

10. Energy and Forestry

Energy

- 10.01 Energy consumption in FY 2006/07 compared to that in FY 2005/06 decreased by 15.2 percent to 7,159 Tons of Oil Equivalent (TOE). This consumption in the first eight months of FY 2007/08 is 6,572 TOE compared to 5,653 TOE in the same period last year.
- 10.02 Classifying the energy source into three categories--conventional, commercial, and renewable--their consumption ratios in FY 2006/07 were 84.3 percent, 15.0 percent, and 0.7 percent respectively. The ratios were 85.0 percent, 14.4 percent and 0.6 percent respectively in the first eight months of FY 2007/08. This shows the increasing dependence of the Nepalese economy on the conventional energy in this year, too, as in the previous years.
- 10.03 In FY 2006/07, energy consumption from the wood fuel source was 85.9 percent, from agriculture residue 5.8 percent, and from livestock residue 8.3 percent. The ratios of fuel wood, agriculture residue, and livestock residue in the first eight months of FY 2007/08 were 88.3 percent, 4.8 percent, and 6.9 percent respectively. On the commercial energy side, of total consumption of energy in FY 2006/07, the share of petroleum product was 65.9 percent, coal 16.0 percent, and electricity 18.1 percent. The ratio of petroleum products, coal, and electricity in the first eight months of FY 2007/08 remained 68.2 percent, 17.6 percent, and 14.2 percent respectively.

Electricity

- 10.04 By the end of FY 2006/07, a total of 560 MW electricity was generated from various hydro-power projects. Out of the total hydropower generated, 555 MW electricity is connected with the national grid whereas the electricity produced from small hydropower stations not connected with national grid is providing electricity facility at the local level. Similarly, including a total of 55 MW electricity produced from thermal power stations and 100 KW from solar plants, the total electricity production has reached 615 MW.

- 10.05 During the first eight months of FY 2007/08, the construction work at Mid-Marsyangdi Hydro Power Project (70 MW) in Lamjung district assisted by the Government of Germany is in the final stage. Similarly, the construction work of Chameliya Hydro Power Project (30 MW) in the far-western Darchula district and Kulekhani Third Power Project (14 MW) in Makawanpur district are underway. For Upper Tamakoshi Project, fund raising activity has been initiated whereas its feasibility study is still ongoing. Gateway construction of the project is underway. The construction of Heldung and Gamgadi small power projects of 500 KW and 400 KW respectively was continuing in order to provide better electricity facility to the solar-power dependent Humla and Mugu districts. The Heldung Small Project is expected to be completed by FY 2007/08.
- 10.06 Private sector's participation in hydropower production remained encouraging this year, too. The projects developed by the private sector are gradually coming into operation. Thoppal Khola (1.65 MW), Sisne Khola (0.75 MW), Shali River (0.232 MW) and Phemekhola (0.995 MW) projects have been completed and have come into operation. Patikhola (0.996 MW) will come under operation by the end of FY 2007/08. Similarly, Power Purchase Agreements (PPAs) have been made for the purchase of power generated from Belkhu (0.32 MW), Upper Haandikhola (0.991 MW), Siurikhola (0.99 MW), Hewa khola (2.4 MW) and lower Piluwakhola (0.99 MW). Construction work of Ridikhola (2.4 MW), Mardikhola (3.1 MW) and Upper Haandikhola (0.991 MW) is underway.
- 10.07 In the process of extending electrification, high voltage transmission lines of 132-KV 2076 circuit km, 66-KV 586 circuit km, 66-KV underground cable 7 circuit km, and 32-KV 2,485 km are in operation by FY 2006/07. Currently, Parwanipur-Pathlaiya (20 km), Ilam-Phidim-Taplejung (90 km), Sittalpati-Musikot (50 km), Buipa-Okhaldhunga (29 km), Chhinchu-Rukum-Jajarkot (70 km), Ghorahi-Holeri (45 km), Udipur-Beshishar-Manang (90 km), Dipayal-Sanfegar-Manma-Jumla (104 km), Dhankuta-Hile-Leguwa-Bhojpur (50 km) transmission lines under 132 KV are under construction. As per the policy-level agreement of increasing the existing import and export rate of 50 MW electricity with India, it has been targeted to set-up transmission lines in additional 3 points of Nepal-India border. Accordingly, the necessary

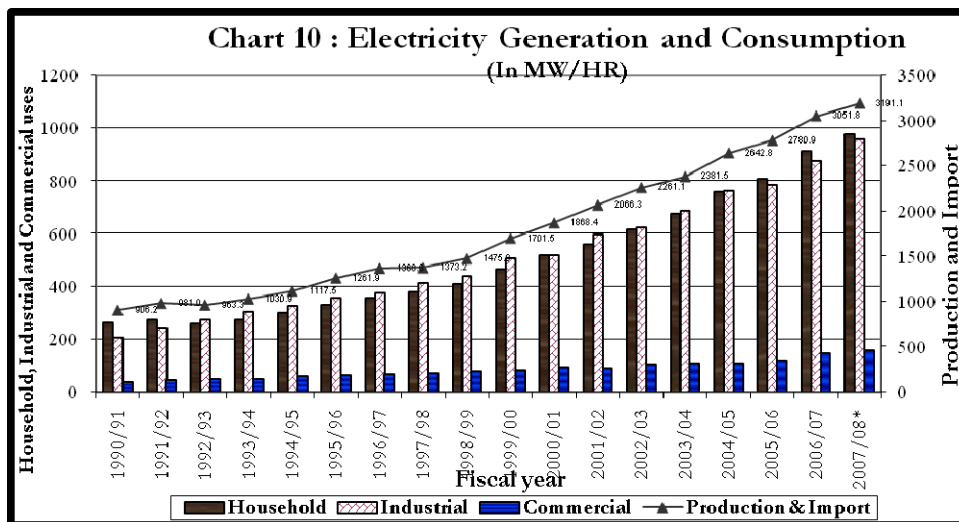
preparation and studies are underway to construct the transmission lines of 400 KV capacities in Duhabi-Jogbani, Butwal-Sunauli and Dhalkebar-Bhittamod. Out of these, construction of Dhalkebar-Bhittamod transmission line has been targeted to start within the current fiscal year. To strengthen the power supply capacity of the Valley to cope with the increasing urbanization, the construction of the Ringmen 132 KV capacity transmission line in Thankot-Chapagaun-Bhaktapur with the financial assistance of the ADB is in the final stage. To transmit the power from existing Khimti Hydor Power and other projects of the area, the construction of 250 KV Khimti-Dhalkebar (75 km) transmission line with the financial assistance of the World Bank is under construction.

- 10.08 Extending electrification has been continuing in all the districts where electricity facility has been provided by the GON and NEA on their own resources. Denmark Government-assisted first phase electrification program in Kailali and Kanchanpur districts has been completed. The second phase electrification is about to complete in these districts. Electrification with the assistance of the ADB in other 27 districts is in the final stage. Similarly, the World Bank has assisted this program in additional areas of Bhaktapur, Lalitpur, Nuwakot, Dhading and Kavrepalanchowk districts.
- 10.09 Extending electrification is underway through Community Rural Electrification Program based on public participation with the involvement of 149 organizations from which 135,000 households will be benefited.
- 10.10 A number of other activities have been undertaken regarding the feasibility and detailed study of hydro-power projects. Continued effort has been made to identify projects that could meet the increasing demands of the hydro power. To avoid the seasonal imbalance in the demand and supply in the national electricity system, it is mandatory that reservoir types of projects should be well-executed. For the same, an attempt has been made to increase the fund for the feasibility study of Upper Seti reservoir type project which has 122 MW production capacity. Feasibility study of Upper Trishuli Third (A) and Upper Trishuli Third (B) is ongoing. The periodic study of Rahughat Hydro Power Project being constructed with the assistance of India is also ongoing. The in-depth study of other alluring reservoir-type projects including Nalsiyaugad, Madi-

Ishaneshwor and Seti-Trishuli Water-Lake Projects has been started.

- 10.11 Out of the total 3050.82 GWH of power supply in FY 2006/07 (hydropower production 2708.68 GWH, thermal power production 13.31 GWH, and 328.83 GWH coming from India), 2,179.89 GWH was consumed domestically and 78.25 GWH was exported to India. In FY 2007/08, 3,191.108 GWH power supply is estimated, out of which will be 2,747.608 GWH from hydropower, 28.5 GWH from thermal power, and 415.0 GWH to be imported from India. Out of this, 2,361.048 GWH is estimated to be domestically consumed and 60.0 GWH is estimated to be exported to India.

Chart 10(a) : Power Production and Consumption



- 10.12 While analyzing the sector-wise consumption of electricity in FY 2006/07, it is found that industrial sector consumed 38.8 percent, household 40.0 percent, trade and commerce 6.4 percent, export 3.5 percent and other sectors 10.9 percent. Likewise, in FY 2007/08, it is estimated that industrial sector consumes 39.6 percent, household 40.4 percent, trade and commerce 6.5 percent, export 2.5 percent and other sectors 11.0 percent.

- 10.13 The number of power consumers is on rise every year. There were 1.39 million households recorded by the end of FY 2006/07 and are estimated to increase by 10.1 percent, reaching 1.53 million households by the end of FY 2007/08.

Petroleum Product

- 10.14 The consumption of petroleum products in FY 2006/07 had increased by 0.7 percent to reach 674,783 kiloliters while L.P. gas had increased 15.5 percent to 93,562 MT. During the first eight months of FY 2006/07, the consumption of petroleum product and LP Gas was 426,179 kiloliter and 48,521 MT respectively. While the consumption of petroleum products decreased by 1.35 percent to 420,417 kiloliters, it has increased by 29.8 percent to 62,964 MT of LP gas in the first eight months of FY 2007/08.
- 10.15 The major portion of the consumption of petroleum products is covered by diesel, kerosene, petrol and air fuel. Their respective ratios remained at 47.0 percent, 15.0 percent, 25.6 percent, and 11.0 percent in the first eight months of FY 2007/08 compared to 45.5 percent, 29.3 percent, 15.1 percent, and 9.5 percent respectively in FY 2006/07.
- 10.16 NOC, the only authorized dealer of the petroleum products, has the storage capacity of 70,898 kiloliters. This capacity is enough for about 25 days considering the magnitude of the average consumption. However, considering the increasing average consumption, the storage capacity needs to be increased. Similarly, out of the total consumption of the petroleum product across the country, 65 percent is imported from Raksaul Depot of Indian Oil Corporation. Considering, the present loading capacity of Raksaul Depot and the heavy traffic from Raksaul to Birgunj customs area, it has been very essential to look at the alternative ways for the petroleum supply.
- 10.17 The NOC was at loss in FY 2006/07 and FY 2007/08 for not reviewing the rate of petroleum products as per the price hikes in the international market. Because of this, the NOC has not been able to develop any of its physical infrastructures except discharging its responsibility of import, storage and distribution.

Coal

- 10.18 The consumption of coal in FY 2006/07 compared to the figure in the previous year had decreased by 34.1 percent to a level equivalent to 172 TOE. Comparing the coal consumption in the first eight months of FY 2007/08 with that in the same period in FY 2006/07, the coal consumption decreased by 4.6 percent to an equivalent of 166 TOE.

Alternative Energy

- 10.19 With the objectives of supplying energy to rural areas by developing sustainably alternative renewable energy technology in Nepal, bringing about socio-economic change in the status of the rural people by operating small industries through such technology, helping to maintain the regional balance in developing and minimizing environmental problems arising from deforestation in rural areas, the GON established Alternative Energy Development Centre in 2053 BS. The Centre assists and suggests the government in making policies on the alternative energy technology. Other tasks of the Centre include developing short-term and long-term plans; executing those plans in coordination with other energy-related organizations and supervising, evaluating and controlling quality of the programs.
- 10.20 To manage and duly utilize the economic resources received from the GON, Danish government and Norwegian government for the solar and micro-hydropower projects, Rural Energy Fund has been established and is functioning well. This Rural Energy Fund also makes coordination with other banks for the necessary financial support. The Fund has helped in expanding the rural people's access, especially in new and sustainable energy system in those areas where electricity has not reached through National Electricity Power Transmission. This has, thus, helped in making a notable improvement in the people's life-style with their improved status in health, education and in income-generating activities.
- 10.21 The concept of Clean Development Mechanism (CDM) has been brought forward as a policy with due importance to address the economic difficulties in the field of renewable energy and to give continuation to related programs. In this regard, two of the bio-energy production programs have been registered at the CDM Executive Board. According to Article 12 of the Kyoto Protocol, under CDM, for minimizing the externality effects after the establishment of bio-gas plant and micro hydropower project in Nepal, the purchase-sale agreement has been signed with the World Bank Carbon Fund for Community Development. As per the agreement, the help of 7 dollars per CER in bio-energy and 10.25 dollars per CER for micro-hydropower programs will be received. Currently, Nepal will receive the grant of about US\$ 672,000 annually given the number of 19,396 gas plants registered.

Similarly, the process of developing the improved water mill as a carbon project has been started. The project idea note has been issued in this regard.

- 10.22 Renewable Energy Grant Policy 2057 BS and Renewable Energy Grant Mobilization Procedures 2057 BS were not found relevant for reducing poverty by providing the rural people with low income opportunities to use renewable energy and giving priority to the use of the resources and technologies for the alternative and renewable energy in the rural areas. So, to increase the access of the people and to bring them as the end users, Renewable (Rural) Energy Grant Provision 2063 BS and Renewable (Rural) Energy Grant Mobilization Procedures 2063 BS have been approved by the GON and have come into effect.
- 10.23 In the context of not having a comprehensive national policy for the development of alternative and rural energy technologies in Nepal, Rural Energy Policy 2063 BS has been approved by the GON and has come into effect. This is aimed at developing and extending the rural energy and helping poverty alleviation. According to the policy, there were energy development programs with the financial assistance of the UNDP and the World Bank. Under the Rural Energy Development Program DDC remained as Rural Energy and Environment Branches and, till FY 2006/07, 25 districts were covered under this program. At present, steps have been taken to extend the program to 40 districts with the upgrading of the projects as the District Energy and Environment Branch. Similarly, in 32 districts, District Energy and Environment Units will be established with the financial assistance of the UNDP. This has been introduced in 7 districts at present as pilot project whereas in other districts steps have been taken to form a unit and to appoint the manpower.
- 10.24 To ensure the easy access of rural community to the Renewable Energy Technology through the maximum exploitation of the resources, MOU has been signed with the Poverty Alleviation Fund, Practical Action Nepal and RWRMP.
- 10.25 To make the programs operated from the central level accessible to the poor people and to minimize the initial cost to link the technology and to provide easily and with low interest rate, the Renewable Energy Promotion Centre has been coordinating with various financial institutions. For the same, the Centre, making ties with National Cooperative Organization and through the members

of the latter, has made a plan to provide loan facility at the local level for energy technology.

Table 10(a) : Alternative Energy/Biogas Status in Nepal

S.N.	Activity Particulars	Progress of the first eight months of FY 2007/08
1	Solar dryer/cooker distribution (in Nos.)	688
2	Biogas Plant (in Nos.)	3025
3	Improved Chulo Plant (in Nos.)	9863
4	Homemade solar energy power system (in Nos.)	21686
5	Improved water mill plant (in Nos.)	795
6	Micro hydro-power production(KW)	960
7	Maintenance of old plants (in Nos.)	38612

Source: Alternative Energy Promotion Centre

Forestry

10.26 The GON has the policy of forest management with the following objectives (i) conserve forest, flora and fauna and bio-diversity which ensure sound environment and sustainable growth in the supply of forest products, (ii) ensure the social and economic empowerment of the poor community by ensuring their access and rights, (iii) support and uplift the industry and business based on the forest production and develop the home market as well as the export creating employment opportunity, (iv) help the equitable development by minimizing poverty through the fair distribution of forest products and generating income source of *Dalits*, indigenous people, *Janajatis*, *Madhesis*, disabled and all other marginalized men and women.

Box 10(a) : Forest Resource Data	
Forest Area	4.27 million ha (29 percent)
Shrubs area	1.56 million ha (10.6percent)
Total stem volume	388 million cubic meter

Sal family out of the total stem volume	28 percent
Total bio-mass	429 million ton
Average stem volume	178 cubic meter per ha
Average number of trees	408 per ha

Source: Ministry of Forest and Soil Conservation

- 10.27 For the long-term development of the forest areas to run the six primary development programs indicated by forestry development master plan and other six support-based development programs, Ministry of Forest and its related departments have continued various projects and programs in each fiscal year through the internal source of the government and through foreign aid. In this regard, a total of 34 projects and programs such as National and Leasehold Forest, Community and Private Forest, Ecological and Genetic Resource Conservation, Soil Conservation and Watershed Management, Herbs and Incense Plants and other Forest Related Programs are in operation in various districts.
- 10.28 In the country, 19.4 percent area has been declared as reserve area consisting of national parks, wild life reserves, protected area, hunting reserve and buffer area.

Box 10(b) : Forest at a Glance

<u>Community Forest</u>	
Community forest consumers' group	14,389
Area of the forest handed to community	12,25,993 ha
Benefitted household Nos.	16,54,529
Community forest managed by women	789
<u>Leasehold Forest</u>	
Leasehold Forest consumers' group	3180
Area of Leasehold Forest handed over	13414 (806 ha)
Benefitted household Nos.	24,362
Leasehold Forest(20 organizations)	32.35 ha
<u>Partnership forest</u>	
Pilot program conducted districts	Bara, Parsa, Rautahat
Partnership forest group Nos	3
Partnership forest area	6,670 ha

- 10.29 Under Community Forest Development Programs, 14,389 consumer groups have been formed so far and 1,225,993 ha forest area has been handed over. From this, 1,654,529 households have been benefited. By mid-March of FY 2007/08, 81 percent physical progress has been achieved.
- 10.30 Under Leasehold Forest and Livestock Development Programs, 3,180 consumer groups have been formed so far and 13,414 ha forest area has been handed over. From this, 24,362 households were benefited. By mid-March 2008, 88 percent physical progress has been achieved.
- 10.31 In bio-diversity programs in Terai and Shivalik areas, 76 percent physical progress has been achieved by mid-March 2008. Similarly, 19.4 percent of the total land has been declared as conservation area which includes national park, wildlife reserves, conservation area, hunting reserves, and buffer area. In the national park and wildlife reserve projects, 87 percent physical progress has been achieved by mid-March 2008. Under District Soil Conservation Program and Community Development and Forest Watershed Conservation Projects, 90 percent physical progress has been achieved by mid March 2008.
- 10.32 For the production, refinement and marketing of the herbs, coordination has been made between the concerned authority and the private sector to launch national program. The objectives of the program are (i) collecting data and carrying out research on the appropriate technologies of the most important and rare herbs and (ii) upgrading the employment in mountainous and hilly regions and promoting exports by conserving such plants and giving priority to their sustainable management. Hence, priority has been given to the research, development and utilization of the herbs.
- 10.33 Under the National Park and Wildlife Conservation Department and as per the legal provision of National Park and Wildlife Conservation Act 2029 BS, reserves and conservation areas have been established and managed well. So far, bio-diversity has been conserved in altogether 16 places which include 9 national parks, 3 wildlife reserves, 1 hunting reserve and 3 protected areas. As mentioned above 19.7 percent of the total land of the country is occupied by such national parks and reserves.

- 10.34 Although such national parks and reserves are to protect, conserve, promote and manage various wildlife and flora, they are also committed to uplift the lifestyle of the people living in the buffer areas. Considering the fact that conservation endeavors are for the betterment of the whole humankind (and so to make the local people benefit from it as far as possible) and considering also the fact that conservation programs become more effective with the cooperation from the local people. National Park and Wildlife Conservation Act, 2029 BS was amended and the provision of buffer area management was added. To produce and develop the forest resources necessary for the local people, wok-plans have been made with the direct participation of the consumers' group and, thus the resources have been utilized and conserved.
- 10.35 A policy has been made to mobilize increasing effective participation of the people in conservation work and ensure sustainable utility of the natural resources and bio-diversity. The policy incorporates- (i) establishing and extending the reserve areas as per necessity for the conservation of bio-diversity in such a way that the nation's ecological system would be represented, (ii) developing management plan and implementing it for the long-term conservation of the bio-diversity of the reserves (including buffer areas), (iii) devising policies for the conservation of the rare species and conserving, promoting and improving their homes, and (iv) mobilizing, conserving and managing corridors and connectivity, managing the ecological process, and bringing about the ecological services into human utility.
- 10.36 As a signatory to the International Treaties on Bio-diversity and Environment Conservation, a policy has been made to implement the treaties effectively and conserve, promote and utilize the wildlife with the active participation of the NGOs and individuals, thereby developing income and employment opportunities. A policy has been taken to increase public participation in the extension of parks, reserves, protected and buffer areas after conducting the feasibility study of the important areas from the viewpoint of bio-diversity conservation. Also, the policy is to let the NGOs and other organizations manage the reserves and develop this sector by establishing co-ordination with the concerned agencies engaged in the conservation of wetlands.

- 10.37 In this fiscal year, 81 spotted-deers have been successfully transferred to Parsa wildlife reserve from Godavari Deer Research Centre under Shivapuri national park. This will help attract the tourists in Parsa wildlife reserve. It is also believed to help increase the public awareness in conservation. Similarly, rhino census was conducted in Chitwan National Park that showed 408 rhinos there. In the process of declaring mid mountain and himal of Darchula district as protected area so that it could best represent the ecological system of mid-hill, feasibility study is ongoing covering the area of 21 VDCs. As a signatory nation of the Wetland Protocol, Koshi Tappu, Bis Hajari Lake, Ghodaghodi Lake, Jagadispur Reservoir, Gokyo Lake, Foksundo Lake, Rara Lake, Gosainkunda, etc. have been included in the wetland list.
- 10.38 As per the directive for the selection of the species, collection of seeds and production of nursery of various species of plants as demanded locally, 29,000 cane trees in 7 districts, 99,000 bamboo trees in 18 districts and 239,000 of herbs like peepla, timmur and Sajyun have been planted in 28 districts. So far, 200 bamboo plants have been produced in nursery through cutting technology. Similarly, to manage leasehold forest in the community forest, consumers have been identified, sub-groups have been formed and field officials have been imparted orientation training for such purpose in 194 community forests.

Challenges

- 10.39 There have been difficulties in introducing and implementing programs due to the damage caused in the physical infrastructure of various district forest offices.
- 10.40 Though biogas micro hydropower, solar power and air power are the major existing alternative energy sources in the country, Nepal has not been able to utilize them properly. Inadequate economic resource and lack of proper peace and security situation still remain the major challenges in this regard.
- 10.41 Hydropower sector, which is regarded as the most important sector from the perspective of economic development, has not been well-utilized and still a large number of people do not have access to it. Also, due to its high cost in the production, there is no possibility of exporting it either. Therefore, it has been a big challenge to meet the increasing internal demand and also promoting its export by

exploring the cost minimizing technology so as to help the national economy.

- 10.42 Petroleum price has been continuously rising in the international market and Nepal has not been able to revise its price. The NOC is at loss, resulting in a huge due to pay the India Oil Corporation. The supply constraint has posed a challenge in the import and in the storage and supply of the product.
- 10.43 Declaring 11 additional reserves as buffer areas has increased the responsibility of the management though there has not been adequate provision of manpower till date. So, there is difficulty in providing effective service in the buffer areas, which has affected the management of parks and reserves.
- 10.44 In the case of renewable energy project programs run with the financial assistance of EU, the programs should run through international tender as per the EU policy. This has created difficulty in achieving the objectives of the program. Due to the conflict and violence in the past, there has been difficulty in transporting alternative energy-related goods in time and in monitoring, evaluating and controlling the quality of the program.
- 10.45 The GON had mentioned, through the FY 2006/07 budget, that it would waive the VAT on the machinery and construction tools in the private sector's micro hydropower projects and small hydropower projects up to 3-MW capacities. This decision, however, could not be implemented due to various reasons. This has affected the development, extension and promotion of the micro hydropower projects.