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BACKGROUND AND IMPORTANT ISSUES

Background

There is unanimity in the two basic objectives of rural energy planning and management:

- o to increase energy input into the rural production system, thereby enhancing its quality and quantity and consequently improving the living conditions of rural residents, and

- o to maximise the efficiency of energy use for maintaining the quality of the natural environment but without undue effects on the production and productivity in rural areas.

The challenge lies, however, in programme implementation. Rural areas and rural residents have for long been neglected by decision-makers and planners. The following statement by Desai in 1982 is no less true today: *"rural fuel supply does not pose a large enough problem for any organised or influential group in rural areas to make a fuss about."* Arguments are often put forward that the inadequacy of a database hinders policy decisions and effective programme designs. An emerging concern, therefore, is the apparent contradiction between the critical nature of rural energy problems, which demand quick solutions, and the complex rural energy patterns, requiring detailed, time-consuming studies. A middle path has to be worked out. A more important point is that the socioeconomic desperateness and disparities in the villages prevent the energy options from reaching the poor who need the most help. Furthermore, alternative energy technologies have often been introduced without sensitivity to the perceived needs of women who are, after all, the primary fuel collectors and end users in the rural areas. These are some of the fundamental problems in the implementation of rural energy programmes (for a more detailed expose, see Bajracharya 1985)

Rather than talk in generalities, this paper concentrates on the specific problems and prospects of rural energy planning in the context of one country, Nepal. The issues and constraints are indeed real and are discussed in greater detail in the remaining part of this section. The prospects for a more effective approach to planning and implementation are suggested in light of the existing circumstances (Section IV). Prior to that, the state of energy programmes in the country is described in Section II. An analysis of implementation approaches-- their problems and prospects -- constitutes the core of Section III. Subsequently, the institutional implications for effective energy programmes in Nepal are discussed in Section V. The final section is devoted to the main conclusions drawn from the Nepalese experience and to an examination of their relevance to other countries.

Important Issues in the Nepalese Context

Nepal is characterised by a predominance of the rural population (about 94% of the total population) whose lifestyle centres around subsistence economic activities. Ninety per cent of the economically active people are engaged in agriculture which contributes to about 70 per cent of export values and 65 per cent of the GDP. The modern sector is very small indeed. This economic structure mirrors the energy consumption pattern in the country. Table 1 is a summary of the energy consumed in different sectors by various types. It is evident that Nepal's energy consumption is one of the lowest in the world. The annual per capita consumption averages 14GJ (860kg of fuelwood equivalent). Fuelwood is clearly the principal source (76%). Together with agricultural residues (11%) and dried animal dung cakes (9%) the traditional forms of energy contribute to 96 per cent of the total energy. Futhermore, the domestic sector dominates the energy scene (95.5%). The consumption in the agricultural sector is in the form of diesel. The very small amount (0.6 million GJ [13,000t]), which is concentrated in the *Terai* (the southern plains' region of the country) contributes directly to productive activity in the rural areas. The other three sectors (i.e., industrial, commercial, and transport) are the domain of mainly the urban areas.

Table 1: Energy Consumption in Nepal (1985/86)

Sector	F.Wood	Ag. Res.	Dung	Total Trade	Coal	Per. Prod(1)	Elec.	Total Comm.	Total Energy	Percentage
Domestic	180.7	26.9	20.5	228.1	0.0	2.2(2)	0.6	2.8	230.9	95.5
Industrial	3.1	0.0	0.0	3.1	1.3	0.8(3)	0.5	2.6	5.7	2.3
Commercial	0.5	0.0	0.0	0.5		0.5(4)	0.6	1.1	0.5	
Transport	0.0	0.0	0.0	0.0		3.4(5)	0.1	3.5	3.5	1.4
Agriculture	0.0	0.0	0.0	0.0	0.0	0.6(6)		0.6	0.6	0.3
Total Cons	184.3	26.9	20.5	231.7	1.4	7.4(7)	1.2	10.0(7)	241.7	100.0
% of Total energy	76.3	11.1	8.5	95.9	0.6	3.0	0.5	4.1	100.0	

Source: Adapted from WECS 1986.

Note:

1) Petroleum products include kerosene, diesel, gasoline, jet fuel, fuel oil, and LPG
2) Includes kerosene (= 2.11 million GJ) and LPG (= 44,000 GJ)
3) Includes diesel (= 449,000 GJ) and fuel oil (= 326,000 GJ)
4) Includes fuel oil (= 326,000 GJ) and kerosene (= 111,000 GJ)
5) Includes diesel (=1.95 million GJ), jet fuel (= 791,000 GJ), and gasoline (= 670,000GJ)
6) Includes diesel only
7) Because of rounding off error, the total does not add up exactly.

From the rural energy planning perspective, the most important consideration is the current supply of fuelwood from rural areas for cooking (181 million GJ or 11 million tons) and for small-scale industries and commercial activities in urban areas (3.6 million GJ or 0.2 million tons). Equally important, but in a different context, is the diversion of agricultural residues (26.9 million GJ or 2.1 million tons) and dried animal dung (20.5 million GJ or 1.9 million tonnes) from their respective use as fodder and manure to burning in the hearth. The consumption of kerosene for lighting (2.2 million GJ or 45,000t) or that of diesel for agriculture (0.6 million GJ or 13,000t) are of second priority considerations only.

The dependence on fuelwood as a major source of energy brings out another important dimension. All of the fuelwood requirements are met from the country's disappearing forests. The current situation is no longer viable for mainly three reasons: (a) the pressure to meet the ever-increasing demand of the growing population; (b) the need to clear forest land for agricultural purposes, thus reducing the possibility of fuelwood supply (Bajracharya 1983); and (c) the excessive pressure caused by the large livestock population (about 16 million head) that creates an inexorable demand on the forest floor to meet fodder and forage needs. There is already evidence that labour use for fuelwood collection is causing additional strain, especially to overworked women in the rural areas. There is also an increasing concern that the problem of deforestation has already caused serious environmental problems such as soil erosion, landslides, greater sedimentation in rivers, disturbance of the hydrological regime and others. The relevant question then is, to what extent can fuelwood use be substituted by another source of energy? and is this a viable proposition? The answer is not easy especially in light of the constraints, e. g., (a) unavailability of commercially exploitable fossil fuels, such as oil, coal, or natural gas, and (b) high costs of distribution of imported fuels to the hills in the context of the lack of infrastructure.

A related paradox in the Nepalese context is the chronic imbalance between the increasing energy needs, on the one hand, and underutilisation of the hydroelectric resource endowment on the other. The country's hydropower potential is estimated at 83,000MW but the currently used capacity stands at 160MW (WECS 1987). Most of the hydropower is currently consumed in the urban areas. Electricity supply to rural areas is insufficient, unreliable, and, at best, limited to a few district headquarters. Is there then an alternative approach that would encourage a greater use of hydroelectricity? relieve the pressure on fuelwood consumption? and contribute to greater productivity in the rural areas?

Another point, to which reference was made above, is related to diesel use in the agricultural sector. What deserves attention here is the increasing trend in its use, especially in the *Terai*, for tubewell irrigation, agro-processing, and operation of farm equipment (such as pumpsets, tractors, and power tillers). Although the use of draft animals for farm power is still dominant, there are currently 2,000 units of two-axle tractors and 400 units of single-axle power tillers in operation. Diesel pumpsets are increasingly gaining popularity for lifting groundwater and surface water. In the *Terai*, where micro-hydro turbines are not feasible, mills for agro-processing are mostly running with diesel. Although small in number as yet, it is evident that they are gaining ground rapidly. The main constraints in diesel use include the high cost of fuel, unreliability of supply, and absence of a sufficient number of distribution points. The cost becomes particularly prohibitive if the current pattern of low-value crops persists. A possible alternative is the substitution of diesel with electricity. This will require, however, an extensive electric grid system that reaches the rural areas. Under the current circumstances, this is an expensive proposition. In the long run, if the demand goes up, the comparative hydroelectric potential of Nepal can be diverted to productive use. In the immediate future, the basic question is whether other alternative energy technologies may be employed to reduce the dependence on diesel.

Over the last decade, there has been a growing awareness of the urgency to tackle the various energy problems outlined above. These concerns have placed a great deal of emphasis on the preservation of remaining forests and the promotion of afforestation. The search has also focussed on alternative energy sources to meet household, agricultural, and other rural needs. Accordingly, various approaches have been tried towards effective implementation of such programmes as community forestry, mini- and micro-hydro development, biogas development, and improved stove installation. Despite these efforts, energy supply from these programmes has remained small, and little enhancement in the rural energy supply and the quality of life has been achieved. Local people seem hesitant to readily accept the prescribed solutions and approaches.

Re-examination of implementation strategies is, therefore, a critical necessity. A number of important issues and questions that are directly concerned with rural energy development are given below.

- Socioeconomic viability and sustainability of energy programmes. To what extent is technological diffusion based on such assessment?
- Forward and backward linkages of rural energy with development sectors. How can the use of energy be compatible with local production systems?
- An integrated approach in the use of energy. How can different energy technologies (e.g., micro-hydro, afforestation, cooking-stoves, biogas) be combined together to meet subsistence and development needs in the village?
- Risks associated with technologies. Can they be minimised or eliminated?
- Incentives and motivations for organising local participation. What mechanisms exist for motivating people to action?
- Interaction between technology users, R&D organisations, and private enterprises. Are there ways to strengthen such interactions and to develop better information systems?
- Assessment of government policies and plans. What are the constraints that inhibit effective implementation?
- Coordination and institutional linkages between government, non-government, and rural organisations.

This paper will look into these various perspectives with examples of success as well as failure and derive many important lessons for more effective approaches.