

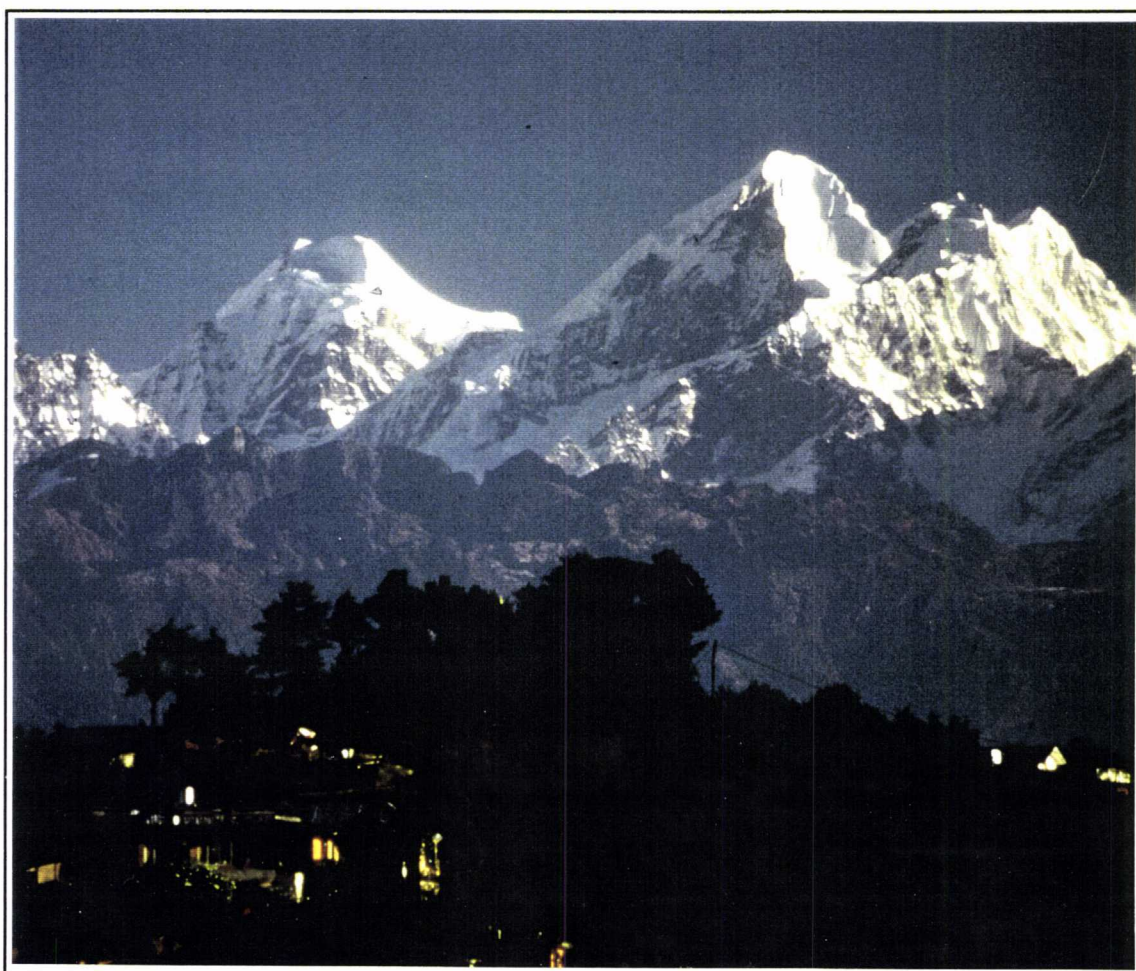
REPORT^{NO}

01-98



NVE
NORWEGIAN
WATER RESOURCES AND
ENERGY ADMINISTRATION

LEGAL FRAMEWORK RELATED TO HYDROPOWER DEVELOPMENT IN NEPAL



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AUTHOR(S) Kjell Haagenzen (editor) Vidkunn Hveding Pål Mellquist Egil Skofteland	DATE 2 January 1998
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ABSTRACT

This report is a summing up of the experience from the NORAD financed NVE support to Nepal in drafting a new legal framework to encourage private investments into the electricity industry of the country. During the period of cooperation with NVE, Nepal has completed:

Hydro Power Development Policy, 1992
Water Resources Act, 1992
Electricity Act, 1992
Foreign Investment Act, 1992
The Industrial Enterprises Act, 1992
Electricity Regulation, 1993
Water Resources Regulation, 1993

The report is also advising on issues still to be paid attention to achieve the political objectives of His Majesty's Government of Nepal as laid down in the Hydro Power Development Policy, 1997.

SUBJECT TERMS

Legal Framework
Hydropower
Electricity
Water Resources
Foreign Investment

RESPONSIBLE

Egil Skofteland
Egil Skofteland
Head, Office of International
Cooperation, NVE

The NVE team

“The NVE team” is frequently referred to in this report. The first NVE team was established in 1991-92 when the institutional cooperation with the Nepalese authorities started. The core members of the team have since been unchanged, i.e.:

*Kjell Haagensen
Vidkunn Hveding
Pål Mellquist
Egil Skofteland*

The team has during its work from time to time been assisted and supplemented by other Norwegian experts/consultants considered to possess special and useful competence.

The approach and basic principles guiding the work of the NVE team are explained in Chapter 2.2.

Based on the positive experiences from the cooperation with Nepal, several NVE teams have been established on similar tasks as part of NVE’s institutional cooperation with other developing countries, based on the same approach and principles as adopted for Nepal.

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1. Introduction

1.1 Hydropower potential of Nepal

The abundant water resources of Nepal constitute one of the country's most valuable natural resources. While water used for irrigation has a long tradition, Nepal has become recently aware of its renewable hydropower potential as a major national asset, base for economical development, and the need for improvements and modernization of irrigation practices.

It has been estimated that the theoretical hydropower potential of Nepal is about 83 000 MW, while the economical feasible capacity is 44 000 MW. The existing hydropower generation is only 253 MW, but it is the intention of Nepal to accelerate the development of its hydropower potential.

The hydropower resources of Nepal are favorably distributed along the entire length of the country. But beyond that, they present formidable challenges to development. Rivers are steep and torrential in their upper and middle reaches. Few favourable sites are available for seasonal storage (valley plains that could be dammed, at high elevations). And above all, Nepal's rivers carry a high sediment load, ranging not only into gravel but also rock and boulder size. The content of suspended mineral matter is high, causing extensive wear on runner blades, valves, and pipes.

2. The EDC/NVE Cooperation

2.1 Historical background

The cooperation between Nepal and Norway on hydropower development has a long history - more than 30 years. A series of projects have been funded by grants from the Norwegian Agency for Development Cooperation (NORAD) through the Norwegian Himal Asia Mission, which is a member of the United Mission to Nepal. In addition to training and the actual construction and operation of hydropower plants, it became an important policy of the Mission, that the appropriate Nepalese infrastructure must be developed to maximize the use of local manpower resources. Thus, initiatives were taken to establish Nepalese companies to take on planning, constructing, and equipping the projects.

The Butwal Technical Institute was founded in 1963 as an industrial development and vocational training project. As a spin-off of its activities, Butwal Power Company (BPC) was registered in 1965. BPC received a license for production and sale of electricity and started the electrification of Butwal. The construction of the small hydropower station Tinau (1 MW) was completed in stages from 1970 to 1978, and it became the first underground power plant in Nepal. The plant was equipped with secondhand machinery from Norway, repaired in Butwal. A new company was established, Butwal Engineering Works, which manufactured penstock pipes, gates, etc, and undertook the erection work. The new company also became a pioneer in design and production of mini hydropower units (cross flow units) used as installation in remote areas. A remarkable development began in Butwal; what was once a small market place is expanding to be a commercial centre.

Based on the experiences gained from carrying out the civil works at Tinau, the Himal Hydro & General Construction Company Pvt. Ltd. was formed in 1976.

In 1982 BPC entered into an agreement to build the Andhi Khola Project, a combined irrigation and power production (5 MW). In 1986 BPC established its own consultancy division, BPC Hydroconsult, which took responsibility for the detailed design of the intake structures and powerhouse. All civil works were executed by Himal Hydro, and again the electro-mechanical equipment was obtained secondhand from Norway. In the process a new company, Nepal Hydro & Electric Pvt. Ltd. was established in 1986 with Kvaerner and later also with ABB as two of the shareholders. This company together with Butwal Engineering Works manufactured the penstock, gates, etc, and erected all the electro-mechanical equipment.

Andhi Khola started production in 1991.

The United Mission to Nepal has directly or indirectly been the main shareholder in all the Nepalese companies mentioned. Other governmental agencies have provided the rest of the share capital apart from the involvement of the multinational companies Kvaerner and ABB mentioned above.

In 1989 the field work on the Jhimruk hydropower project (12 MW) began. The agreements constituting the framework of the project made BPC the builder, owner, and operator of the project until one year after commissioning (the guarantee period). Planning, designing and supervision was undertaken by BPC Hydroconsult, and the civil works were assigned to Himal

Hydro after tendering and contract negotiations. Nepal Hydro & Electric had the responsibility to produce, deliver, and erect the hydraulic steel structures. The electro-mechanical equipment was supplied by Kvaerner and ABB in close cooperation with Nepal Hydro & Electric, which manufactured the main part of the turbines, panel boards, and installed all the equipment.

The Norwegian Water Resources and Energy Administration (NVE) acted as a technical advisor throughout the planning and implementation periods of the Jhimruk project.

Through an agreement between the Norwegian Institute of Technology and the Institute of Engineering at the Tribhuvan University, the Nepal River Research Laboratory was constructed in Kathmandu by a special grant from NORAD. At this laboratory, model tests for Jhimruk and training activities were undertaken.

The Jhimruk Power Plant started commercial production in August 1994.

In line with the intentions as mentioned above, the organizing and contractual set up were arranged to provide for further training of the established Nepali companies involved in hydropower development.

Soon after the Jhimruk project was initiated, BPC was requested to undertake a medium sized hydropower project to meet the power shortage expected to occur in the system in the near future. From the list of projects at the stage of pre-feasibility provided by Nepal Electricity Authority (NEA), the Khimti Hydropower Project (60 MW) was selected. NORAD provided a grant to prepare a bankable feasibility study, but the project itself was too big for NORAD funding only.

This started a long (four years) and complicated process ending with Khimti being among the first hydropower projects anywhere to be developed with private financing on the so-called "project financing model". This model makes particular requirements on the efficient organization of the project on the part of each of the main participants; the Developer, the Lender(s), and the Licensing Authority. The process of developing an appropriate and modern legislation started in 1991 with the assistance of NVE. The results are described further in the following chapters of this report.

A new Nepali company, Himal Power Ltd., was formed in 1993 and was to become the owner of the project. Statkraft (Norway) is the main shareholder with 73%, ABB & Kvaerner with 6% each, and BPC 15%. A Power Purchase Agreement was agreed with NEA. The Financial Closing took place in June 1996.

Khimti Kola is expected to start production in 1998.

The successful financial closure of the Khimti Kola hydropower project (the Khimti project) may encourage the further development of private power projects in Nepal. This has already been evidenced by the 36 MW run-of-river Upper Bhote Koshi project financed by IFC.

2.2 The approach

Representatives of Nepali authorities and hydropower specialists have a long tradition in visiting Norway to participate in hydropower conferences and to have discussions with Norwegian authorities and professionals. Based on discussions during such a visit in October 1991, Nepal requested NORAD to fund a NVE mission to Nepal to assist in the planning of the development of Nepal's water resources. This visit took place in December 1991 and was

the start of a fruitful cooperation which still continues in 1997, based on continued requests from Nepal. However, the original main objectives of the cooperation have been reached.

The cooperation between NVE and the Nepali counterpart institution - now the Electricity Development Centre (EDC) - was soon to be formalized and based on Institutional Agreements (or contracts) that clearly state the objectives and responsibilities of the two parties, the time schedule, reporting procedures, and the budget. Over and above these Agreements were the bilateral agreements between Nepal and Norway; these agreements regarded assistance and NORAD funding for development of water related legislation in Nepal. Also, they gave the terms and conditions for the Institutional Agreements.

The main objective of the NVE contribution has been to assist the Nepalese authorities in establishing the necessary legislation, related regulations, and institutional framework for a future balanced development of water resources in the country. In Nepal there was a growing interest to attract foreign investors, but at the same time securing the Nepalese own interests. It was recognized that the existing legislation was not sufficient to meet these requirements. The planning of the 60 MW Khimti project accelerated the need for a more relevant legislation. At an early stage, it was considered to establish a temporary law for this project only, but this option was left as the developing of a general electricity law progressed.

The mode of work adopted was simple but efficient. A NVE team was established comprising of Norwegian experts, including contracted consultants considered to possess special competence and international experience. The Team's main function has been to support and provide advice to the Nepalese authorities, by being available for consultations as needed, participating in workshops and seminars, helping in examination of issues and responses, etc., while the actual drafting of legislation and regulations has been done by the Nepalese side. A few of the activities took place in Norway in connection with study tours organized for the Nepalese authorities, but most of the work took place in Nepal.

Some basic principles have been adhered to throughout the period of cooperation. Firstly, the process taking place in developing a new legislation and the transfer of knowledge hopefully taking place during this process are considered as important as the end product itself. Since a new law will never be final, but improvements and revisions will continue, this will contribute to the sustainability of the project.

Secondly, the role of NVE has been of a strictly advisory nature. It has been considered very important that all laws and regulations developed are a true product of Nepal. This will provide a sense of ownership which should not be underestimated. Legislation should never be copied from one country to another, but be rooted in the countries own traditions, specific situation, and traditional rights. However, some issues are rather universal and much can be learned from the experiences of other countries. The task of the NVE team has been to present the options available and comment on their relevance, but the actual drafting of the new legislation has been the responsibility of Nepal.

Thirdly, the full involvement of all concerned parties (stakeholders) being affected by the new laws or regulations in Nepal has been imperative, and it has taken place. Concepts such as hearing the voice of the local public and local authorities have been introduced and accepted, as have important provisions on environment and necessary concern of social issues.

It should also be mentioned that the services of the NVE team came to a virtual standstill due to political instability and institutional and personnel changes in Nepal in some periods of the 5-years cooperation. However, this should be expected in a cooperation like this, and the activities were again resumed.

2.3 Achievements

The achievements made by Nepal during the period of cooperation with NVE can briefly be summarized as follows:

Hydro Power Development Policy	1992
Water Resources Act	1992
Electricity Act	1992
Foreign Investment Act	1992
The Industrial Enterprises Act	1992
Electricity Regulation	1993
Water Resources Regulation	1993

All these laws and regulations can be found in a booklet “Nepalese Legal Provisions on Hydro-Power Development” compiled by EDC in 1996. The establishment of EDC itself in 1992 as a department under the Ministry of Water Resources took place in this period. Under the present legislative framework, EDC is mandated as a regulatory body for licensing and monitoring of electricity generation, transmission, and distribution projects. It also serves as a “One-Window” agency for the developers. One main function is to provide advisory assistance to the Ministry on the updating and refining of legal and institutional documents required for the development of the power sector.

One of the final involvement of the NVE team under the present Agreement was in late 1996 to assist EDC in organizing a workshop and seminar in Nepal based on the experiences from the implementation of the Jhimruk hydropower project and the licensing and financing of the Khimti scheme. This was seen as a unique opportunity among the parties to compare the experiences gained from planning and implementation of such projects in a Nepalese context. Representatives from all involved parties participated in the seminar; the government, the donor agencies, the lenders, and the developers. The results and subsequent recommendations from the exercise are included in the following chapters of this report. It is important to underline that laws and regulations are never permanent. The development is a dynamic process and improvements can always be introduced.

3. *The challenges of a changing power industry in Nepal*

3.1 Basic issues related to development of hydropower projects in developing countries

The current situation of the power sector in Nepal - as in other developing countries - is characterized by inadequate infrastructure and lack of financial resources. The demand for electricity, however, has been growing at a high rate, and this growth is expected to continue in the future. Managing these changes effectively is the challenge of Nepal and may necessitate state control and monitoring of the electricity sector.

Since securing the supply of electricity at reasonable prices must be regarded as major political achievements of the Government (HMGN), extensive political attention will be given to the electricity sector.

Today generation, transmission, and distribution of electricity are undertaken by Nepal Electricity Authority (NEA), the state owned utility of Nepal. Since the future investment need is huge but the traditional funding sources are limited, private sector participation is increasingly recognized as a source of funding in developing countries like Nepal. In addition, private sector participation may bring new skills, technology and management techniques to the sector. It is important to emphasize the role of the private sector as a complement to the public sector rather than a replacement.

Accordingly, Nepal like other developing countries, is facing a dilemma; how to encourage private investments without giving away the public control of the electricity sector. The private investors may put a pressure to adopt market based tariffs and discourage the infrastructure development role of the state owned monopolies.

In short the electricity sector needs to offer and deliver:

- a) a decisive and convincing policy of the Government
- b) a clear-cut, simple, and modern legal framework
- c) an efficient public administration - handling the public service and public control linked to the energy sector.
- d) a competitive track record related to implementation of the legislation and policy documents that promote private investments in the electricity sector.

Nepal has embarked on such a program through the Hydro-Power Development Policy of 1992. Among the objectives laid down in this policy document is "to motivate the national and foreign private sector investment for the development of hydroelectric power". Further, it is stated the importance of making the supply and distribution of electricity "regular and reliable", as well as making "electricity sufficiently available to the people".

3.2 Legislation

To put in place a new legal framework is a complicated and time-consuming task. The drafting of new bills always requires a lot of effort and time. In addition to the drafting itself,

the political treatment of the bill is comprised of hearings and political discussions in the Government as well as the Parliament, and this will usually be rather time-consuming.

The practical importance of new legislation depends on the quality of the existing legal framework. In Nepal, as in most developing countries, the quality of the legislation is uneven. In the energy field, sector-specific legislation appears to have been substantially improved by the enactment of an electricity act. However, this will not be sufficient to offer terms to facilitate private investments in the electricity sector. From the investors point of view the remaining legal environment will be of crucial importance as well. Laws addressing contracts, companies, mortgage, bank-transactions, customs, currency, labour legislation, etc., will be decisive to a successful implementation of any privatization program.

As a new legislation based on the Constitution of the Kingdom of Nepal of 2047 (1990), Nepal still will need time to establish the legal framework needed to encourage private investments in the electricity sector.

3.3 Public administration

The task of the public administration will be:

- a) to grant licenses, permits, and approvals necessary for implementation of any planning, construction, and operation of electricity facilities.
- b) to control the performance of the licensee to be in accordance with the terms of the license.
- c) to provide general public service related to the energy sector.

The granting of a license means implementation of the licensing procedure as it is laid down in the law and the management of the terms of the license means a continuous supervision and control of the activities of the licensees.

Too often the public administration of the electricity sector is integrated as a department of the Ministry in question. To split the policy making from the public administration functions, it may be advisable to consider an establishment of a Directorate, Regulator, Agency, or a similar functioning body to get the arm-length distance necessary between the decisions of the public administration and the political decisions. If private investments are wanted, such a split may be deemed necessary to have an independent Regulator to safeguard the competition in the market and provide predictability in the decision-making of the public administration. Nepal has in this respect made an important step in the right direction by establishing the Electricity Development Centre (EDC) in 1992.

3.4 Licensing

To keep control of a market for private investors, the introduction of a licensing system should be considered. If generation, transmission and distribution will require a license, the Government will keep a strong position in making the rules, restrictions, and impetus necessary to consolidate an efficient development of the electricity sector.

Accordingly, it will be important that any license should be granted subject to terms laid down in the license itself. Such terms or conditions should contain any measure necessary to leave the policy making to the government - still giving necessary leeway and predictability to private investors. To find the balance between the restrictions and the privileges forwarded through the license is the crucial challenge of any jurisdiction.

If the licensing uses the Build, Operate, Transfer (BOT) scheme as a model, the state should take over the facilities of the licensees upon the expiration of the license without paying any compensation.

The licensing system was introduced in Nepal in the Electricity Act 1992, § 3.: “No person shall be entitled to conduct survey, generation, transmission or distribution of electricity without obtaining license under this Act.”

3.5 State ownership

Another method to get influence over the electricity sector is through state ownership. This could be carried out through state owned enterprises or joint ventures between state owned enterprises and private investors.

Through a state's investment in private projects, the state will obtain information using its position as an owner through participation in General Meetings and representation in the Board of the company.

4. *Private investments and private financing of hydropower projects in Nepal*

4.1 The requirements of International Financing Institutions and private investors

Since the new policy of Nepal is to encourage national and foreign private sector investment in generation and distribution of electricity, the financing issues should be paid particular attention. Such private investments will most likely be based on project financing or non-recourse financing, while similar projects in industrialized countries are financed from internal sources or balance sheet borrowings. Accordingly, Nepal needs to continue its efforts to seek mechanisms which will increase the **availability** of project financing in order to accelerate project implementation.

There is an obvious difference in the qualifications of being a receiver of grants and soft-loans, as compared with the requirements necessary to obtain commercial loans and investments from the international capital markets. To get grants from development aid agencies and soft-loans from bilateral and multilateral donors, a poorly developed economy and lack of institutional development as well as a low resource base may be deemed as a prerequisite, or at least as a facilitator for such assistance. To encourage commercial investments and support from Export Credit Agencies as well as international lending agencies, the opposite seems to be the case.

The role of being a receiver of development assistance and an attractive commercial partner for foreign investment qualified for commercial borrowing is a challenge. A developed legislation, institutional framework, and a business friendly environment are necessary requirements for future foreign investments in Nepal.

Any power project involves a multitude of risks. The lenders and developers will seek to reduce their risks through agreements and guarantees. To reach financial closing of independent power projects (IPPs), the following issues will be of importance:

4.1.1 The cash-flow

An assessment of the cash-flow of the project is required. Any investor, sponsor or financier will like to see the cash-flow of a project secured through an agreement between the power producer and the buyer of electricity. In most cases the buyer will be a state owned utility, having the monopoly rights and obligations of transmission and distribution. To convince the financial institutions, for some form of Government guarantee or support may be required to back-up the take-or-pay obligations of the purchasing state owned utility. This was the case in Nepal where the Government had to provide such guarantees in connection with the Khimti-project.

However, how to avoid the need for such guarantees in the future should be considered. This must be based on the credibility of Nepal Electricity Authority (NEA) to make a cash-flow commitment without any ancillary guarantees. The assessments undertaken by the financing institutions will be decisive for the future development. In a transitional period it seems wise

to emphasize a pragmatic and flexible approach to this issue. If the position of Nepal is too rigid, the ability to gain access to the capital market for future fund raising may be prevented or reduced. A creditworthy power purchaser, by international standards, is a basic requirement.

4.1.2 Feasibility studies

The predictability will also depend on the feasibility of the project. The feasibility studies will focus on the technical solutions as well as environmental and social issues related to the project. Since such studies will be scrutinized by independent experts on behalf of the lenders, the importance of having a bankable feasibility study from the very beginning should be highlighted. Otherwise, the lenders will require additional studies to get a base sufficient for providing finance. Such additional studies can be time consuming and costly and may seriously delay any project. To avoid this, it is recommended to consider extensive Terms of Reference for such feasibility studies, for example in accordance with the World Bank or Asian Development Bank standard terms, securing the quality of the studies.

4.1.3 Contract structure

The contract structure seems to be of great importance for private investments. The contract structure in the Khimti-project as first presented to the financing institutions was deemed insufficient and not bankable. The restructuring of the contracts in the Khimti-case caused delays and extra costs.

Some contract-schemes as the Build-Operate-Transfer modality (BOT) could be applied to meet the financing requirements related to the contract structure. Such a structure could be used taking care of an adequate risk allocation.

As far as construction of the plant is concerned, a turn-key contract seems to be preferable compared with a diversity of contracts with the project company as far as a project is depending on a non-recourse financing (project financing), where the one turn-key contractor has the completion risk. Otherwise, a more diversified contract structure may be considered recommendable.

4.1.4 Legal framework

The legal framework will always be investigated through legal opinions and reports to satisfy the requirements of the financing institutions. This issue will be extended on in Section 5. However, the legislation and the public administrations handling of the legislation will be scrutinized in legal tests and legal opinions undertaken by the lenders and investors. In general, transparent legal framework for commercial activities that enable companies to be set up, registered, and run without unduly difficulties will favor the financing.

4.1.5 Guarantees

As already mentioned, State guarantees may be requested by the investors as well as the lenders. Such guarantees will be addressing the performance of the State-owned buyer of electricity as well as the currency issue.

The payment guarantee of the Power Purchase Agreement (PPA) will address the cash-flow of the project, while the currency guarantees will aim to secure payment linked to the exchange rate of the local currency against the currency in which borrowings are made and equity provided. Such a guarantee may also include foreign exchange convertibility and availability and/or the settlement of off-take obligations in foreign exchange.

In a country like Nepal with a non convertible currency, the foreign exchange risk is of vital importance from a financial point of view. The country's foreign reserve balance will be a major concern for future project investors. The Government (HMGN) must be prepared to issue some sort of currency guarantees to attract foreign financing.

4.1.6 The track-record

All together the issues mentioned above will be included in the general impression of the country. To succeed with future private investments, the impression based on a track-record of the first projects should be as convincing as possible to reduce the costs and reluctance of investors engaging money in new projects.

It should be recognized that Nepal is still at an early stage of development as far as private commercial investment is concerned. This fact, at the present stage, necessitates use of Government guarantees and admissions to obtain such investments. As the track-record grows, showing that implementation of new hydro power projects is viable, the allowances should be gradually reduced.

Attention should also be given to the relationship between risks and costs. The greater the risks to be taken by the private sector participants, the higher will be the demanded rate of return.

4.2 Measures to be taken encouraging foreign investments in Nepal

Among the basic preconditions for a successful transition to a private investment scheme will be a convincing policy from the Government that is related to development and private investments in the electricity sector. Such a policy should contain conditions conducive to investment. This means rules emphasizing :

- I) appropriate market driven returns
- II) practical and simplified licensing procedures
- III) a realistic approach to the apportionment of project risks

The policy must include availability of attractive opportunities for private participation.

The main economic factors of the country - economic growth, low inflation, and a stable currency will also be of importance. Even if the Hydro-Power Development Policy 1992 and the new electricity legislation (1992) is a major step in the right direction, it is still a long way to go to establish the legal, financial, and regulatory regimes necessary for implementation of a private electricity market.

In addition to the policy, the following issues should be paid attention to:

a) Rules of repatriation of profits.

To foreign investors clear-cut rules allowing repatriation of profits will be a prerequisite. Such rules are already laid down in The Foreign Investment and Technology Transfer Act, 1992, - Art. 5.

b) Governing law.

As noted by the Workshop on Khimti, Nagarkot 31/10-1/11-96 lending institutions require the financial agreements to be governed by systems of law known to them such as New York law or London law. The Workshop recognized the need of acceptance of this for such international agreements. For agreements between Nepalese parties, the governing law should be the law of Nepal. Considering the need to attract foreign investors, contractors, and industries to work in Nepal, relevant Nepalese legislation should over time be harmonized as far as practicable with general, internationally used, and recognized principles.

c) Dispute solution

On this issue the Workshop made very distinct recommendations. The Workshop found harmonization to be required with regard to arbitration of disputes. The existing Arbitration Act and similar relevant laws should be revised with regard to its practical use in cases involving foreign parties. The ongoing preparations for Nepal to accede to international conventions on arbitration should be concluded.

d) Acquisition of land

Acquisition of land and rights necessary to development of the project is of crucial importance. The experience of Khimti is in this respect reasonably encouraging, compared with the experience from other developing countries. The acquisition of land has been carried out efficiently and in a timely manner. However, this is an issue that should be paid continuous attention. Especially the access to transmission lines and load centers could be an impediment to a speedy development of new projects.

The Workshop addressed a problem that has been encountered related to acquisition of land. In some cases the title to acquired land could not be obtained, in spite of payment being ready. The reasons were as follows: in case the owner could not be contacted no title could be issued.

In the case of acquisition of land owned by the government no title but only a lease could be obtained. The Workshop recommended that Nepalese law should be amended so that title to land could be obtained through a deposit system (payment deposited with the Court) when the owner can not be reached, and also that a lease on Government land could be transferable to the extent necessary for being included in collateral for a licensed project.

e) Ratings from credit agencies.

Such ratings will focus on the possible lack of credible opportunities as well as the perception of high country risk.

f) Investments incentives

Like income tax holidays, measures as tax and duty free importation of capital equipment, as well as the ability to employ foreign nationals, will facilitate project financing.

g) Coordination of lenders

To reduce costs related to the lending of money, coordination of the lenders as one syndicate fronted by a lead bank or represented by one common agent seems advisable. The experience from the Khimti project showed how negotiations with three different lenders caused much duplication of efforts and conflicting conditions as well as increased costs.

h) Government approval of loan documents

The Nepalese Government (HMGN)'s requirement of approving the signed loan documents should be reconsidered. This was a time consuming procedure in the Khimti project and delayed financial closing. After the documents are finally negotiated and agreed between all the parties, HMGN approval seems to be a bureaucratic formality with limited practical implications. HMGN can be informed and consulted at an early stage about the financial terms and conditions and make comments if needed.

In addition the following measures will be of importance:

- Legal framework
- Independent court-system
- Membership in international arbitration organization (MIGA)
- Adequate local accounting
- Maturity of domestic financial market
- Local private participation as investors

Also these measures should be paid due attention in order to instigate a private investment scheme

5. *The legal framework*

5.1 The relation between electricity and water use legislation

To some extent hydropower production differs from generation of electricity from other energy sources. Siting of a hydropower project will be decided by the location of the waterfalls and the watercourses. An implication of this will be a close linkage and interplay between the water use legislation and the electricity legislation. However, the administration of use of water resources and generation of electricity will frequently belong to different ministries and be related to different acts. This will call for a close interaction between the different acts as well as different parts of the public administration.

5.2 Law-making as a process

Law-making is a continuous process of amendments and drafting of new bills to accommodate to the development of the country. A good solution at an early stage of the development may be a bad solution at a later stage. Too often, even in industrialized countries, it has been experienced that lack of necessary amendments and accommodations to new challenges in the legislation have been hampering the economic development.

In order to establish a structure and a program taking this experience into account, it is required to make necessary amendments to the legislation to keep it up-dated and along the line of the requirements of an increasingly modern economy.

5.3 Relation acts / regulations

To avoid acts that are too extensive in handling in detail all possible situations, it may be wise to consider an apportion of rules between the act, the regulations, and the guidelines as well as the policy documents.

Any rule must, however, have the legal authority from the act. In addition, the main principles of the legal framework should be clearly laid down in the act itself. More detailed rules could be elaborated in regulations, while political statements and programs could be presented in policy documents. To facilitate the use of the legal framework, the issuance of guidelines could be considered.

The advantage of such a system will be more flexibility, since the change of detailed rules laid down in the regulations does not require a new enactment by the Parliament. Usually a change of regulations may be carried out by the Ministry or by the Government. This will give the benefit of rapid accommodations to a change in the economic environment. Otherwise, any change of rules as laid down in the laws must be prepared as a bill for the Parliament and pass a rather extensive procedure before a change can be accomplished. This principle, however, has been applied in the Nepalese Electricity Act 1992 and Electricity Regulation 1993.

5.4 Adjacent legislation. Need of up-grading of legislation in general

Too often developing countries suffer from having an insufficient legislation to meet the demand of modern commercial investments. This could only to a limited extent be mitigated by a few new enactments, securing modern acts in a few sectors such as the electricity industry sector. To perform business in any country, the growth of the general commercial legislation must be kept at a certain level to make the legal environment necessary to meet expectations of private investments. Even if Nepal has achieved a substantial improvement so far through Water Resources Act (1992), Electricity Act (1992), Foreign Investment and Technology Transfer Act (1992), Industrial Enterprises Act (1992) and the related Regulations, there is still an urgent need for further improvements of commercial law in general.

The development of hydropower will also comprise activities related to other parts of the legislation. To construct a hydro power plant acquisition of land and rights will be necessary as well as import of equipment and services. Construction works as well as operation and maintenance of the plant will involve use of the local labour force and the buying of local services. The financing of the project may pay attention to legislation related to currency, banking, mortgage, contracts, companies, etc. The operation and construction of the plant may involve legislation related to pollution, forestry/agriculture, fisheries, etc.

This implies a need for cooperation between the electricity laws and the rest of the legislation for implementation of a hydropower investment scheme.

5.5 Environmental legislation

Environmental laws specify how power projects must conform to strict environmental regulations.

To obtain financing of a project, the environmental rules and guidelines as decided by banks like ADB and IFC will apply, in addition to the domestic legislation.

However, the standards related to Environmental Impact Assessments as well as terms of license following up the environmental mitigation measures should take into account the differences between the developing countries and the present industrialized countries. Bearing in mind that the developed countries may already have utilized most of their own hydropower resources, it does not seem appropriate to impress their expensive standards on developing countries without the same economical resources and ability to give priority to environment over economical growth. On the other side it is important to avoid environmental degradation in developing countries. The challenge is once again to find the right balance based on a realistic approach to the problem. From Nepal's point of view, it is important to consider how restrictive requirements could compromise the feasibility of a project, or increase the costs of the project.

Basically, the standards as well as implementation of environmental regulations should be based on Nepalese law and Nepalese tradition, not on any foreign dictate or set of rules.

5.6 Signing of international conventions and treaties, tax-agreements

International transactions and investments call for basic rules depending on signing of international conventions, membership in international organization, and bilateral tax-agreements or treaties. For the time being Nepal has still some way to go. As an example, the New York Convention of 1958 is not signed, elaborating the necessary commitments linked to the usually accepted standards of developed countries. Such a commitment, which will always be based on reciprocity, should be to the benefit of further economical development and further foreign investments in Nepal.

5.7 Further recommendations

A. English translation of Nepalese law

To facilitate the access to a proper understanding of Nepal law, it seems advisable to get as much as possible of the legislation of Nepal translated into English language. If parts of the legislation will not be available to foreigners, because it is not translated, the foreign understanding of the content and quality of the Nepalese law may be hampered.

The translation could be issued in a law collection. This law collection should be kept updated with all amendments, so it can be trusted as an authorized, correct and updated version of Nepalese law. In addition a brief guidebook in English, that explains the main principles and interpretations of the most important acts should be considered helpful for foreigners contemplating investing or financing in Nepal.

B. Education of local lawyers in skills related to commercial law

It is the opinion of the NVE team that even if Nepal has a number of skilled and qualified lawyers, there is a great need of more Nepalese lawyers with education and training related to international and commercial law and practice. The need of documentation, legal opinions, etc., related to financing and investments are still not sufficiently elaborated in the local legal education.

To mitigate this problem, the NVE-team suggests young, talented Nepalese lawyers to be trained in international law-firms to get the experience and practice necessary for future performance of such tasks. It is the opinion of the team that the big London law firms could be considered as a favorable venue for such training. The economic support necessary for such training could be provided by foreign development agencies.

C. The further modernization of the legislation to meet international standards

It will still be needed to continuously modernize the legislation as a whole as well as development of customary law to meet international standards.

D. Support to the existing law schools and university students of economy in Nepal should be considered and provided by the different developing agencies

Raising the standards of lectures, textbooks and seminars addressing commercial issues and practice related to international contracts, would be a major contribution to the Nepalese ability to use domestic experts in development of future projects.

This can also be accomplished through support to pay international lawyers to be guest teachers at the local university and law school. Likewise, student seminars addressing such issues could be supported by experts from abroad.

The textbooks of law and economy could be extended along the same lines by relevant literature presenting qualified presentations of the more crucial issues to be met by the professionals of Nepal in the future.

6. *Institutional framework*

6.1 The relation between policy making and public administration

The legal framework will be of little use unless the public administration of the rules is efficiently noted and utilized. To safeguard such efficiency, an institutional restructuring may be deemed necessary.

In doing this, it will be important to separate the political decision-making from the decisions made by the public administration to avoid mixing of policy with administration. The Nepalese system as established is meeting the need of such a «division of work» between political bodies and public service. EDC has the role of the regulator under the Ministry of Water Resources (MWR), while NEA has the role of state owned utility liable for the electricity supply of the country.

6.2 The role of Electricity Development Centre (EDC). The “One-window system”- the relation to other public institutions

In the Hydro Power Development Policy of 1992 it was decided to set up a Hydroelectricity Development Unit in the Ministry of Water Resources in order to promote the private sectors participation in the hydroelectric projects and to render assistance necessary to the private sector in the operation of hydropower projects.

Accordingly, the Electricity Development Centre (EDC) was established pursuant to § 36 of the Water Resources Act 1992. This was in compliance with the need of a «one-window» system to facilitate introduction of the licensing system and simplify the procedure related to any application for a license for generation, transmission or distribution of electricity.

The Workshop (Nagarkot 31/10-1/11 1996), however, addressed this issue and identified some problems still to be solved to obtain a simple, efficient and predictable public administration of the licensing system. The Workshop emphasized the importance of expedient handling of applications and requests from the licensees as well as the need for more power and influence related to the handling of permits to be granted by other public authorities.

As mentioned, the “One-window” system is established to facilitate and to encourage foreign investments into the electricity industry. The Workshop welcomed the “One-window” system for receiving and processing applications, but found that the system should be strengthened in the follow-up activities. When a license has been granted, the EDC should be empowered to request from the relevant Government agencies a specific undertaking with regard to the permits and authorizations which have been included in the terms of the license.

It is the experience from the Khimti I project that the “One-window” system still needs major improvements. The issuance of visa, permits from local officials, concessions to import of materials, license for communication systems, applications related to customs duty, standardization of royalty fees, and the definition of engineering/environmental standards are still too complicated and time-consuming.

As presented in the Seminar on Khimti I, Kathmandu Nov. 1996, the experiences of the civil works, engineering and supply contractors were as follows:

" In practice the "One window system" seems to show "Too many doors behind the window". This is exemplified by applying for visas for expatriate personnel. The Khimti contractual rights and EDC's recommendation letters are not sufficient for the Immigration Department to issue visas for expatriate personnel. They require now work permits, evidence that Nepali personnel is not available for positions filled by expatriates, and individual employment contracts.

Furthermore non-tourist visas have been issued for four months only for long-term staff who are listed for work of one year or more. Needless to say, this creates frustration and a lot of unnecessary time spent for processing of visas."

6.3 The role of Nepal Electricity Authority (NEA)

NEA was formed in 1985 and given the responsibility to undertake all planning, construction operations, and maintenance of electrical supply in Nepal. The obligations of the utility comprised generation, transmission, and distribution.

In the initial years, the general impression of NEA from outside may have been that of an utility incapable of the consolidation essential for operating along the lines of modern management.

From 1990 onwards, the NEA as an electricity utility seems to have been improving its reputation. The new legislation of 1992 (including an amendment to the NEA Act), the first Corporate Plan of 1993 and the study of Commercialization Strategic Plans aim to move NEA toward operating its business on commercial terms and are moves in the right direction.

From the NVE team's point of view it is important to emphasize NEA as a crucial and important player in the future electricity industry in Nepal, while maintaining the overall responsibility of generation and transmission as well as distribution of electricity. Private investments into the generation of electricity may provide a support to the developing program, but they will not relieve NEA from its responsibility as the state owned utility. This should be taken into consideration in the further development of NEA as a company and public utility.

It seems difficult, if not impossible, for NEA to meet the expectations of a state owned monopoly and the expectations of a commercial company competing with private investors at the same time. Based on this, it may be deemed necessary to consider a further restructuring of NEA in the future. It may be considered to split transmission from generation and to separate the civil services from commercial activities in the electricity market. Likewise, a continuation to reduce the staff of NEA, which reduces the costs of a large bureaucracy, should be considered necessary to make NEA competitive in the future electricity industry.

6.4 Efficiency of the decision making systems - recommendations

To further enhance the achievements of Nepal in the creation of a modern and efficient decision making system that encourages development and private investments, the following issues might be considered:

- a) Simplification of procedures of the public administration related to granting of permits, licenses, etc. One way to safeguard such improvements may be to set mandatory time-limits in the acts or in the regulations, stating that any decision shall be made within the prescribed time-limits calculated from the date of the application.

Considering a restructuring of the public service and infrastructure in general may be another way to obtain such improvements.

- b) Another way to make steps to increase efficiency may be to standardize the format of different approvals, permits, and consents. Major achievements have already been obtained in the formats of the Regulation. However, there is still a need for similar standardization of other documents necessary to do investments and business in Nepal.
- c) To avoid wrong decisions to survive, an appeal system related to the decisions of the public administration may be deemed expedient. Even if such decisions may be taken to court, a civil appeal system may be considered as an alternative.
- d) The efficient handling of meter reading, billing and bill collection will be crucial for any electricity system or industry. This will obviously be a positive improvement of the existing systems and procedures.
- e) Accordingly, the whole quality of the institutional framework, including promotion of transparency, independence and honesty in public administration will be the backbone of the Nepalese public administration in the future as well as in the past. In addition, any measures taken to increase the speed of process within the public administration will be welcomed. In this respect, Nepal may still have some way to go in order to be competitive with industrialized countries. Such improvements will also reduce the costs of the public administration to the benefit of the country.

7. The licensing system

7.1 The objective of the licensing system

A licensing system should be implemented as an important instrument to carry out the policy of the Government. Such a licensing system is now established through the Water Resources Act and Electricity Act of 1992.

The objective of a licensing system is the need of the Government (HMGN) to keep control with the hydropower development of the country, even if such projects are accomplished by private companies. The licensing system provides a framework necessary for preparation of any project as well as construction and operation of the same. The licensing, together with state ownership within the electricity industry, should provide the instruments necessary to safeguard the state control with the electricity sector.

A licensing system will replace agreements between the Government and any private investor. The Government will grant a license based on the information provided in any application as an unilateral prerogative of the State. Without such a system, the Government will be forced to perform commercial negotiations with the sponsors of a project, which may give the Government a substantial weaker position.

7.2 Licensing procedure

In Nepal, the licensing procedure of survey, generation, transmission, or distribution of electricity are laid down in § 4 of the Electricity Act. Any application shall be submitted to the prescribed officer along “with the economic, technical, and environmental study report and with other prescribed particulars on the relevant subject”.

According to the Electricity Act, § 4 (2) the officer prescribed “shall have to issue license to the applicant” within 120 days in the case of a license for generation, transmission or distribution. These rules are elaborated in the Electricity Regulation (1993) § 3-25.

This is meant to help the promotion of private investments. However, the speed of the licensing procedure as a whole will be of vital importance for the efficiency of the system. If additional permits, approvals, or permissions will be necessary to carry forward the project, the time-consumption of the whole system must be taken into consideration. Since a licensing system granting licenses in a timely manner does not help if other permits cause delays, a total evaluation of the whole system may be necessary to get a complete picture of the Nepalese public administration of the electricity industry.

7.3 The terms of a license

§ 5 of the Electricity Act states that the terms of a license issued for generation, transmission or distribution of electricity may be of 50 years in maximum, while the terms of license for the survey of a electricity generating or transmission project may be of 5 years as a maximum.

According to § 11 the licensee shall have to pay royalty to His Majesty's Government at a rate fixed in the Act. In addition, the public authorities may prescribe the arrangement of housing and bonus of the laborer and staff associated with the work of electricity generation, transmission, or distribution (§ 15).

The format of different kinds of licenses is laid down as schedules to the Electricity Regulation of 1993. In the format "Other conditions" are laid down as the last point in the table of contents. However, this point is not described or elaborated in neither the act nor the regulations. It may be wise to consider to provide a more detailed set of rules related to conditions to be included in a license.

Such rules could be inserted in the regulations, making what kind of conditions may be deemed appropriate from the licensing authorities point of view more predictable to private investors. Usually such conditions may include obligations related to environmental mitigation, transfer of technology, duties of the licensee in relation to the local communities directly involved in the project i.a.. These are conditions which most financing institutions will like to see in a license for any hydropower or transmission project.

7.4 Duration of a license - the BOT scheme

As mentioned above the maximum duration of a license for developing a hydropower project is stipulated to 50 years. In a BOT scheme, it seems to give more than ample time for depreciation of the assets, repayment of the loans and for the sponsors gaining the profit, necessary to encourage private investments. Based on the experience from similar projects, a duration of 20 to 30 years should be considered. If a license is granted for more than 30 years, it may be advisable to introduce escalation of taxes and royalties after a fixed period of time to safeguard the economical interest of the State.

8. The contract structure

8.1 Different groups of contracts

Aiming at private investments into the electricity sector, measures different from what is necessary and expedient in the State monopoly system have to be taken. Likewise, full recourse-financing will necessitate other measures than non-recourse financing.

Most importantly in any evaluation by sponsors, investors and lenders of a project will be the rate of return and the cash-flow of the project. The electricity price itself is only important related to the costs of the project. Apart from the price-issue, the following areas will be crucial for evaluation of the viability of any project based on non-recourse financing:

- a) Technical
- b) Legal
- c) Financial

Since the policy of the Government of Nepal (HMGN) is to open up for Independent Power Producers (IPPs) into the electricity industry, the non-recourse or project financing has to be encouraged. Accordingly, the set-up of such financing will comprise the following groups of contracts that are crucial to make success obtainable.

The PPA - the Power Purchase Agreement will be the most important document for any financing of this kind, since this contract is directly related to the generation of cash-flow of the project. The PPA will contain a fixed price based on a take-or-pay principle for a period long enough to enable all debt to be paid and other obligations to be fulfilled.

The EPC Contract means Engineering Procurement Construction (EPC). This contract will include a fixed maximum Contract Price, a guaranteed completion date, and articles elaborating rules addressing liquidated damages sufficient to serve interest on debt, etc. This could be arranged as a turn-key contract, as a BOT or as separate contracts related to civil work, supply of equipment, etc. In the case of several contracts, the risks of inconsistencies between the different contracts will be left with the sponsors and developers, since the lenders will tend to avoid taking such risks at all.

Based on the experience from Khimti, where the contract-structure had to be revised based on the demands from the lenders, it seems wise to stick to a package solution such as a turn-key contract or similar arrangements. If only one contract is needed, the risks related to construction of the plant are left with the consortium behind the contract. Risks do not disappear, but the experience from Khimti indicates that financing seems to be substantially easier to obtain if the project is based on a turn-key concept.

Another contract crucial to the financing is the Operation and Maintenance Agreement. This agreement safeguards a qualified operation of the plant making the lenders feel more convenient related to possible risks of running the plant.

8.2 Risk allocation

Any power project involves a multitude of risks and all parties (sponsors, developers, lenders) will seek to reduce their own portion of the risks and to their benefit try to put the risks on the other parties.

Basically the following risks of a project can be identified:

- a) Construction risks
- b) Operation and performance risks
- c) Price risks
- d) Market risks
- e) Contractual risks
- f) Political risks

Through the setup of contracts the risks should be minimized as far as possible to increase the predictability related to the project and to reduce the costs of financing, accordingly.

An important requirement for any IPP-program is a clear and equitable allocation of risks between the private developer and the host government.

Different schemes that provide support to obtain efficient and reasonable financing are available. The BOT scheme seems to be the most known system for such financing, even if ample examples of success with this system in hydropower financing do not prevail.

However, the experience from the Khimti project indicates that the scheme itself seems to facilitate financing of such projects. Any BOT package must be based on a PPA and a long-term license granted by the government to build, own, and operate the plant. On the expiration of the license, the power plant will revert to the state without any compensation to the Licensee.

8.3 Competitive bidding

During the Seminar and Workshop in Kathmandu, the issue of competitive bidding was thoroughly discussed, disclosing different opinions on this topic.

Competitive bidding among prequalified consortiums related to the construction of the plant and supply of equipment, however, was not subject of any discussion. It seems expedient and common practice to use an international open-bidding related to such contracts, often based on an international contract standard as, for instance, the FIDIC rules (Federation Internationale des Ingenieurs-Conseils).

The discussion, however, focused on the use of competitive bidding among different groups of sponsors, addressing the right to develop projects at a very early stage - the Memorandum of Understanding stage. Such bidding would be based on an outline of a project or a pre-feasibility or feasibility study of the project.

The possibility to achieve transparency and use of competition for obtaining the lowest possible price, will favor such a bidding. But on experiences from other countries, such an open-bidding at this stage of development of a project seems also to imply serious disadvantages. Such bidding may hamper the development, since the risks still to be

evaluated at such an early stage of a project will be tremendous, forcing the bidding parties to include a premium in the price to meet such risks. This may lead to a higher price of the project compared to a system of competitive negotiations.

A precondition for considering the use of such competitive bidding is a surplus of sponsors and investors willing to participate in the bidding process.

It is also important to bear in mind that the costs of preparation of the bidding documents will be extensive and may still not be sufficiently detailed to avoid surprises related to the payments. It should likewise be taken into account that the time needed to take a competitive bidding project off the ground is significantly longer than on a competitive, negotiated basis.

The benefits of competitive negotiations will be that the groups of investors involved in the process will be limited and easier to organize. The advantages of competition will still be kept, since the limited groups of participants in the process will need to provide prices and terms better than the other groups. Such a system may comprise two or three different prequalified groups having the trust of the Government.

The international experience so far has often shown formal competitive bidding not to be a suitable instrument because of the rigidity and high costs of the process. With this background, the NVE team will rather recommend the use of competitive negotiations in which the negotiation is conducted simultaneously with as few as two bidders, in order to obtain from the competition between the two the best possible proposal in terms of price as well as other relevant criteria. Negotiation with a single bidder could also be suitably used, provided the bidder has indubitable qualifications and the Government (the EDC) makes use of independent, professional advice in the evaluation.

8.4 Use of engineering standards

As Nepali engineering standards have not yet been fully defined, reference is normally given to foreign standards; ASTM, DIN, IS, BS, and NS. Often these are given as alternatives without any preferences. Based on the experience from the Khimti project, confusion occurs when various standards are applied to the various parts of a project, particularly when it comes to workmanship standards and traditions in design. It should be considered to use one defined standard in future projects to avoid such confusion.

9. The transmission system

The transmission system has not been subject to investigations of the NVE team. However, the team would like to highlight a few points that should be given attention in the future. These points are related to the development of the grid and distribution systems in Nepal. The Team is aware that ADB is funding a study (1997-98) to prepare a transmission system master plan for the next ten years based on load forecasts and a generation expansion plan being established.

Likewise it is important to bear in mind how the technical viability of new hydro power plants depends upon the cost of transmitting the electricity generated from the plants. Banks are most unlikely to lend money to IPPs unless there is a cohesive transmission development plan under implementation.

9.1 The Grid

The need of developing a national grid that connects different projects under planning and construction seems to be a main objective of the future development of the Nepalese electricity industry. Such a grid will sustain security of supply and increase the ability to export or exchange electricity with India at economically favorable terms. Accordingly, a grid code should be prescribed to safeguard uniformed and predictable rules of dispatch, etc.

9.2 Third Party Access (TPA)

To encourage private investments into the electricity sector, the provision of the access of any IPP to the transmission grid to a cost-based price will be an instrument of crucial importance. This may provide the flexibility necessary to promote an increased private participation as obtained in other countries like the UK and Norway.

9.3 Peak power and base load

The allocation of the resource available in the most efficient manner and the introduction of a price system reflecting the difference in value of peak-capacity compared with base-load should be considered. Such a price variation will encourage investment in the peak-capacity strongly needed to avoid load-shedding or brown-outs in the future.

9.4 Districts isolated from the grid

Because of the high cost of construction of new transmission lines, some areas may still be isolated from the grid. To get electrification of such isolated areas, other measures such as

leaving the responsibility for the electricity supply to private investors may be considered. Such a license should comprise generation as well as distribution within such areas that are excluded from supply from the grid.

9.5 Tariffs related to end-consumers

The aim of retail tariff regulation is to ensure the financial viability of the electricity industry, and tariffs should be based on or at least reflect the costs of new investments. While social objectives have often dominated tariff-setting, willingness to pay among poor consumers can be much higher than expected due to the small quantities consumed. Furthermore, the tariff structure should adequately compensate for the risks of the investor to encourage any IPP project.

Too often the tariff of the end-user is not covering generation costs of new capacity because of political considerations. Political decisions to subsidize the electricity price will make negotiations on tariff more difficult.

The arrangement with a Tariff Fixation Commission as laid down in the Electricity Act, § 17, may be a good solution, subject to the Commission's determining of a reasonable tariff which is acceptable to the customers as well as the IPP investors.

10. Power for export

10.1 Basic requirements

A profitable export of power can be established if the cost of power from other sources in the importing country is higher than the cost at which the exporting country can offer power for export.

In free negotiations a trade will only come about as long as there is benefit to each of the trading partners the buyer as well as the seller. The total, combined profit of the two parties will be the difference between what the importer would have to pay for power from other available sources and the cost for the exporter of developing power for export. How this difference will be split is a matter of bargaining power in the negotiation. The main thing to bear in mind in assessing the potential is that the exporter can only expect a profit which is somewhat smaller than the cost differential.

Consequently, the main topic of our examination must be the cost differential.

10.2 Cost of power in the importing country

The relevant buyer of power from Nepal is India. As of now, the Indian power supply industry is heavily regulated, but it is reported to be moving towards a greater liberalization.

Actual cost of power to Indian utilities in areas neighboring Nepal is not known to us. In a liberal regime, however, the country would always have the option of generating thermal power from coal, which is the cheapest internationally available fuel for large-scale use. The cost of such power, generated near a suitable port for import of coal in South or South-East Asia is now in the order of USD 0.05 (USc 5.0) per kWh (firm power at 0.8 load factor, cost of desulphurization and ash disposal included). This cost is then a useful "benchmark" against which the cost of imports would be considered.

For power to be supplied inland at a distance from the coast, the cost of transmission must be added. This cost, however, is moderate, when large quantities are transmitted. In a project now being studied in Mozambique, the cost of transmitting 900 MW over a distance of 1300 km is estimated at approximately USc 0.5 per kWh. So for power supplied within this distance from the coast, the cost would not be much above USc 5 per kWh. Only at prices lower than this would there be an economic incentive for the importer.

(For comparison, the price paid by Thailand for power imported from neighboring Laos is reported to be of the order of USc 4.5 per kWh, at the border, some 600 km inland. Alternative power could have been from lignite or "brown coal" in the same area).

10.3 Cost of power for export

Development of hydropower in Nepal is not particularly cheap, in spite of its abundance. This is due to the extremely rugged topography of the country, which consists of steep, narrow

valleys, few lakes or wide valley plains suitable for establishing storage. The steep rivers also carry extreme sediment loads, often calling for costly intake structures or causing rapid sedimentation of storage basins.

The cost of the sites now being developed for domestic supply (Khimti Khola, Kali Gandaki, etc.) indicates a cost level much too high for export. Khimti needed a buy-back rate from NEA of USc 6 in order to be acceptable to the developer. The same rate has been agreed for Bhote Kosi and is being proposed for a number of other small or medium sized projects. For the larger Arun III project, which has been temporarily shelved, reported cost figures vary between a low of USc 4,5 (1993 level, without contingencies) and a high of USc 8 (2002 level, projected) per kWh.

If cheaper sites could eventually be identified, it would be contrary to the interest of the country to reserve these for export while more expensive sites are being used for domestic supply. The loss (extra cost) to consumers would cancel any gain from the export.

Then, it may safely be concluded, that the potential for profitable export of power is slim or non-existent for Nepal.

10.4 Export in multi-purpose projects

The situation for export in the case of multipurpose project in Nepal's four big watercourses could be a bit different. The cost of implementing a multi-purpose project is justified by the combined benefits from a number of different purposes like power generation, irrigation, water supply, flood attenuation, navigation, etc.

The most easily quantifiable of these various benefits is the power generation. Characteristics of the other benefits are not only that they are less easily quantifiable, but also that they accrue nearly entirely downstream of the project. A likely course of negotiations towards the project may then be like this: Firstly, a value is ascribed to the power to be generated by a comparison with the benchmark cost of alternative power as indicated above. Secondly, the other benefits will be assessed in a less quantifying fashion to ascertain whether the downstream beneficiary can be willing to pay for the benefits as much as necessary to make the project viable. The downstream beneficiary could even be willing to accept a higher price for power than in the pure export case, but only in exchange for paying less for the other benefits. In any case, no substantial profit can be expected by the owner of the site and not more than the margin necessary to make the project as a whole "bankable" (sufficiently reassuring to the financial institutions involved).

10.5 Exchange of power (alternating export/import)

Even if the prospect for large scale export of power does not seem very promising, there can be a good case for exchange of power on a more moderate scale to take advantage of the complementarity between hydropower in Nepal and thermal power across the border. In contrast to the generation of firm power for export, which calls for some possibility of seasonal storage, a profitable exchange of power can be based on a more moderate storage, sufficient to allow the energy available at a plant in Nepal in the dry season to be produced in its entirety during daytime, in part for export. The thermal power is supplied back to Nepal from the

foreign thermal system at night, allowing the reservoir to be filled again for the next day's generation.

10.6 Export versus domestic supply

Because costs turn out to be too high for profitable export of power should not be taken to mean that the cost of power for domestic supply is excessively high. On the contrary, a cost of firm power in the order of US\$ 6 per kWh is definitely higher, but not much higher, than the "benchmark" cost of thermal power based on the cheapest internationally available fuel in favorable locations near the sea. If such power should have been transmitted to Nepal as import power, or generated in the country from imported fuel, the cost would have been considerably higher.

Consequently, the country's hydropower is definitely a valuable resource in that it enables the country to avoid, for its own part, the high cost of importing power over long distances or the cost of importing fuel at high transport costs.

11. Power for industry

11.1 Industry in general

Virtually any industry is fundamentally dependent on the regular supply of electricity. Even if some of the industry's energy requirements could be covered from other sources, all lighting and all motive power for industrial machinery and tools need electricity. Electricity is the only source of energy that can be controlled in minute quantities in industrial instrumentation. A breakdown of the electricity supply, even temporarily, can cause devastating interruption in industrial processes.

Compared to the demand for regularity, the cost of electricity comes second in importance. For most industries, the cost of electricity rarely amounts to more than 2-3 per cent of gross production cost.

While a reliable supply of electricity is a condition without which industry cannot operate, it is not itself sufficient to motivate the establishment of industries, irrespective of the price at which electricity is offered. The cost of electricity in "normal" industries is dwarfed by other costs. Lack of reliability, though, can be a major cost factor. Thus, given a choice between low priced electricity, lacking reliability, and a somewhat higher price at which the utility can assure reliability, the choice is clear in the majority of industries.

11.2 Energy intensive industries

A special class of industries are those for which electricity is not only an infrastructure for the production process but an input by itself. These are the so-called power-intensive or power-consuming industries.

A characteristic of these industries is that they are all engaged in large scale processing of raw materials, primarily the processing of mineral ores into metal (aluminium, ferro-alloys, etc.)

The dominant ore processing industry, the iron and steel industry, uses coal as its main energy source, since a chemical reaction with coal (reduction) is the basis for extracting iron from the ore, and because carbon from the coal is an additive for making iron into steel. The iron and steel industry is indeed a heavy user of electricity as well for handling and milling, but location is entirely dependent on the availability of reasonably priced coal. In the choice between locating the industry near the source of coal or the source of ore, the history of the industry shows that a location near the coal fields is the preferred one.

In contrast, other metals industries whose processes are based on electricity (aluminium, ferro-alloys, abrasives) tend to be located near the supply of power and accept that they have to have the ores transported over long distances. Then minimization of these transport costs generally dictates a location at or near the coast, so that only ocean transport is required. Location at the coast also minimizes the cost for transport of the products to market.

This is then the typical, required location of an electricity-based metals industry: near the coast and with good port facilities and moderate distance to a source of low cost electricity.

None of these criteria are satisfied by Nepal. As long as no ore deposits are identified in the country, ore would have to be transported over a long land distance in addition to the ocean transport (typical sources of ore are Australia, South Africa, and South America). The products, less bulky than the ores but still a considerable volume, would have the same transport handicap on their way to the market.

Above this, power costs in Nepal are not competitive, by a wide margin. Countries with good coastal locations competing to attract metals industries offer prices as low as USc 2 per kWh.

12. Use of local resources

From Nepal's point of view use of local resources is an important objective. First of all, optimum use of local resources in hydropower development will reduce costs because:

- a) Local manpower costs less than foreign manpower
- b) Local input means simpler set-up and reduced overhead
- c) Local resources require no foreign exchange

Secondly, development of local capability is of vital importance for efficient operation and proper maintenance of the country's power generating facilities in the future.

It will be important to consider the local participation at an early stage of the project planning. When the basic plant specifications are determined and the scheduling of the project is fixed, it may be wise to consider:

- Which components can possibly be manufactured in Nepal ?
- What minor design changes could be made in order to enable local industries to do the job?
- What time schedule is realistic when assuming a high degree of local participation?
- How should contracts be put together in order to facilitate local contribution?
- How could local contractors carry out construction work with the type of equipment and manpower they have or can afford to get?
- Can project preparation begin at an early date in order that construction time later may be less critical?

These questions should be considered, especially when foreign consultants and foreign investors are involved. This is the case when a competent, local developer in partnership with foreign investors can contribute invaluable know-how and local insight. In case no such local partner is involved on the developers side, it falls on EDC to take care of these issues and later to include them in the terms of license.

It should also clearly be in the interest of the Government to obtain an extensive use of local input in the developing of the Nepalese electricity industry.

13. *The need of a master plan for the utilization of the water resources*

Nepal has, beyond a doubt, a considerable theoretical hydropower potential. However, of this theoretical potential, only a certain percentage is likely to be accessible in the near future when all technical, economical, social, and environmental factors are matched against each other.

A country about to develop its hydropower resources will need right from the beginning some forward planning in the form of a Master Plan, to guide the selection of successive sites to be developed. The plan should however not be so elaborate and rigid as to become a straightjacket for the essentially political process of actual selection.

In the initial stages, the best should not be allowed to be the enemy of the good, by requiring to have all future and possible sites included, which will take long time and a heavy cost. It should suffice to identify and survey those sites that stand out as obvious candidate projects and incorporate these into a geographically satisfactory plan, with a ranking as to relative attractiveness (cost, environmental impact, location, etc.) This will allow the selection of first priority projects without much potential error.

The Plan can then be successively expanded and completed, from studies eventually covering all potential sites. An important aim of the planning process is to make reasonably sure that projects developed now will be designed so as to fit into an optimal power generation system as progressively developed over the future.

A considerable material in the form of mapping and design studies is already available, to support the elaboration of a preliminary Master Plan with additional studies as necessary. It is important though to review existing planning material so as to ensure a reasonable uniformity in the treatment of data, and in the quality of analyses as among the various projects when used for comparison and ranking.

Studies for a Master Plan should:

- Determine with necessary accuracy the location of potential projects, the theoretical power potential, the hydrology, the geology, etc. In short, to collect, process, and quality control the basic data needed to form a qualified opinion on where to start.
- Outline the technical considerations. Is it possible to utilize this particular site in due time with available technology and realistic financial frames?
- Evaluate whether the area can be reached at all by existing roads or, if not, is it technically / economically possible to build new roads to this particular site in time?
- Hold the location of the more promising projects against existing power lines or the areas with highest priority for electricity supply.
- Outline the social implications. Resettlement of people? Water supply for consumption or irrigation? Mitigating measures possible and / or economically feasible?
- Outline the environmental implications and complications. Mitigating measures possible and / or economically feasible?
- Summarize the assumed cost of developing each site, including alternative solutions if any, based on as updated knowledge as possible.

To avoid costly failures, all development projects dependent on natural variations in precipitation and river run-off need as good basic data on the resource itself as possible. Far too many development projects have been economic disasters by neglecting this basic fact. When it comes to capital intensive undertakings such as hydropower schemes, this cannot be overlooked in any country, developed or developing.

When a sufficient amount of data are collected and processed, all the projects should be ranged in a priority list according to criteria such as total cost per kWh and / or size, simplicity, low degree of conflicts, or what ever is regarded as appropriate in Nepal. This list should then be the basis for further field investigations or technical reconsideration if necessary, or for actual detailed planning and implementation. One would assume that HMGN has a lot of plans and proposals based on surveys made by several foreign consultants during the last decade. This material is probably an excellent start for construction of a national Master Plan.

One may always be prepared to rearrange such a list if new projects or new solutions may come. The Master Plan is then a continuously changing product showing at any time which are the best projects suitable for developing, at which price, and which consequences.

However, there are some pitfalls in this concept. A Master Plan should not be allowed to turn into an instrument so cumbersome or rigid that the hydropower development stops for shorter or longer periods of time. The ambitions of a Master Plan should be to identify, with the necessary accuracy, the projects that will provide Nepal with the cheapest electricity as fast as possible and with a minimum of damages or inconveniences on all levels.

The often loudly voiced omniscient guidelines of the international communities, international money lenders, and NGO's should be listened to in a polite way, but not necessarily adapted fully in these matters. Nepal should adopt what is appropriate for Nepal and not what is the present situation in the well off industrialized countries. When the latter developed their own hydro power potential some decades ago, they did not at all follow the guidelines they now wish to impose on the developing countries.

It may prove necessary to engage some foreign assistance to get the process of making a Master Plan going, but the necessary capacity and knowledge to make and maintain a Master Plan should be built up within HMGN. Without a definite policy to be as self sufficient as possible as fast as possible, Nepal will be in the pocket of expensive foreign consultants for a long time.

A Master Plan for hydropower development is clearly a work that must be done in an integrated cooperation among relevant ministries, governmental agencies and other stakeholders. However, one ministry (or agency) should be the responsible public unit for the progress of the process and execution of the necessary tasks. Other ministries / units / stakeholders should be invited and encouraged to participate, but not allowed to slow down or veto the process without extremely grave objections.

14. *Water resources management*

Within the overall aim of assisting in the development of water resources and electricity legislation, the work of the NVE team has concentrated initially on the energy and electricity issues of primary importance to accommodate the first internationally financed hydro power projects in Nepal. Development of the necessary legal and financial instruments was imperative, to prevent the efforts in the hydropower sector from stopping fully.

The NVE team did, however, comment briefly on an existing draft version of the Water Resources Act, 2049 and, while the team was assisting HMGN on the pressing legal institutional issues related to the Electricity Act, 2049, general issues of water resource management were frequently addressed. The need for an in-dept analyses of the complex issues in general water management is, in the Team's opinion, obvious and cannot be delayed for long without grave consequences.

With Nepal's ambitions to develop her ample hydropower potential for electricity generation and industrial development, the complexity and challenges in the water management sector will also increase exponentially. However, water shortage and pollution are already of major concern and are becoming more widespread every year. The competition between different uses is rapidly increasing and will continue to do so with increasing industrial development. The present National Policies in relevant areas are not sufficiently developed neither for each sector nor harmonized across sectors to cope with the challenges. The legal instruments are of variable quality or even missing entirely. The institutional capabilities are often indecisive, outdated, fragmented, or absent.

14.1 Status of the water resources management in Nepal

The distribution of surface water in Nepal is uneven and natural reservoirs (lakes) are nearly non-existent. Most of the surface water is at any time in snow-capped mountains or the rivers run from these areas or in one of the numerous irrigation canals. The rainfall is highly seasonal and the river flow fluctuates accordingly.

Even if Nepal has a considerable hydropower potential, and hence ample water resources, the water is not necessarily available in the right place or at the right time of the year. Water scarcity is frequent in the most densely populated areas. The gap between demand and availability of water in the necessary quantities and qualities is of fundamental concern for HMGN. When the supply is limited and unevenly distributed, only storage in reservoirs, water recovery, demand management, water saving procedures, and adequate sewerage and sanitation technology can alter this situation.

Water quality degradation is probably the most important issue because this reduces the usability of the available resources even more. The situation in the Kathmandu Valley and other urbanized areas clearly demonstrates this problem.

The old tradition of regarding the surface water as potable even after it has received considerable amounts of untreated sewage, manure or other pollutants from the users upstream is now a serious health problem. Despite some efforts on the drinking water and sanitation

sectors, progress is slow compared to the magnitude of the problem. Lack of education, public information, and some cultural conditions are also important in this context.

Intensive agricultural activities based on old traditions, forest removal, overgrazing and urbanization, just to mention a few, cause an accelerated soil erosion, sediment transport in river channels, canals and reservoirs, increase flood peaks, reduce low flows and degrade the water quality. A wide range of well proven solutions are available to prevent or arrest these undesired effects, but the potential success of such measurements is dependant on an integrated legislation, a competent Public Administration, financial resources and public education and awareness.

Water use is complex even in the old rural tradition if the population density is high. When one introduce modern industrial production methods and the degree of urbanization increases as the population continues to grow, the complexity and competition for water increase even more. Typically, one moves from a situation where each decision has only a limited effect on the total household of water to a situation where a decision made in one public sector easily may cause a serious situation in other sectors.

The introduction of hydro generated electricity is no exception in this respect since medium and large sized projects often include diversion of rivers or impoundment of such magnitudes that it will alter the hydrological regimes in a particular river basin. It is important to realize, however, that hydropower projects often increase the available volumes of water in dry periods. Since the water usually is unevenly distributed in time and space, this is more often than not regarded as necessary in order to improve the living standards of the population in arid areas or in the country as a whole. The storing of water in one period of the year to apportion the water in dryer seasons is often the most efficient kind of water management. Hydro power projects launched as multipurpose projects (irrigation, navigation, drinking water, process water for industry, etc.) are normally attractive because the electricity generation does not degrade the water quality and the capital investments may be shared by more than one user.

14.2 Increase of water supply

In the urban areas of Nepal, like the Kathmandu Valley, the present water resources are reported to be exhausted because of too heavy withdrawals and leakage from the inadequate piping system. The demand continues to increase. Means of increasing the supply are therefore a pressing issue. As previously mentioned, building a reservoir or diverting a river for hydro power purposes give access to large volumes of water for other purposes than production of electricity. The much needed water management system for handling the hydropower part of the energy sector can easily take care of some of the other water management challenges as well. Here one should look for common interests and not conflicts of interest.

To manage a balanced supply of water to different users and to cover the basic needs of the population, HMGN must focus on:

- decisive and harmonized policies on all sectors where the use of water resources plays a major part.
- a workable and adequate legal framework.
- an efficient and competent Public Administration capable of enforcing the legislation.

14.3 Demand for water and competition among alternative uses

The most common competition for water before the hydropower sector became of importance, was between water withdrawal for irrigation (and between irrigators), water supply for domestic use and some industrial purposes in the later years. The Water Resources Act, 2049 and The Water Resources Regulation, 2050, regulate to some extent, the use and give some indications on how disputes should be solved. There are, however, reasons to believe that the current integration and harmonization between different parts of the legal environment in Nepal is somewhat below desired levels.

HMGN's possibilities of executing the existing laws and regulations are limited and the legislation as the institutional setup needs some additions and improvements.

A major concentration on hydropower is likely to increase already latent competition among other users or create new conflicts. As most countries have priorities for allocating water based on age long traditions, this seldom reflects the present economic value of water, and non-economic objectives tend to take precedence.

Few developing countries charge prices for water services which reflect their real value to the users. This often leads to over-consumption and depletion of water resources and undermines the sustainability of water schemes by failing to provide sufficient income to cover the capital costs and the expenses of running the supply.

In most cultures, water is regarded as an inherited or basic right and the idea of paying for a "right you have inherited" is very difficult, if not impossible, to understand.

Competition for water will in the future be a serious constraint to development and welfare for more countries than Nepal. The process of reallocating water to higher value uses is not easy, nor always politically possible among the rural population which has invested generations of labor and all their available capital in a traditional irrigated agriculture.

14.4 Water resources management and the river basin concept.

A "popular" policy or management doctrine today is to delegate the decision power to the lowest possible administrative level. The idea, which was developed in the more literate and well functioning parts of the industrialized world, is basically sound, but not necessarily practicable everywhere. Strategic planning for the utilization of the water resources is often only possible on the national level because of the complexity of the water management and the lack of competent administrative personnel in the regional levels.

Never the less, one should have "the river basin concept" as the ultimate goal for water resource management in any country. The gravity forces and the run of the river do not recognize political borders between countries or regions within a country. The smallest unit sensible to use when dealing with water resource management is then the river basin. For Nepal, the advice from the NVE team is to start planning for a river basin water management structure, taking legislation, institutional structures, and financial resources into consideration. It may take some decades to get there, but it is best to start walking in the right direction than running in a wrong one.

In many cases, water management plans have not been, or only to some minor extent, implemented because they were prepared primarily by technical staff or did not sufficiently address the need for a better regulatory framework and institutional capacity. In several

countries, master plans for sub-sectors such as irrigation, hydropower, or consumption have been made in minute details. These plans, however, have not addressed the scarcity of water resources as such and have not taken into account political realities, other sectors' needs and positions, or non-governmental stakeholders.

As stated for the energy sector in Nepal, the NVE team will stress the need for clear discrimination between:

- Policy-making
- Regulatory activities
- Operational activities
- Trading functions

15. *Implementation of hydropower schemes based on private sector involvement in cooperation with public sector. A summing up of the main issues*

Prerequisites of a hydropower scheme are:

- Legal framework
- Efficient public administration
- Impetus to encourage private investments
- Track-record; - at least based on a few success stories

Schemes could be promoted by a list of projects selected from the current Master Plan with regard to suitability for this type of implementation. In any case, the Team will like to underscore the importance of being able to indicate to potential investors which projects would from the State's point of view be given priority, as well as their general characteristics.

The role of the State in the hydropower scheme should be restricted to:

- Enactment of legislation, including clear and transparent regulations.
- Granting of licenses
- Running of State monopolies related to the electricity industry.