IV

TOWARDS MORE EFFECTIVE APPROACHES TO IMPLEMENTATION

A number of implementation approaches and dissemination strategies have been adopted by different organisations in an attempt to promote rural energy programmes. Although some are proven to be unsuitable, they still continue without any improvements. Public sector management of small hydropower schemes is an example. On the other hand, implementation efforts by the private sector, which have been successfully tested and proven to be effective, are still not receiving the necessary push from government and public sector agencies. Furthermore, coordination of R&D, credit, extension, and training to encourage users' participation is grossly inadequate. Targets are set to disseminate specific products through uniform directives to inadequately trained extension agents. Very little emphasis is placed on the process of "fine tuning" to correspond with local circumstances or on market surveys to suit users' preferences. Little or no flexibility is given to field officers and extension agents. The consequence is that technological successes are sporadic at best. In the absence of adequate assurance against failures, rates of rejection are high. Furthermore, lack of follow-up services results in high rates of abandonment after the targets are met (Bajracharya 1986). There is clearly a need to conceptualise different approaches to addressing rural energy problems. Important elements of these are suggested in this Section from that perspective.

Elements of an Approach

Energy and Rural Realities

It is important to recognise that a particular energy resource has multiple end uses and has a strong interrelationship with rural activities. Forests, for example, are the source of fuelwood, fodder, and timber. The fodder supply supports the livestock system which is essential for providing draft power and compost in crop production. Forests are equally important for such enterprises as beekeeping, paper-making, and production of handicrafts. Similar arguments can be made about other energy systems. Failure to recognise these inter-linkages is one important reason for inadequate participation by local communities in ongoing community forestry projects. An agroforestry approach, for example, that integrates forestry - livestock - horticulture has a much greater chance of success.

Systems' Approach in the Choice and Use of Energy Technology

Energy technologies are devices for conversion, generation, or utilisation of energy. In many instances, the "technology driven approach," sponsored by external agencies, predominates in rural areas without consideration of the socioeconomic conditions. In order to ensure the successful implementation of energy technologies, it is essential to analyse the following aspects:

- regular supply of inputs,
- supply of auxiliary equipment and spare parts,
- skill and facilities for maintenance and operation,
- marketing and transportation systems,

- o organisation for resource mobilisation and management, and
- o credit, extension, and local manufacturing support.

All these aspects together constitute the energy technology system. A particular technology may need readjustment or modification in design to fit into the socioeconomic environment. Economic viability, institutional and management capability, and sustainability need to be carefully assessed before technological feasibility can be ensured.

Supply of Commercial Energy

We have already referred to the sparing use of kerosene (45,200t), diesel (13,000t), and electricity (171 GWH) in rural areas. Although small in actual quantity, they do contribute to lighting and the operation of farm-related equipment and the demand will foreseeably increase as long as the supply can be assured. From this aspect, it is important to give adequate attention to the distribution system so that the rural population can rely at least on a sustained and regular supply of what little they get. In seriously deforested areas where the priority for protection is very high, it would be worth considering, in the short run, whether the substitution of fuelwood by heavily subsidised kerosene is a viable proposition from an economic and supply point of view. In the long run, however, given Nepal's comparative advantage with hydropower and the high import cost of petroleum products, the solution would very much rest on the substitution of kerosene and diesel by (a) electricity from decentralised small hydro-schemes and central grid extension and (b) biogas generation in significant amounts. This would require a substantial allocation of financial resources, administrative capability, institutional coordination, credit availability, and political determination. An appropriate energy pricing policy would also play a key role in this venture.

Research for Development

Research on rural energy technologies is of recent origin in Nepal. Over the last ten years, the Research Centre for Applied Science and Technology (RECAST) of Tribhuvan University has been engaged in technological research related to the development of improved cooking-stoves, biogas, micro-hydro technologies, and solar dryers and cookers. In addition, a variety of research activities on micro-hydro and biogas technologies has been conducted by private turbine manufacturers and the Biogas Company. What needs encouragement is 'Participatory Action Research' aimed at developing suitable energy systems that correspond to rural needs and priorities. This approach emphasises collaborative efforts among researchers, manufacturers, users, and promoters. Research priorities have to be set within the above framework (Bajracharya 1984 and 1986).

Demonstration and Dissemination

Attempts have been made to popularise technologies by demonstrating their applicability in rural areas. The Appropriate Technology Unit has been established by ADB/N in four different regions of the country for the specific purpose of demonstration and dissemination. New products and designs that are developed, either in Nepal or outside, are brought to the service area for field testing. Samples are given to the small farmers' groups and tried under local conditions. The usefulness, reliability, and farmer's acceptance are determined on the basis of close monitoring by ATU staff. A part of the cost is borne by ATU. If the technology proves to be unsuccessful, ATU compensates for the entire cost. When the technology is willingly adopted and accepted by

the former, ATU works towards its supply and distribution through private manufacturers and entrepreneurs with credits made available by ADB/N field offices and SFDPs. After the establishment of ATU in Rapti Zone in 1982, for example, a total of 127 biogas plants, 56 water turbines, one 4kW rural electrification scheme, 538 improved cooking-stoves, and 406 storage basins were installed within three years. These technologies were rarely found in the area prior to the establishment of the ATU. Furthermore, ATU in Rapti Zone imparted training to 1,728 farmers on the operation of biogas plants, water turbines, improved cooking-stoves, and beekeeping (Upadhyaya 1985).

Support Services for Repair and Maintenance

This is often a neglected but important aspect in the dissemination of new energy technologies. Repair and maintenance facilities are normally available in urban areas and some accessible market centres (especially in the *Terai*). Satisfactory services are available, for example, from the sales' depots of the Agricultural Tools' Factory and the Biogas Company, as well as some small mechanical workshops. The principal difficulties lie, however, in the hills of Nepal where the energy problems need the most attention. If anything goes wrong from a technical standpoint, either the technician has to be brought to the village from urban or market centres or the machinery has to be carried, literally on backs, to the repair shop in the nearest urban centre. The inconvenience and the heavy costs naturally discourage users from trying out new technologies. As a part of the technology dissemination package, therefore, emphasis has to be placed on (a) the training of some selected people in the village in repair and maintenance services and (b) the promotion of rudimentary mechanical workshops in conveniently located village centres. Regarding the second point, it might be noted that there are village blacksmiths and some local entrepreneurs who could be encouraged through proper incentives. Until these services are locally possible, technology suppliers should be compelled to go on regular monitoring visits with the purpose of providing repair and maintenance facilities where required. Financing agencies, such as ADB/N and other commercial banks who provide loans for new technologies, could be asked to take the necessary initiative in this direction.

Development of Energy Villages

Rural residents of Nepal are aware that the shortage of energy has been a major constraint in realising the objectives of economic development. Lack of access to alternative technologies and the absence of systematic adaptation of potential technologies have, for example, hindered the development of irrigation to increase agricultural production, and the harnessing of energy for agro-processing, lighting, and cottage industries. There is, in addition, the absence of a systematic understanding of the 'process' that enables village residents to absorb the technology suited to their needs and embark upon economic development efforts.

To counteract these obstacles, the concept of the "Energy Village" is proposed to intensify deliberately the use of rural energy technologies and to integrate them with the various energy requirements of the community as a whole. The Irrigation and Rural Energy Development Model (Figure 2), implemented by the community of small farmers in Karma Singh *Phant* of Gorkha District, provides a case in point. The community, with the assistance and support of ADB/N, has successfully demonstrated the use of water resources to generate the energy required for application in irrigation and agro-processing. This is then integrated with diversified systems of crop production, horticulture, fisheries, fodder production, and livestock-raising activities. Emphasis was placed on the maximum use of local resources (such as water) and also on the reinforcement of the organisational capabilities of small farmers' groups. The principal elements

of this approach include (a) intensifying energy use, (b) providing the necessary support to use technologies suited to local conditions, and (c) institutional mechanism through SFDP to increase small farmers' capabilities to operate such systems. The development efforts at Karma Singh *Phant* are in the preliminary stages but the results are indeed encouraging. It is conceivable that this model may be disseminated to other villages. The emphasis on specific resources might be different but the principles could be the same.

Private Sector Involvement

Experiences show that the private sector approach could be the most feasible and lowest cost option for implementing rural energy projects. Proper incentives and necessary support systems are, at present, minimal for the engagement of the private sector in the development and management of rural energy programmes. Several alternatives are possible.

Farm Forestry Approach

While the "Community Forestry Approach" needs to be continued, alternatives such as agroforestry and private farm forestry need to be encouraged. Various activities might be included.

- Promotion of a network of nurseries for the distribution of saplings, including those of fruit and fodder trees.
- Establishment of effective extension and training services to enable village people to become extension agents.
- Provision of long-term credit with concessional rates of interest for integrating crop farming with pineapples, bananas, pulses, groundnuts, and others that yield quick economic returns.
- Development and distribution of proven technical packages for tree farming with compensatory measures in the case of failure.

ICS Dissemination

Government subsidy may be provided for (a) training of potters and technicians for stove installation and (b) publication and distribution of posters and manuals for ICS production and maintenance. Credit agencies should, at the same time be encouraged to finance ICS production through pottery enterprises in rural areas. Stove installation activities can also be promoted as a part of the ongoing credit programmes of financing agencies. The important point is to promote direct linkages between stove producers and users. A subsidy of 50 per cent may be provided directly to stove producers so that users can get them at relatively lower prices.

Small Hydro Schemes

The performance of government-owned small hydro schemes can be much improved if the management and operation are entrusted to private agencies. Arrangements for training may be provided by the Small Hydropower Development Department to encourage such involvement.

Installation of Biogas Plants

To increase the dissemination of biogas plants, private contractors may be encouraged to install them according to design specifications provided by the Biogas Company. There is evidence to show that the cost of installation is lowered under these circumstances. A former staff member of the company had, for instance, gone ahead with the establishment of his own private firm and succeeded in installing biogas plants at much lower cost than the Biogas Company could manage.

Strengthening Local Participation

The afforestation efforts in Belkot Village *Panchayat* of Nuwakot (as described in Section III above) show that the village communities have the capability to plan and implement their own programmes, to mobilise their own resources, and to manage the project on a continuing basis. The experience from SFDP indicates that small farmers are motivated to participate when credit is accessible to them. The experience in REPS-PAR shows that villagers participate willingly in implementation when they are involved in the choice of the project and they are engaged in planning and decision-making (Bajracharya et al. 1987). Both the REPS-PAR and SFDP approaches highlight the role of the catalytic agent in motivating village residents to participate actively in the programme. Another key aspect that needs to be considered is the participation of women in programme activities. The success of the community forestry programme in Darchula was largely due to the active participation of women in the forestry users' committee. A similar involvement of women would help a great deal in the promotion and dissemination of ICS. In many cases, the introduction of a new technology or device fails either because women are not trained or because the new device does not meet their needs. ICS acceptance increased in Sangramtar, for instance, when the design modification was done as per the local requirements. Such requirements were identified through the interaction of the household women, the researcher, and the ICS producer.

The local community clearly needs to be encouraged and allowed to formulate their own plans and programmes of action based upon their values, goals, needs, and priorities. Their indigenous knowledge, skills, and organisations require much strengthening for effective implementation of programmes. Many local informal organisations have been successful in managing community projects such as village forestry, irrigation systems, and drinking water systems. The rules, regulations, and control mechanisms were established without any external help or assistance. When government agencies attempt to form new organisations, the tendency is to ignore the existing ones. As a result both the government-sponsored organisations and the pre-existing ones become ineffective as demonstrated in the experiences of community forestry in Dolkha District.

There are many examples of informal mechanisms that people were using to organise their social life, pool their labour and other resources, express their common interests and concerns, and mediate or resolve conflicts. The *guthi* in Kathmandu Valley is an institution in which members partake in religious and social responsibilities. In some cases, they might own a common piece of land. Revenue obtained from *guthi* land is known to have been used to support religious or communal activities such as afforestation, installation of taps or ponds, and sponsorship of cultural and social events. The *Thakalis* of Western Nepal operate rotating credit associations (known as *dhikur*). A common fund, established through contributions from members, may be used on a rotating basis for establishing new business or for meeting unexpected expenses during times of financial crisis. The *Gurung* women organise labour groups for agricultural activities on the basis of traditional female associations called *Rodi* (UNICEF 1987). The *Tharu* community in Dang-Deokhuri and Kailali districts have set rules and regulations for timely operation and management of local irrigation systems. The scale of operation involves as much as 5,000ha.

These local organisations, which contribute to reinforcing ethnic and kinship solidarity, provide effective networks for community participation. It is worthwhile to explore fully the potentials inherent in these systems.

The key factors for the successful participation of local groups rest on (a) flexibility in rules and regulation, (b) assistance of the experienced catalytic agent in guiding the people to form their own group as per their requirements, and (c) provision of credit and extension support as 'entry points for mobilising external resources while strengthening local organizations.

Improving Institutional Coordination

The absence of coordination among institutions and organisations in the planning and implementation of rural energy programmes is a major constraint. This is apparent not only at the national level but also at the district or project level. There exists a gap between micro-level implementation and macro-level planning. As a consequence, it is difficult to see whose responsibility it is to look into rural energy. Seen from the conventional perspective some of the responsibilities lay with sectors dealing with agriculture, irrigation, forestry, power, and cottage industries. The irony is that when rural energy is fragmented, its significance and priority are lost in the midst of other activities within each of the sectors. The elements of an appropriate institutional framework are discussed in greater detail in the following section.