

10. Energy and Forestry

Energy

- 10.1 Energy consumption in FY 2005/06 decreased by 1.67 percent to 8,478 Tons of Oil Equivalent (TOE) compared to FY 2004/05. In the first eight months of FY 2006/07, 5,652 TOE energy was consumed.
- 10.2 Energy is divided into three categories according to its source viz., traditional, commercial and renewable; in FY 2005/06, traditional, commercial and renewable energy occupied 85.5 percent, 13.54 percent and 0.61 percent respectively of the total energy consumption, where as in the first eight months of FY 2006/07, such ratios were 85.85 percent, 13.55 percent, and 0.6 percent respectively. This indicates that the dependency of Nepali economy on the traditional source of energy has not changed.
- 10.3 On the natural energy side, share of fuel wood consumption was 88.68 percent, agriculture residue 4.85 percent and animal residue 6.47 percent and the pattern of such consumption in the first eight months of FY 2006/07 remain the same. On the commercial energy side, share of petroleum products was 58.54 percent; coal 22.74 percent and electricity consumption was 18.81 percent of the total consumption of energy in FY 2005/06. While consumption of such energy in the first eight months of FY 2006/07 was 58.48 percent, 27.72 percent and 18.80 percent respectively of petroleum products, coal and electricity respectively.
- 10.4 Of the total energy consumption by sector in FY 2005/06, the share of household consumption was 89.21 percent, industrial use 4.51 percent, commercial use 1.51 percent, transportation use 3.71 percent and agriculture and other uses account for 0.81 percent and 0.21 percent respectively. Share of such energy consumption in first eight months of FY 2006/07 is expected to be 89.21 percent, 4.51, 1.51, 3.71, 0.81 and 0.21 percent for household consumption, industrial use, commercial use, transportation use, agricultural use and others respectively.

Electricity

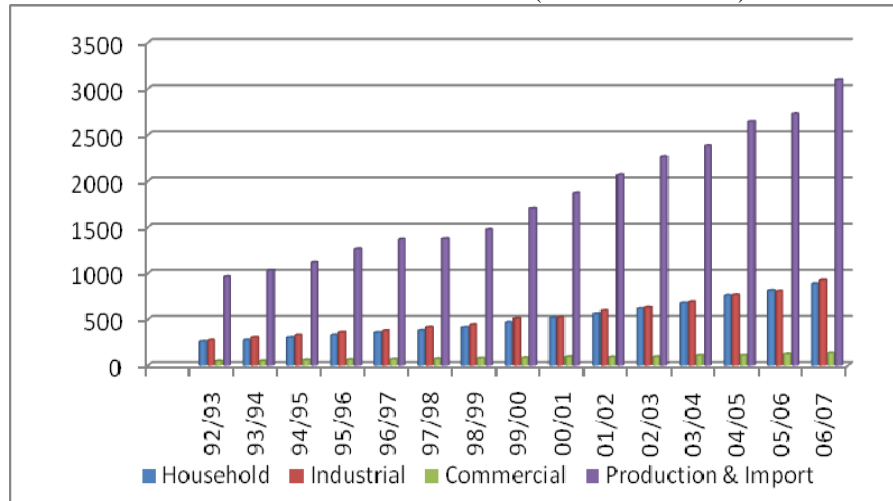
- 10.5 At the end of FY 2005/06, a total of 556.4 MW of hydropower (0.67 percent of total potentials) was generated from various power projects. Out of total generated hydropower, 550.225 Mega Watt is connected in national grid and remaining electricity generated by other medium hydropower centers is providing this service various local areas. Similarly, energy produced from thermal power plants and solar plants has been 55.028 MW and 100 kW respectively. This adds up to 611.529 MW of total energy production. As of now, all 75 districts have access of electricity facility.
- 10.6 In the course of adding hydropower production, construction of Middle Marsyangdi Hydropower project (70 MW) in Lamjung district, with the financial support from the government of Germany, is nearing completion. Chameliya hydropower project (30 MW) in Darchula district of Far West and Kulekhani III hydropower project (14 MW) in Makawanpur district are going ahead for the start up of production. To supply reliable electricity in Humla and Mugu districts, where solar power is the only source of electricity, two small power projects, Heldung (500 KW) and Gamgad (400 kW) are under construction.
- 10.7 As in the previous years, it is satisfactory to see private sector's enthusiasm on the production of electricity. Electricity projects under private sector are gradually coming under operation.

Projects like Khudi (3.45 MW) and Baramchi (999 kW) came into operation. Sali River (232 kW) and Pheme Khola (995KW) will come under operation after completing their construction by the end of this fiscal year. Similarly, power purchase agreements have been concluded for the purchase of power generated from Lower Chaku (1.765 MW), Seti II (979KW), Ridi Khola (2.4 MW), Narayani Shankar biomass (500 kW), Mai Khola (2.4 MW) and Phawa Khola (2.079 MW). Construction of Sisne Khola (750 kW), Thopal Khola (1.4 MW) and Lower Nyadi (4.5 MW) are under way of which power purchase agreements have been signed.

- 10.8 In the process of electrification, high- voltage transmission line 132 k.v.in 2076 circuit km, 66 kV in 586 circuit km, 66 kV under ground cable in 7 circuit km and 33 kV capacity 2485 km lines were brought under operation at the end of FY 2005/06. Currently, 132 kV Parwanipur-Pathalaiya (20 km), 33 kV Ilam-Phidim- Taplejung (90 km), Sitalpati-Musikot (50km), Buipa-Okhaldhunga (29km), Chinchu-Rakam-Jajakot (70KM), Ghorahi-Holeri (45km), Udipur-Beshishar- Manang (90km), Dipayal-Sanfebagar-Manma-Jumla (100 km) and Dhankuta-Hile-Leguwa- Bhojpur (50 km) are under construction. As per the mutual understanding reached with India for the increase of power exchange from the present capacity of 50 MW, construction of transmission lines at the four border points are being planned. Accordingly, necessary study and preparation works are under way for the construction of transmission lines of 400 kV capacities at Duhabi-Jogbani, Butawal-Sunauli, Dhalkewar- Bhattamod and Anarmani- Kakarvitta. In order to strengthen the capacity of Kathmandu valley due to growing urbanization, construction of Thankot-Chapagaon-Bhaktapur 132 kV transmission line supported by the loan from the Asian Development Bank, is nearing completion. Construction of Khimti- Dhalkebar 220 kV transmission line (75km) has begun with the financial support from the World Bank. Electricity generated from Khimti, Bhoté Koshi hydropower plants and would be other future power projects in Sindhupalchowk and Dolakha area will be distributed through this transmission line.
- 10.9 Expansion of electrification in all districts is continuing, where electricity is available, from the Government of Nepal and the Nepal Electricity Authority's own resources. The first phase of electrification has been completed and the second phase is under construction in Kailali and Kanchanpur districts with the grant assistance from Denmark. The electrification in additional 27 districts is on with the Asian Development Bank's support. Preliminary works have begun for the electrification in additional locations of districts including Bhaktapur, Lalitpur, Nuwakot, Dhading and Kavrepalanchok after signing agreement with the World Bank for financial support.
- 10.10 In the process of expansion of electrification, works are under way to electrify 135 thousand households with the involvement of 149 community organization under the Community Rural Electrification Program.
- 10.11 Several works are under way for conducting feasibility and detailed study of hydropower projects. Identification of other potential source of energy is being done to meet the demand for energy. The need of implementing reservoir type of hydropower projects has been felt to reduce seasonal imbalance of supply of and demand for electricity. Thus, efforts are continued to arrange fund for the detailed study for Upper Seti (122 MW) reservoir type project, which is found attractive so far from the study carried out. Likewise, pre-feasibility study for Uttar Ganga (Baglung) and Nalsiaugadh (JaJarkot); and first phase of Seti- Trisuli project (Tanhu) has been completed, in the context of identifying and conducting attractive reservoir type projects. Funding arrangement is being explored, detailed design works are underway for the

infrastructure, and access road is under construction for the Upper Tamakoshi hydropower project. Feasibility is being carried out for Upper Trisuli III (A) and Upper Trisuli III (B).

Chart 10 (A): Production and Consumption of Electricity
(In 1 million GWH)



10.12 The total supply of electricity in FY2005/06 was 27,77.41 Gega Watt Hours (GWH) including production of electricity from hydropower 2495.09 GWH, thermal power 17.1 GWH and 266.22 GWH import from India. Out of this, 1965.3 GWH and 101 GWH was consumed internally and exported to India respectively. Where as in FY 2006/07, the total supply of electricity is expected to reach 3094.6 GWH, which includes production of hydropower 2687.6 GWH, thermal power 27 GWH and 380 GWH import from India. Out of the total expected power supply in FY 2006/07, internal consumption and export to India is expected to be 2197.342 GWH and 165 GWH respectively.

10.13 While analyzing the sector wise consumption of electricity in FY 2005/06, it is found that industrial sector consumed 38.88 percent, household 39.21 percent, commercial sector 5.97 percent, and export 4.89 percent and 11.05 percent was consumed by other sector. Likewise in FY 2006/07, it is estimated that industrial sector consumes 39.18 percent, household 37.44 percent, commercial sector 5.65 percent, export 6.98 percent and other sector is estimated to consume 10.75 percent of total power supply.

10.14 The number of power consumer is increasing every year. This number is estimated to increase by 9.54 percent from 12,79,902 in FY 2005/06 to 14,02,000 in FY 2006/07.

Petroleum Products

10.15 In FY 2005/06, consumption of petroleum products declined by 4.28 percent totaling 670 thousand 275 kilo liter (kl) and the consumption of L.P.Gas increased by 4.39 percent and reached at 81 thousand 500 metric ton. During the first eight months of FY 2005/06, consumption of petroleum products and L.P. Gas was 456 thousand 214 kl and 51 thousand 217 metric ton respectively. Where as during the same period in FY 2006/07, consumption of petroleum products declined by 6.58 percent to 426 thousand 179 kl and consumption of L.P.Gas increased by 9.31 percent to 59 thousand 32 metric ton.

- 10.16 Diesel, kerosene, petrol and aviation fuel occupy major share of consumption of petroleum products. In FY 2005/06, out of the total consumption of petroleum products except L.P.Gas, share of diesel, kerosene, petrol, and aviation fuel was 43.91 percent, 33.81 percent, 12.08 percent, and 9.59 percent respectively. In the first eight months of FY 2006/07, share of diesel consumption was 44.10 percent, petrol 14.86 percent, kerosene 30.26 percent, and aviation's share of consumption remained at 10.15 percent.
- 10.17 Nepal Oil Corporation (NOC) is the sole entity dealing the petroleum products. NOC has got storage capacity of 70,898 kl, which is sufficient for 25 days consumption on average. Thus storage capacity needs to be increased considering the increased trend of consumption and to meet the target set at 100,000 kl storage capacity by the tenth five-year development plan. Sixty-five percent of the total consumption of petroleum products comes from Raxaul based depot of Indian Oil Corporation. Considering the existing loading capacity of Raxaul depot and traffic congestion of different vehicles along Raxaul –Birgunj customs area, it is indispensable to consider for an alternative means of transportation of petroleum products.
- 10.18 Nepal Oil Corporation is running losses due to its inability to adjust price according to price change in the international market in FYs 2005/06 and 2006/07. As a result, NOC has not been able to invest for infrastructure development rather engaged only in storage of imported petroleum products and in sales distribution.

Coal

- 10.19 Consumption of coal in FY 2005/06 increased by 71.71 percent to 261 ton oil energy equivalent (TOE) as compared to preceding fiscal year. During the first eight months of FY 2006/07 coal consumption has reached to 261 TOE.

Alternative Energy

- 10.20 With the objectives of helping particularly rural people; for the improvement of their socio-economic status, maintain regional balance and to minimize environment degradation in the rural area due to deforestation; through sustainable development, distribution and operation of small industries and business; Nepal government is implementing various activities through Alternative Energy Promotion Center (AEPC). AEPC provides support and advise to the government in devising policy on alternative energy promotion, prepares long-term and short-term programs, helps implement programs through coordinating energy related organizations, controls quality, regulates, monitors and evaluates programs.
- 10.21 In an effort to support for the sustainable rural development and protect environment through maximum use of renewable energy such as biogas, micro-hydro, solar energy, improved stove, wind power and improved water mill, government has been providing grant subsidies for some time. Now the government has prepared Renewable Energy (Rural) Subsidies Management, 2063, after revising the earlier system of subsidies in order to further enhance development impact, provide quick and easy service and increase access of socially backward and rural people. Renewable Energy Subsidies Operation Manual, 2063, is under implementation for the smooth management of subsidies.
- 10.22 Rural Energy Fund, established to manage funds received from the government of Nepal and foreign donors, under the AEPC is in operation. This fund has helped to increase rural people's access, particularly providing electricity services in the areas where electricity has not been connected with the national grid. With the supply of electricity through this program there has

been significant improvement in living standard of the people, income and employment has increased, health and education level has also improved.

- 10.23 With the objective of protecting environment by reducing dependency on traditional energy and providing access of fair and reliable energy; increasing employment and productivity through rural energy development and improving life style of rural peoples connecting rural energy with social and economic activities, Rural Energy Policy, 2063 has been approved by the government and is in effect. This policy is expected to contribute to the protection of environment and reduce poverty by increasing fair, reliable and appropriate energy access to rural area.
- 10.24 In the context of tremendous expansion, protection and development of renewal and alternative energy programmes, Alternative Energy Promotion Development Committee has been reconstituted to give more autonomy by increasing the number of members representing private and non-governmental organization. With this amendment, it is expected that the committee will play an important role in fast and sustainable development of energy sector.
- 10.25 With the objective of sustainable technology development by institutional reforms of renewal and alternative energy sector, Agreement with the governments of Norway and Denmark will be signed for the implementation of second phase of Energy Sector Program for five years. The main objective of this program is to strengthen institutions of renewable and alternative energy for sustainable development of energy.

Bio-gas

- 10.26 The number of biogas plants decreased by 3 percent from 2,330 in the first eight months of FY 2006/07 to 2,262 during the same period of FY 2005/06. With a view to provide easy access of biogas to poor people and help produce clean and hygienic cooking gas and quality compost manure from slurry, a biogas credit unit has been established at AEPC. This unit provides prompt and easy credit service at a concessional rate of interest for the construction of biogas plants.

Table 10 (a): Status of Alternative Energy/ Biogas

S.N.	Activities	Progress in FY 2005/06	Progress in the first eight months of FY 2006/07
1.	Distribution of Solar dryer / Cooker (in number)	150	279
2.	Installation of biogas plant (in number)	18,000	2,262
3.	Installation of improved stove (in number)	40,000	13,670
4.	Installation of domestic solar system (in number)	20,000	9,859
5.	Installation of improved water mill (in number)	1,200	306
6.	Production of Micro- Hydro Power (KW)	2,075	1,042.15
7.	Installation of solar drinking water and micro irrigation (in number)	162	-

Source: Ministry of Environment, Science and Technology.

Forest

- 10.27 Community and leasehold forestry program in an integrated manner is under implementation to help maintain social empowerment, gender equality, social justice, equity and good governance. To increase broad base of economic growth through community forestry

programmes and the policy of increasing involvement of backward women and Dalit in community forestry by maintaining social empowerment; gender equality; social justice and equity and good governance, women's participation in the community forestry program has increased.

- 10.28 A forest management action plan is under implementation. This action plan was enacted with a view to raise public revenue and national production through scientific management of forest and optimal utilization of forest resources. Similarly, a five year forestry action plan is approved and implemented in the current fiscal year to increase the productivity of the forestry sector through proper sales and distribution of forest product and scientific management of it.
- 10.29 The system of ensuring active participation of local stakeholders while identifying and planning the programs of community forestry, leasehold forestry and partnership forestry is being practiced. Different forestry development projects are being implemented to conserve environment and develop different forest species. Such projects include; Sindhu-Kavre Forest Development Project, National and Leasehold Forest Development Program (12 districts), Community Forest Development Program (38 districts), Livelihood Forest Development Program (15 districts), Dolakha-Ramechhap Community Forest Development Project and Hill Leasehold Forest and Pasture Development Project. Similarly, different soil-conservation and watershed management projects are under implementation in order to maintain eco-balance, conserve biodiversity and secure habitat for water creatures.
- 10.30 Considering the importance of conservation and development of available and endangered type of medicinal herbs and plant resources, several research, conservation, sustainable development type of activities are being implemented with people's participation.

Box 10 (a): Forest & Plants Conservation and Development Programs at a glance	
1.	Community Forest Development Program (38 districts) <ul style="list-style-type: none"> • Users Group-231 • Forest transfer after the preparation of action plan-258
2.	Leasehold Forest and Livestock Development Program <ul style="list-style-type: none"> • Leasehold Forest Area Demarcation - 106 km.
3.	National and Leasehold Forest Program (12 districts)
4.	Livelihood Forest Program (15 districts)
5.	Dolakha- Ramechhap Community Forest <ul style="list-style-type: none"> • Users Group Formation-14 • Forest Action Plan and Forest Transfer-6
6.	Sindhu-Kavre Forest Development Project <ul style="list-style-type: none"> • Users Group Formation-20 • Forest Action Plan and Forest Transfer-3
7.	Churia Forest Development Program (3 districts) <ul style="list-style-type: none"> • Users Group Formation-26 • Forest Action Plan and Forest Transfer-42
8.	Forest Promotion and Tree Improvement
9.	Hills Leasehold Forest and Pasture Development <ul style="list-style-type: none"> • Leasehold Forest Area Demarcation-153 km.
10.	Natural Resource Management Governance Program <ul style="list-style-type: none"> • Users Group Formation-50

- 10.31 Emphasis will be given for the research and development of plant resources. Research on appropriate technology and data collection on highly important but endangered medicinal

herbs and their genetic species will be carried out. These products shall be developed and conserved in the Himalayan and hilly regions as a main source of employment and income. For such purpose production, processing and market arrangement of medicinal herbs will be undertaken as a national program with the involvement of concerned agencies and private sector.

- 10.32 The 298 square km area of Parsa Wild Life Conservation has been declared as preserved Area, within the conservation area program.

Challenges

- 10.33 Considering the growing ecological imbalance due to increased pressure on natural resources and deforestation, electricity services have to be provided to people easily and quickly at fair price, by completing ongoing power projects as early as possible. It is expected that such action will mitigate the associated risk, but a challenging task.
- 10.34 Major source of alternative energy available in country such as biogas, micro-hydropower, solar energy and wind power has not been fully utilized. Inadequate source of financing and deteriorating peace and law and order situation have contributed to this problem. Arranging sufficient fund and maintaining law and order and restore peace is a challenge.
- 10.35 It is a challenging task to produce sufficient amount of energy to meet the domestic demand, increase import and to support to the national economy while exploring technology that helps to reduce the cost of production, and using available resources judiciously.