees to meet them.
- b) A mixed plantation is more likely to recycle nutrients through a richer litterfall. Such a plantation is hence expected to provide a sustainable biomass yield. A study by Ravindranath et al. (1990) showed that a mixed stand of trees had a better soil nutrient status than an adjacent 60-year old eucalyptus stand.
- c) Mixed tree plantations seem to provide better biomass productivity rather than monocultures. Auclair (1983) refers to a number of studies which support this conclusion. However, a recent FAO report (1992) argues that an increase in biomass through mixing species is not a foregone conclusion. Good et al. (1993) also favour mixing of species for better sustainability and protection from pests and diseases.

This paper reports an experimental study of mixed and monoculture stands in a semiarid tract of South India. Total biomass growth has been monitored over a period of