

## GROUP DISCUSSIONS

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After the presentation of discussion on the papers, four working groups were formed to discuss and report on four thematic areas. Group 1 deliberated on a "Rational Approach to Rural Energy Planning". Group 2 focussed on the theme "Planning and Implementation of Micro-hydro Technology". Group 3 discussed "Planning and Implementation of Biogas Technology" and Group 4 examined aspects of "Planning and Implementation of Energy Conservation Measures". The papers presented in the seminar and the discussions arising from them provided the background for detailed deliberations by the working groups. The working groups were expected to highlight the major issues and come up with a set of recommendations that could be of use to concerned agencies in the planning and implementation of policies and programmes in the energy sector. The group reports were presented by the conveners of each working group at the plenary session and were discussed and subsequently adopted by the participants.

The issues raised and conclusions arrived at by each working group are summarized below.

### **Group 1. Rational Approach to Energy Planning**

The Group first took stock of the existing approach to energy planning in Nepal. It was pointed out that a "rational" approach did not exist at present in Nepal's energy planning. Certain energy technologies had initial successes but these successes had little to do with consistent government efforts. This lack of consistency was attributed to institutional deficiencies. The relevance of particular technologies in the context of Nepal was not properly assessed. There was a pervasive lack of knowledge regarding local resource use. Financial incentives were lacking and, even in cases where there were some incentives, the support levels were not uniform. Lack of follow-up was regarded as endemic in the propagation and diffusion of technology. As a consequence second generation problems were rarely addressed. Lack of support for people-based planning was therefore quite obvious.

In view of the problems highlighted above, the group felt that the only rational approach to energy planning was an "integrated approach". Energy had to be viewed in totality and an integrated approach was therefore recommended. It was important to promote the energy sector's linkages with other sectors such as agriculture, industry, and transport within a certain geographical area. This in essence was one of the major advantages offered by area-based planning where strong intersectoral linkages contributed to the economic well-being of the people. To promote this integrated approach, it was also

necessary to take note of the respective role played by the private sector, government sector, financial intermediaries, and technology-promoting institutions. Alternative energy technologies played a far more important role in promoting local economies by following an "integrated approach". The group believed that there was the need for a focal point for energy planning and it was recommended that in Nepal's context the National Planning Commission should remain the institutional focal point. The group suggested that the NPC had to be strengthened in order to play the role of the focal point more effectively. The group felt that area-based planning provided the best opportunity for rational energy planning. The group recommended that the linkage between policy-making bodies, NGOs, and the private sector had to be meaningfully nurtured. To this end the NGOs and the private sector should be involved in discussions on policy and programme issues. The group called for a decentralized approach to rural energy planning and recommended that the active participation of user groups be sought in dealing with energy planning issues at the local level.

The issues and recommendations of the working group were endorsed by the participants with the observation that some pilot exercise should be undertaken in the development of energy villages.

## **Group 2: Planning and Implementation of Micro-Hydro Technology**

In its report to the plenary session, this group also identified a number of issues and solutions regarding the planning and implementation of the micro-hydro system. One of the major issues was that there were too many breakdowns in micro-hydro systems and they took too long to repair. Skill levels in mechanical, civil, and electrical fields were low. New end uses of mechanical and electrical energy were not being adopted in many instances. As a result many schemes had low load factors. There was also no coordinated and systematic approach to research and development. The propagation of micro-hydro technology was lagging behind and, as a result, manufacturers had insufficient orders. Only one financial institution was really concerned with micro-hydro in a major way and therefore there was a dearth of financing agencies. The diffusion of micro-hydro also suffered from the fact that the electrification subsidy was limited and there was a backlog of requests not fulfilled. At the policy level the group noted the absence of a coordinating agency for micro-hydro development.

A number of solutions to deal with the issues highlighted above were also noted. Training on operations and maintenance was suggested by the group at three levels - for operators, for local seminar, and for manufacturers. Training to enhance the skill levels of manufacturers, installers and entrepreneurs was suggested. The promotion of new end uses, training, support services, and the promotion of financial incentives in the form of subsidies and tax exemptions was recommended. The establishment of a coordination unit for research and development was suggested to foster a systematic approach to R & D. The group expressed the opinion that there was an urgent need to induce more financing institutions to promote micro-hydro. More funds had to be sought to make

electrification subsidies available to a larger number of schemes. It was also stated that there was a need to establish a coordinating agency for micro-hydro development at the central level.

The group came up with three major recommendations. First, it was recommended that a coordinating unit for micro-hydro development be established in the Ministry of Water Resources. Secondly, the group recommended the establishment of a Task Force to (a) prepare a detailed inventory of constraints and potentials related to micro-hydro systems and (b) to prepare a detailed plan to significantly increase the dissemination of micro-hydro systems under the leadership of WECS. Thirdly, the group recommended the establishment of a lobbying group that included the representation of the Association of Hydropower Manufacturers and all parties concerned with micro-hydro development.

### **Group 3: Planning and Implementation of Biogas Technology**

The group presented its report under four major themes: 1) the role of biogas in rural energy, 2) government institutions and subsidy policy, 3) research and development, and 4) promotion and dissemination of biogas. That there was the potential to establish a million biogas plants in Nepal was indicative of the major role of biogas in rural energy. Together, these plants would mean a savings of 10 million metric tons of fuelwood (i.e., 100,000 hectares of forest land). In terms of nutrient value, it would result in a saving of 1.3 million metric tons of nitrogen, 1 million metric tons of phosphorous, and 0.35 metric tons of potassium. Biogas would also have other indirect benefits arising from stall feeding, improved sanitation, and improvement in the quality of life. This potential of biogas should be realized during the planning and implementation phases for biogas technology.

The group stated that, insofar as government institutions and subsidy policies were concerned, there clearly was a need for long term commitment to the dissemination of biogas technology. The group recommended the creation of a Department of Rural Energy Development that would coordinate efforts to establish use of alternative energy in rural areas. The group decided that since the cost of biogas plants was higher for users at the present there was clearly a need to continue with subsidies. However, this could be provided either through institutional support or through direct subsidy to the users. The group pointed out that subsidy should perhaps not be a "forever" proposition. The group recommended that the subsidy provisions be retained in the coming Eighth Plan. The achievements, however, should be reviewed after the plan period before continuing with such a policy in future.

On the topic of research and development in the biogas technology area, a number of needs were identified by the group. Cost reduction was imperative if biogas technology was to be widely disseminated. Alternative uses had to be found for spent slurry. Research was also needed on alternative feed materials. The issue of gas production in cold regions had also to be addressed in order to make biogas a viable proposition at higher altitudes. Last but not least there was also the need to develop biogas appliances so that use could be

diversified. The group also recommended that encouragement be provided to the private sector in the research and development area.

Regarding the promotion and dissemination of biogas the group suggested that the private sector should be encouraged to construct biogas plants, particularly family-sized plants. The group noted the creditable work done by ADB/N in the area of credit provision for biogas, but believed that there was a need to involve other lending organizations if the potential for biogas dissemination was to be realized. More attention needed to be paid to manpower training both in construction as well as in extension work regarding biogas technology. The group also felt that there was a need to look at the institutional aspect of community biogas plants.

The group recommended that the role of the Biogas Company should be limited to research and development, extension and communication, training, and monitoring for quality control. More private sector initiatives should be encouraged. The group noted the need to provide import facilities for construction materials to the private sector.

#### **Group 4: Planning and Implementation of Energy Conservation Measures**

The group presented its report by emphasizing that introduction of new technologies and ideas in the context of the existing rural culture and economy had to take proper cognizance of both the technological and the institutional aspects. With respect to each technology, the group identified the technology potential, assessment of resources on which the technology is to be based, the R and D status of technology, demonstration and field trial aspects, and commercialization and popularization aspects. The group restricted its deliberations to improved cooking stoves (ICS), kerosene and electric stoves, biomass, and solar and wind energy.

Regarding ICS it was noted that the potential was high but a number of problems related to maintenance, durability, etc had come to the fore. Adaptation had to be made on local varieties and there was a need to create an institutional base for dissemination/diffusion of ICS at the local level.

On the topic of electric and kerosene stoves, the group stated that more awareness had to be aroused through the dissemination of appropriate information regarding efficiency.

Concerning biomass, three technologies were considered: gasification, densification, and charcoal. In the first case there was a need to monitor regional and international R and D. Regarding densification the focus needed to be in supporting the manufacturers in areas of materials and production processes. Charcoal was more efficient than fuelwood and attention had to be focussed on making its use more popular.

On the topic of wind energy the group stated that general as well as site-specific resource assessment was called for as this was lacking in Nepal.

Regarding solar energy, at least six technologies were identified (solar drying, flat-plate solar, P/V remote, P/V pumping, PV storage, and solar cookers). Solar drying as well as flat-plate solar-water heaters in particular had clear potentialities. The focus needed to be on reducing costs and bringing these technologies into wider use at the household as well as at the industry level.

With this review of the status of different energy conservation technologies, the group made a number of recommendations. The group felt that energy conservation and alternative technologies and practices had to be linked to the development agenda of the country. Many technologies existed in the solar, wind, and biomass fields. In propagating and disseminating these technologies, priorities had to be worked out.

The group recommended that an agency be established to coordinate/promote activities in alternative energy technologies. Such an agency would prioritise technology options and select specific technologies for promotion, development, demonstration, and dissemination on a regional or sectoral basis. Such an agency would also be responsible for mobilising resources and laying down criteria for the allocation of resources for research, demonstration, and commercialization with respect to particular technologies.

The agency would also be responsible for developing or supporting the development of energy conservation and education packages for dissemination through existing national programmes. The group felt that the agency should also act as a clearing house for information on alternative technologies and also monitor the technology-related activities of different agencies.

The group felt that for technologies such as ICS a link with local formal or informal institutions was essential in both the processes of adaptation and dissemination.

The group recommended that wind energy was a potential source. At the present moment, however, the focus in Nepal should be on a general resource assessment backed by some site-specific, in-depth studies.

### ***Chairman's Conclusion***

The Chairman of the session, Dr. Mahesh Banskota, summarized the discussions. He observed that the present seminar on Rural Energy Technologies represented a most interesting collaboration between three very special institutions. The Agricultural Development Bank of Nepal, apart from playing a leading role as a commercial bank for the agricultural sector, had been a pioneer in promoting improved rural technologies that incorporated rural energy development. The Water and Energy Commission of His Majesty's Government had played an important role in the systematic development and

management of energy resources in Nepal. The International Centre for Integrated Mountain Development (ICIMOD), while not directly involved in energy programmes in the field, had brought together the experiences of several countries in the development of energy programmes in mountain areas. Thus, the united effort of these three institutions represented a major step forward in the integration of policy-level thinking with practical experience not only here in Nepal but also in other countries with mountainous regions.

The Seminar, with its different topic areas, had clearly indicated the availability of enormous potentials. Use of biogas, micro-hydel, and solar sources at present account for only a very small fraction of the total energy supplied, compared to traditional sources such as forests. Thus, the technological options in the field of alternative energy supply were not lacking even for mountain areas, although the appropriateness of any one technology might be in question. It was important to understand this point because, in many cases it was not the absence of technology per se but the inability to use it that acted as a constraining factor in the development of mountain regions.

This seminar had also raised the issue of the underlying energy linkages between different sectors. In the past, energy planning and development was often undertaken without fully understanding the energy linkages between sectors. This resulted in an extremely poor performance from the established energy system. In view of the relative advantage of one energy technology vis-a-vis another for specific activities, it would be generally more useful to talk about combinations of appropriate energy technologies rather than just one technology. If biogas worked well with respect to household cooking, micro-hydel was better suited for limited scale non-agricultural processing. Planning of energy systems should consider the needs of transport, agriculture, and industry and identify appropriate options and linkages. It was probably one of the main reasons behind the poor end use of established rural electrical systems at present.

The issue of costs and prices was raised time and again by many speakers during the discussions. Underlying issues of costs were related to the questions of user charges, subsidy, and ultimately sustainability of rural energy technologies. Many of the proposed rural energy technologies were not affordable by the very poor in developing countries, and consequently the real options for the poor were not even being discussed. Biogas was mainly an alternative for land holding groups with some cattle, while micro-hydel required relatively large initial investments.

The Government and many supporting agencies were already concerned about the increasing subsidy burden of many energy projects. Unless effective ways to increase end use or reduce costs per unit could be identified, many rural energy technologies would become unsustainable. The question of cost was therefore very critical in the continuing economic viability of rural energy technologies.

This Seminar also raised many questions regarding the importance of an institutional set up for more effective energy planning and of a management system dealing with specific issues of pricing, technology, integrating end uses, and matching energy demand and

supply. There were additional aspects regarding promotion and training. A central coordinating unit for rural energy technologies was also thought to be useful. The integration of the private sector and NGOs was seen to have important potentials, especially in some areas.

In the past there had been too much talk about integrated energy development without any significant progress being made. This Seminar had also raised the issue of the need for an integrated approach. The present collaboration between ADB/N, WECS, and ICIMOD should now be continued in order to implement concrete steps towards the development of prototype rural energy planning in mountain areas. The Chinese experience in this respect provided very useful guidelines on how to proceed in implementing integrated energy planning.

10. National Structure and Engineering (PIA)

Participating Agencies/Institutions and the Items They Displayed

Items displayed/chart, photographs displayed	Organization/Manufacturer
1. Demonstration of electricity generation through biogas study	1. Biogas Company, Kathmandu 2. Charu and Charu
2. Various models with their applications	1. Solar Cooker 2. Charu and Charu
1. Maps, photographs	1. Agricultural Development Bank
2. Models of alternative energy technology application within a village area	1. Books on renewable and solar photovoltaic energy
3. Map of places covered by alternative energy technologies	1. Catalogues and photographs