

3. Energy Consumption Pattern

Overall Consumption Trend

Before discussing the energy demand in the manufacturing sector, this section provides a brief discussion of the overall energy consumption pattern in Nepal. The annual per capita consumption of energy in Nepal is one of the lowest in the world. The total consumption of energy in 1990/91 was estimated to be 9,147 thousand tonnes of coal equivalent (TCE) of which about 95 per cent was derived from traditional sources (fuelwood, agricultural residue, dung) and the remaining five per cent from commercial sources, namely petroleum products, coal, and electricity. The overall consumption trend of both traditional and commercial energy during the period 1979/80-1990/91 is presented in Table 1 and (Figure 1) along with the annual average growth rates of both types of energy.

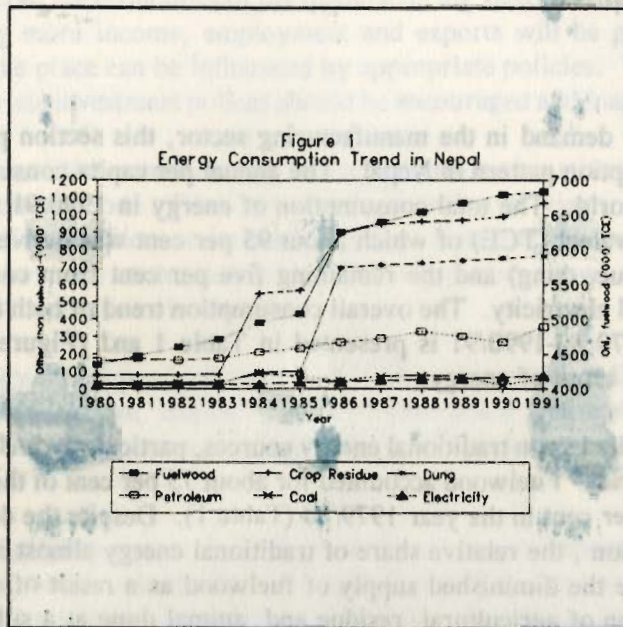
The country is heavily dependent upon traditional energy sources, particularly fuelwood which comes mostly from the forest and private lands. Fuelwood accounted for about 75 per cent of the total energy consumption in 1990/91 compared to 93 per cent in the year 1979/80 (Table 1). Despite the declining share of fuelwood in the total energy consumption, the relative share of traditional energy almost remained stagnant over the past decade. This is because the diminished supply of fuelwood as a result of dwindling forest resources forced increasing consumption of agricultural residue and animal dung as a substitute cooking fuel. The average annual growth rates of agricultural residue and dung consumption during the period 1980-1991 were 27 and 35 per cent respectively, compared to 4.2 per cent annual growth of fuelwood consumption over the same period (Table 1). The current trend of redirecting agricultural waste and dung from use in agricultural fields to use as a cooking fuel will have long-term detrimental effects on soil fertility and productivity. The loss in agricultural production through this substitution and deforestation is still unknown.

Table 1: Traditional and Commercial Energy Consumption Pattern in Nepal
'000 tonnes of coal equivalent (TCE)

Energy Types	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Growth
Traditional													
Wood	4341	4476	4596	4718	4946	5075	6248	6393	6544	6667	6786	6834	4.21
Residue	77	79	81	83	550	565	893	944	961	967	989	1067	27.00
Dung	29	30	31	32	95	98	696	710	725	737	748	761	34.59
Total	4447	4585	4708	4833	5591	5738	7837	8047	8230	8371	8523	8662	6.25
Share	95.51	95.30	95.48	95.27	94.47	94.48	95.69	95.13	94.73	95.13	96.01	94.70	-0.08
Commercial													
Petroleum	158	174	165	177	211	230	268	288	330	301	266	355	7.64
Coal	31	32	35	36	86	69	46	74	76	70	21	58	5.86
Electricity	20	20	23	27	30	36	39	50	52	58	67	72	12.35
Total	209	226	223	240	327	335	353	412	458	429	354	485	7.95
Share	4.49	4.70	4.52	4.73	5.53	5.52	4.31	4.87	5.27	4.88	3.99	5.30	1.53
Grand Total	4656	4811	4931	5073	5918	6073	8190	8459	8688	8800	8877	9147	6.33

Source: Economic Survey 1991 (Ministry of Finance, HMG)

Note: Growth rates were estimated using a semilog function.



The country's lack of modern infrastructure, low manufacturing and commercial potential, and, above all, the low level of industrialisation explain why the commercial consumption is very low. The commercial energy consumption, however, has been growing at a faster rate (8.0% per annum) than traditional energy consumption (6.2%) over the past decades. According to data presented in Table 1, commercial energy consumption is well below energy provided by dung and crop residues.

Petroleum products, coal, and electricity are the three major forms of commercial energy used in the country and they accounted for 73.2 per cent, 12.0 per cent, and 15 per cent respectively of the total commercial energy consumption in the year 1990/91. Table 1 indicates that the average growth rate of electricity consumption is relatively higher (12.3%) than that of petroleum fuel (7.6%) and coal (5.8%).

All the petroleum products and coal consumed in Nepal are imported. Over 85 per cent of the commercial energy used in 1990/91 was imported and the remaining 15 per cent came from domestic sources (i.e., electricity). The total import of POL products increased from 75,019 MT in 1979/80 to 231,847 MT in 1990/91. Diesel was dominant among imported POL products followed by kerosene and petrol. The share of diesel in total POL products increased from 29 per cent in 1979/80 to over 45 per cent in 1990/91.

A large share of the country's foreign exchange earnings from export is spent annually on the import of POL products. For example, the value of POL product import increased from Rs 193.9 million in 1979/80 to Rs 3,025.6 million in 1991. In other words, the value of import of POL fuel as a percentage of merchandise export almost doubled during this period from 21.8 per cent to 40 per cent, and this financial burden is expected to increase over time with growth in the overall economy. It is evident from the table that the share of POL products in the total commercial energy consumption slightly declined from 76 in 1980 to 73 per cent in 1991, whereas the share of electricity was increasing. In other words, the consumption of electricity was growing at a faster rate (12.35%) than petroleum fuel (7.64%) and coal (5.8%). The consumption of electricity in 1991 was 72 thousand TCE compared to 20 thousand TCE in 1980. Rapid urbanisation has led to further increase in the demand for electricity.

Sectoral Consumption of Energy. Table 2 presents the sectoral consumption pattern of both traditional and commercial energy during the 1981-1989 period. The total consumption of energy in 1989 was estimated to be 6,006 thousand tonnes of oil equivalent (TOE) of which about 95 per cent was consumed by the domestic sector and the rest by other sectors like industry (1.8%), commerce (0.9%), transport (1.78%), and agriculture (0.2%). Over ninety per cent of the total energy use in the domestic sector was accounted

for by traditional sources and its share almost remained stagnant over the period. The average annual growth rate of energy consumption in this sector was 7.4 per cent during the 1981-1989 period. Energy consumption in the commercial sector registered the highest growth rate (15.7%), followed by the agricultural sector (12.7%), and industry (9.3%). The lowest growth rate was recorded in the transport sector (5.2%). The relative share of traditional energy was steadily declining in the commercial sector at an annual rate of eight per cent, whereas the opposite prevailed in the industrial sector. Transport and agricultural sectors consumed only commercial energy. Further details of the sectoral energy consumption pattern by type of energy and annual growth rates are presented in Table 3.

Energy Use in the Manufacturing Sector. The industrial sector's share of the total energy consumption was less than two per cent. In 1989, of the total energy consumption by this sector, about 50 per cent was derived from traditional sources and the remaining from commercial sources, namely, petroleum products (8.3%), coal (27.7%), and electricity (13.8%). The average growth rate of traditional energy is about 12 per cent compared to nine per cent growth in the case of commercial energy. Among the different types of commercial energy sources, electricity consumption registered the highest growth rate (17%), followed by petroleum products (8.6%), and coal (5.6%) during the same period. The overall energy consumption in this sector is growing at the rate of 10 per cent per annum. Most of the non-commercial fuel was consumed by bricks and tile manufacturing industries, sugar refineries and carpet and rug industries. The share of fuelwood and coal in the total consumption of energy by this sector remained almost stagnant at 41 per cent since 1980 (see Figure 2).

Table 2: Share of Energy Consumption by Sectors and by Major Sources of Energy in %

Sectors	1981	1982	1983	1984	1985	1986	1987	1988	1989	Growth
Domestic:										
Traditional	98.81	98.90	98.84	98.77	98.67	98.81	98.72	98.70	98.78	-0.00
Commercial	1.19	1.10	1.16	1.23	1.33	1.19	1.28	1.30	1.22	0.39
Total	95.64	94.73	94.47	94.04	94.14	95.40	95.30	94.86	95.24	-0.05
Industry:										
Traditional	41.51	56.96	55.56	40.87	43.64	56.93	45.87	46.85	50.00	2.35
Commercial	58.49	43.04	44.44	59.13	56.36	43.07	54.13	53.15	50.00	-1.94
Total	1.57	2.26	2.31	2.80	2.61	2.43	1.89	1.87	1.80	1.69
Commercial:										
Traditional	50.00	67.86	65.52	58.82	56.76	48.15	26.09	24.53	25.86	-7.91
Commercial	50.00	32.14	34.48	41.18	43.24	51.85	73.91	75.47	74.14	5.05
Total	0.53	0.80	0.83	0.83	0.88	0.48	0.80	0.89	0.97	7.69
Transport:										
Commercial	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Total	2.11	2.03	2.22	2.14	2.16	1.42	1.85	2.19	1.78	-2.07
Agriculture:										
Commercial	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Total	0.15	0.17	0.17	0.19	0.21	0.27	0.16	0.19	0.22	4.84
All Total:										
Traditional	95.42	95.52	95.19	94.51	94.52	95.88	95.16	94.72	95.22	-0.03
Commercial	4.58	4.48	4.81	5.49	5.48	4.12	4.84	5.28	4.78	0.54
Quantities ('000 TCE)										
All Total:										
Traditional	3217	3335	3338	3883	3987	5400	5492	5617	5719	7.46
Commercial	154	156	169	226	231	232	279	313	287	8.07
Grand Total	3371	3491	3507	4109	4218	5632	5771	5930	6006	7.49

Source: Water and Energy Commission 1989

Note: Within each sector the traditional and commercial shares are based on total sectoral consumption. The total share within a sector is the share of the sector's energy consumption relative to all Nepal.

Figure 2
Share of Energy Consumption: By Sectors

