2. REVIEW OF THE CURRENT ENERGY SITUATION

Countries of the HKH Region

The total final energy consumption in the region amounted to 71,311 million GJ in 1992, of which 66 per cent was met by commercial energy sources and the rest by traditional fuels, though a large variation in the share of traditional fuels is observed. For example, in Afghanistan, Bhutan, Nepal, and Myanmar, the share of traditional fuels lies between 75 and 95 per cent, whereas in China and Pakistan it is less than 25 per cent (Table 2). Large countries, such as China and India, consume about 66 per cent and 29 per cent of the total energy respectively, while the remaining countries consume less than five per cent.

There is also a wide variation in the per capita final energy consumption pattern within the countries. For example, in India and China it is two to three times more than the average value amounting to 16,500 MJ per capita, while it varies between 7,500 and 16,500 MJ per capita in the other countries. This is the consequence of a combination of socioeconomic factors and the availability of energy resources and reliable technologies.

The energy resource base of the region incorporates a combination of traditional and commercial sources, including fuelwood, agricultural residue, animal wastes, hydroelectricity, petroleum, coal, wind, and solar. The energy potentials in the countries of the region are presented in Table 3. The present potential for a sustainable supply of energy amounts to more than six times the total energy consumption.

The resources available in the region vary significantly. For example, the share of coal as an energy resource occupies first place (with more than 90 per cent in China and India), whereas renewable energy accounts for less than two per cent in China and six per cent in India, eight per cent in Bangladesh, and 11 per cent in Pakistan. In Afghanistan and Myanmar, the sustainable supply of renewable energy amounts to 26 per cent and 20 per cent respectively, while it is 100 per cent in Bhutan and Nepal.

Almost 94 per cent of the annual supply is available in the form of coal for at least 50 years — mostly in China and India. Only about 60 per cent of the total final energy demand of the countries in the region can be met by a sustainable supply of renewable energy, assuming a loss of 50 per cent during conversion of primary energy into final energy. If India and China were to be excluded from the analysis, the sustainable final energy supply potential would exceed 3.7 times the total final energy demand, assuming an overall conversion efficiency of 50 per cent between primary and final energy supply. Similarly, if 70 per cent of the present energy demand is assumed to be met by biomass fuels in countries other than India and China, in that case only about

35 per cent of this demand in the countries overall can be met by biomass fuels with the remaining having to be met by mining of the forest or by the extensive use of renewable energy resources.

The per capita electricity production varies significantly in the region from 39kWh in Nepal to 535kWh in China as depicted in Figure 7 (World Development Report 1994), compared to 11,868kWh in the USA. Significant variations exist within the region. China and India have a notably higher commercial energy intensity of 187 and 132kg of oil equivalent per US $100 GDP respectively, while Nepal has less than 15kg, as shown in Figure 8.

In Nepal and Bhutan, hydropower typically occupies first place with more than a 60 per cent share, while biomass constitutes four per cent in Bhutan and 10 per cent in Nepal. The present usage pattern shows that the contribution of biomass to current energy needs is more than 90 per cent, while hydropower contributes less than one per cent.

The Hindu Kush-Himalayan Region

Although reliable estimates of the energy resource base of the HKH region are not available, the trend of resource availability as depicted in countries like Nepal and Bhutan may best represent the energy supply potential as well as the existing energy supply patterns. The preliminary understanding of the energy supply potential, as seen in the case of Nepal and Bhutan and mountain areas of the region, clearly indicates that there is a rich renewable energy resource base, with a tremendous potential for providing energy not only to the people of the HKH but also to the people living beyond the region.

Given the unreliability of estimates of total energy consumption in the HKH region, the energy consumption pattern in the domestic sector—as seen from various case studies — shows that the contribution of traditional fuels amounts to more than 90 per cent of the total energy requirement, apart from in Jammu and Kashmir (Table 4). The share of fuelwood in traditional energy is more than 65 per cent, with the exception of Ningnan County, China.

The trend indicates that the use of agricultural residue and animal dung as sources of energy is on the increase in the HKH region, but, in urban areas, the transition from biomass to commercial energy forms is evident. The urban areas of the HKH region are now increasingly dependent on imported conventional energy resources.

Investigations in typical villages of the HKH show that the useful energy requirement in the domestic sector amounts to from 65 to 80 per cent of the total useful energy requirement, as depicted in Tables 5 and 6 (Rijal 1991). The useful energy requirement for cooking varies from 55 to 85 per cent of the total energy required in the domestic sector, depending on the climatic condition of the area. The domestic sector depends on traditional forms of energy to meet its energy needs.

The useful energy requirement for farm activities varies from five to 25 per cent of the total energy requirement, depending on the intensity of cropping patterns; size of land holdings; ruggedness of the soil structure; and availability of, access to, and use of modern farm inputs (Tables 5 and 6). More than 85 per cent of the total useful energy required on the farms is for ploughing, planting, and threshing activities, which include farmyard manure and fertiliser application. These requirements vary significantly from village to village depending on the topography, accessibility, and availability of irrigation facilities. A substantial quantity of the farm energy requirement is met by muscle power (human and animal).

The type of industry dictates the choice of energy input. For example, in Lekhgaun village, in the Surkhet district of Nepal, almost 45 per cent of the useful energy is met by muscle power, e.g., weaving, mat-making, and agro-processing are the main activities, whereas, in Marpha, in the Mustang district of Nepal, more than 80 per cent of the useful energy requirement is met by fuelwood since alcohol brewing is the main rural industrial activity (Table 5).

As a result of various socioeconomic factors (Figures 1 to 6), a wide variation exists in the per capita final and useful energy consumption patterns within the HKH region the availability of energy resources and technologies can be considered a part of these socioeconomic factors.

A cursory analysis of energy supply and demand patterns indicates a severe imbalance of sustainable energy supply and demand in the HKH region. Actions and programmes were introduced in the mountains, but to no avail. The approach adopted for development of the energy sector did not show any significant increase in the use of renewable energy, despite the existing potential. This was due to the fact that the development of the energy sector was primarily biased towards fulfilling the energy needs of the people living in the plains. It was also due to the fact that renewable energy development required a substantial initial investment which, however, would turn out to be cheaper in the long run.

At the same time, the economic cost of biomass fuels is rarely perceived, neither by users nor by nations, and thus traditional sources of energy still play a predominant role at the cost of the resource decreasing at a faster rate than can be replenished. The present trend of unsustainable and indiscriminate use of biomass has affected the welfare of the population in the HKH region, as it increases the time needed to collect fuelwood and fodder. It has likewise reduced farm productivity and adversely affected the quality of life (Monga et al. 1988; Monga et al. 1992).

It is not that technologies to save energy, diminish adverse environmental impacts, or reduce life-cycle costs to consumers are not available. The problem is of matching energy resources and technologies with the energy services required as well as the availability of energy technologies at the desired location. Besides this, transfer of efficient energy technologies and their affordability are also critical problems. Efficient technologies may not be popularly adopted unless mechanisms for their transfer are

improved upon, impediments to their adoption removed, and the issue of affordability appropriately addressed (PEP Project 1995).

Given the state of affairs, the energy sector in the HKH region needs to be looked at anew, for which rethinking is essential. The question that immediately needs to be addressed is how these renewable energy resources can best be exploited while maintaining the economic and social sustainability of the mountains.