"In the hydropower sector, institutional and regulatory mechanisms are weak which has resulted in rampant corruption and absence of accountability, integrity and transparency.

"
A STUDY OF NEPAL’S HYDROPOWER SECTOR
Report: A STUDY OF NEPAL'S HYDROPOWER SECTOR

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Preface

Transparency International Nepal (TIN) has been leading a social movement, which aims at promoting integrity and combating corruption in Nepal. In 21 years of fighting corruption, TIN has seen progress and upheavals in the governance system, yet its core mission still remains the same – a corruption-free Nepal. In order to achieve this goal, TIN adheres to democracy, integrity, transparency, accountability, justice, solidarity, courage and honor as its values.

TIN’s Strategic Plan 2013-2017 has been guiding its overall activism and management. In line with strategic directions, TIN is implementing different programs – Building National Integrity in Nepal (BNIN) being one of them. The BNIN Program is being implemented with the support of Royal Norwegian Embassy (RNE) in Nepal.

TIN has been initiating some important studies under the BNIN program targeting different sectors to assess ground realities. A Study on Nepal’s Hydropower Sector is one of them. This study was considered out of public concerns related to the non-realization of the potential of Nepal’s hydropower sector.

The economics of energy, its security and its sustainable development must always take priority. It has become cliché that Nepal with a huge amount of water resources has been engulfed in darkness throughout the year. Thus, it was necessary to look deep in the hydropower sector so that the country can bail out of energy crisis. There are many suggestions and recommendations prescribed by this study with transparency, accountability and integrity measures being the urgent ones in electricity production, transmission and distribution.

Furthermore, license holding in survey and development is a glaring example where corruption control is utmost needed.

The government of Nepal lacks adequate financing to develop this sector. There are hurdles at policy and institutional levels. But a step towards easing hassles by following the public-private partnership model impartially, fairly and justly could be towards the right direction. The government of the day has to address the energy crisis, end load-shedding and unleash the potential of hydropower in Nepal’s economy. The bottom-line is to maintain good governance and transparent public procurement in hydropower sector.

In this light, this study conducted by Nepal Economic Forum (NEF) for TIN may be a useful reference as far as challenges in Nepal’s hydropower sector is concerned. The study highlights facts and figures to support the importance of anti-corruption, integrity and certainty in public policy formulation, implementation and monitoring in Nepal’s hydropower sector. This study could be of assistance to those who want to know hydropower dynamics in Nepal.

We, at TIN, are happy to publish this report. The NEF deserves our special thanks for undertaking this study. Similarly, we are equally thankful to the Royal Norwegian Embassy for technically and financially supporting our initiatives, without which this report would not have seen the light. The support of other actors, including those in the TIN membership and Secretariat, is hereby also highly acknowledged and credited.

Shreehari Aryal
President
Nepal's hydropower generating capacity of major river basins is said to be 83,290MW of which 42,133MW is deemed economically feasible to harness. Nepal has exploited only 776MW (1.80%) of its total generating capacity. As of now, the two major players in the hydropower sector are the Nepal Electricity Authority (NEA) and the Independent Power Producers (IPPs), with the NEA owning 65% of all hydropower projects in operations and the IPPs controlling the remaining 35%.

Policy formulation

Policy making and regulation in Nepal is relatively a centralized process. Most of the policies that are formulated follow a top-down approach. The Ministry of Energy (MoE) is the apex policy formulation body. It is responsible for formulating the policies, plans and implementation for conservation, regulation and utilization of the energy sector. The Ministry of Finance (MoF) deals with the subsidies and taxation policies. Besides these government agencies, organizations like Alternative Energy Promotion Centre (AEPC) are also utilized to structure the policies in the energy sector.

Major policies governing the sector

The Electricity Act 1992 and the Electricity Regulation 1993, are the main laws governing the hydropower sector in Nepal. The Electricity Act 1992 covers all issues in regards to survey, generation and distribution of electricity along with the licensing terms and regulations. The Electricity Regulation 1993 supports the Act and sets out procedures for obtaining licenses for hydropower projects. While these Acts are still in enforced, the Electricity Act 1992 and its regulation have often been criticized when it comes to licensing issues, royalty payments and unclear policy directives.

The Hydropower Policy 1992 was announced after the establishment of democracy in Nepal in 1990. It was established with the aim of creating an investment-friendly environment to encourage the rapid development of hydropower sector in the country and to encourage involvement of the private investors as well. The policy has been considered progressive with measures regarding generation license validity and income tax holidays warmly welcomed by investors. While considered progressive, the policy has also been described as being limited in scope.

The Hydropower Policy 1992 was revised and was replaced by the Hydropower Policy 2001. The main goals of this policy were to develop hydropower as an exportable commodity, generate electricity at low cost by utilizing the water resources, tie-up electrification with the economic activities and extend reliable and better electricity service throughout Nepal at a reasonable price. The policy has been directly responsible for increased power generation and private sector encouragement in hydropower development and capacity building. The policy, however, has been criticized for having inconsistencies with 1992 policy and for failing to deliver on certain provisions set out in it.

While the Hydropower Development Policy and Electricity Acts deal mainly with the hydropower development and electricity usage, the Water Resources Act 1992 and Water Resources Strategy 2002 are concerned mostly with development and use of water resources in Nepal. The Water Resource Act 1992 gives priority to the use of water for drinking purposes over any other domestic and commercial use, whereas the Water Resources Strategy 2002 is concerned with the overall development of water resources in Nepal and has formulated 10 different strategies to meet it.

Issues of accountability, integrity and transparency in the hydropower sector

Nepal has been plagued with issues of lack of accountability, integrity and transparency which in turn is hampering the overall development of the
country. Currently ranked as the third most corrupt nation in South Asia, lack of transparency and accountability is an issue in Nepal that needs to be resolved.

Impact of lack of accountability, integrity and transparency on the Hydropower Sector

- Cost and time overrun can have detrimental effects on the overall profitability and efficiency of the project
- Compromise on quality of products and services
- Low level of integrity and trust
- Foreign and domestic investors are discouraged from investing in the sector
- Current load shedding problem faced by the country

Impact of lack of accountability, integrity and transparency on the Hydropower Sector

Source: Developing a Strategy to Promote Transparency, Integrity and Accountability in Nepal’s Water Sector, WIN, 2010

Table 1: Ways to promote accountability, integrity and transparency in Nepal’s hydropower sector

<table>
<thead>
<tr>
<th>Changes to PPA and pricing methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>More objective, practical and receptive PPA’s should be considered</td>
</tr>
<tr>
<td>Pricing can be linked to some objective based index to increase credibility</td>
</tr>
<tr>
<td>Electricity should be charged as a commodity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role of Government and Integrity Pacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrity pacts should also be considered as an option</td>
</tr>
<tr>
<td>Public procurement should be made more transparent, systematic and uniform</td>
</tr>
<tr>
<td>Establishment of sub-sectoral ministries should be considered</td>
</tr>
<tr>
<td>Greater inspection of hydropower projects</td>
</tr>
<tr>
<td>FDI approval process should be simplified for hydropower projects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Completion Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project specifics and procedures should be documented upon completion for future usage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strengthening Accountability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A move from denial to acceptance of such problems and building a coalition of management, employees and consumers in regards to solving the problem of corruption is also essential</td>
</tr>
</tbody>
</table>

Source: Developing a Strategy to Promote Transparency, Integrity and Accountability in Nepal’s Water Sector, WIN, 2010

Risk areas and mitigation measures

As with any form of investment, the hydropower sector also carries immense risk to investors and other players in the sector. Listed below is a brief overview of the risks prevalent in the hydropower sector and some mitigation measures to correct it.

Table 2: Risk areas in the hydropower sector and mitigation measures

<table>
<thead>
<tr>
<th>Risk Areas</th>
<th>Background</th>
<th>Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiduciary Risk</td>
<td>NEA related inefficiencies, Corruption, Preference to low cost bidder, NEA cost overrun issue</td>
<td>The Fiduciary Risk Reduction Action Plan, Changes in procurement plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political &amp; Governance Risk</td>
<td>Changing government, changing priorities, Political interference, Bureaucratic hurdles, Multiple institutions involved</td>
<td>Political unity, Unbundling of NEA, Risk sharing mechanisms</td>
</tr>
<tr>
<td>Sector Strategies &amp; Policies Risk</td>
<td>Inconsistent policies, Outdated Acts and policies, Planning deficiencies, Lack of regulatory body, Government failure in achieving goals, Slow adoption of act and policies</td>
<td>Implementing the holistic basin wise development concept, Reconciling conflicts of interest in Act and Regulations, Shortening of procedures, Update policies and Acts, Set achievable goals</td>
</tr>
<tr>
<td>Institutional Risk</td>
<td>Off-taker issue, Weak project development agreements</td>
<td>Open access for IPPs, Drafting of standardized PPA should be considered, Institutional reform to improve NEA’s financial performance, Transmission and distribution should be open to the private sector</td>
</tr>
<tr>
<td>Financial Risk</td>
<td>IPPs unable to raise the required capital, Foreign exchange risk, Interest rate risk, Market risk</td>
<td>Better fund structures should be developed, Rate of revenue should be denominated in foreign currency, Sign long term PPA with the NEA, Reduce high distribution losses incurred by the NEA</td>
</tr>
</tbody>
</table>
Recommendations

The report highlights some key macro-level recommendations to further the development of the hydropower sector in Nepal. Recommendations include: methods to solve institutional and legal issues faced by the sector; ways to solve the demand supply mismatch and directions to create a better financial climate for hydropower investors. The table below gives a brief insight into the recommendations underlined in this report.

Table 3: Recommendations to improve the hydropower sector

| Institutional and Legal | • Formation of an effective ‘one-window’ institution  
|                        | • Define clearer terms of reference for institutions  
|                        | • Restructuring the NEA  |
| Solving the Supply-Side Issue | • Issues regarding PPA rates need to be resolved  
|                          | • Revisit demand forecasts  
|                          | • Energy bank between India and Nepal should be established efficiently  
|                          | • Pursue micro-hydropower projects  |
| Other Recommendations | • Improve financial climate for hydropower investment  |
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## Abbreviations and Acronyms

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<th>Abbreviation</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>AEPC</td>
<td>Alternative Energy Promotion Centre</td>
</tr>
<tr>
<td>BFI</td>
<td>Banks and Financial Institutions</td>
</tr>
<tr>
<td>BGHPDC</td>
<td>Budhi Gandaki Hydroelectric Project Development Committee</td>
</tr>
<tr>
<td>BOOT</td>
<td>Build, Own, Operate and Transfer</td>
</tr>
<tr>
<td>CAR</td>
<td>Construction All Risks</td>
</tr>
<tr>
<td>CBET</td>
<td>Cross-Border Energy Trade</td>
</tr>
<tr>
<td>CIAA</td>
<td>Commission for the Investigation of Abuse of Authority</td>
</tr>
<tr>
<td>DoED</td>
<td>Department of Electricity Development</td>
</tr>
<tr>
<td>EAR</td>
<td>Erection All Risks</td>
</tr>
<tr>
<td>EDC</td>
<td>Energy Development Centre</td>
</tr>
<tr>
<td>EIA</td>
<td>Environment Impact Assessment</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FRRAP</td>
<td>Fiduciary Risk Reduction Action Plan</td>
</tr>
<tr>
<td>GoN</td>
<td>Government of Nepal</td>
</tr>
<tr>
<td>GW</td>
<td>Giga Watt</td>
</tr>
<tr>
<td>HDP</td>
<td>Hydropower Development Policy</td>
</tr>
<tr>
<td>HIDCL</td>
<td>Hydroelectricity Investment and Development Company Ltd.</td>
</tr>
<tr>
<td>IBN</td>
<td>Investment Board Nepal</td>
</tr>
<tr>
<td>IEE</td>
<td>Initial Environment Examination</td>
</tr>
<tr>
<td>INPS</td>
<td>Integrated Nepal Power System</td>
</tr>
<tr>
<td>IPO</td>
<td>Initial Public Offering</td>
</tr>
<tr>
<td>IPPAN</td>
<td>Independent Power Producers’ Association Nepal</td>
</tr>
<tr>
<td>IPP</td>
<td>Independent Power Producers</td>
</tr>
<tr>
<td>KW</td>
<td>Kilo Watt</td>
</tr>
<tr>
<td>MHP</td>
<td>Micro Hydro Projects</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Energy</td>
</tr>
<tr>
<td>MoF</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>MW</td>
<td>Mega Watt</td>
</tr>
<tr>
<td>NEA</td>
<td>Nepal Electricity Authority</td>
</tr>
<tr>
<td>NERC</td>
<td>Nepal Electricity Regulatory Commission</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NHDP</td>
<td>Nepal Hydropower Development Project</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
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<tr>
<td>NPC</td>
<td>National Planning Commission</td>
</tr>
<tr>
<td>NPR</td>
<td>Nepali Rupee</td>
</tr>
<tr>
<td>NRB</td>
<td>Nepal Rastra Bank</td>
</tr>
<tr>
<td>NRREP</td>
<td>National Rural and Renewable Energy Program</td>
</tr>
<tr>
<td>PDA</td>
<td>Project Development Agreements</td>
</tr>
<tr>
<td>PMP</td>
<td>Pancheshwar Multipurpose Project</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnerships</td>
</tr>
<tr>
<td>PTA</td>
<td>Power Trade Agreement</td>
</tr>
<tr>
<td>RE</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>RERL</td>
<td>Renewable Energy for Rural Livelihood</td>
</tr>
<tr>
<td>RET</td>
<td>Renewable Energy Technologies</td>
</tr>
<tr>
<td>RHL</td>
<td>Remit Hydro Limited</td>
</tr>
<tr>
<td>RoR</td>
<td>Run-of-River</td>
</tr>
<tr>
<td>SAARC</td>
<td>South Asian Association for Regional Cooperation</td>
</tr>
<tr>
<td>SARI/EI</td>
<td>South Asia Regional Initiative for Energy Integration</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USD</td>
<td>US Dollar</td>
</tr>
<tr>
<td>WECS</td>
<td>Water and Energy Commission Secretariat</td>
</tr>
<tr>
<td>WRS</td>
<td>Water Resource Strategy</td>
</tr>
</tbody>
</table>
1. Overview of the hydropower sector

The fact that Nepal has immense hydropower potential is well known by now. Nepal’s hydropower generating capacity of major river basins is said to be 83,290MW of which 42,133MW is deemed economically feasible to harness.1 According to the National Energy Crisis Reduction and Energy Development Decade Plan 2016, Nepal has harnessed only 776MW of its significant hydropower generating capacity.2 This represents only 1.80% of the economically feasible capacity.3 While countries like Norway (utilizing 98.25% of hydropower capacity) and Brazil (utilizing 85.56% of the hydropower capacity) have been able to harness majority of their hydropower capacity, Nepal does not even come close to utilizing 10% of its capacity as the sector is fraught with various bottlenecks.

1.1 Current energy consumption pattern

In Nepal, traditional sources of energy have dominance over energy demand and consumption. Despite high potential for generating energy through water resource, energy crisis still remains, as Nepal has failed to achieve notable progress in the production of alternative and renewable energy. This high dependence on traditional sources of energy is unhealthy for the economy and development of the country as a whole (see figure Figure 1). Hence, there is a dire need to develop hydropower projects in the country itself. Further, imports of fuel from India increases Nepal’s dependency on its neighbor, which as the recent trade embargo showed, can have devastating consequences. Furthermore, these imports aggravate the trade deficit of the country as well.4

Figure 1: Energy consumption status in tons of oil equivalent


---

1.2 Size - Hydropower potential and utilization

The table below shows the size of hydro electricity generation potential from the major river basins in Nepal. Of this economically viable potential, 59.6% lies on only two rivers; the Karnali and Mahakali (see Table 4). The small-scale plants are exploiting most of this capacity.

Table 4: Nepal’s major rivers and their hydropower potential

<table>
<thead>
<tr>
<th>S.No.</th>
<th>River Basin</th>
<th>Total theoretical potential (MW)</th>
<th>Technical Potential (MW)</th>
<th>Economic Potential (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sapat Koshi</td>
<td>22,350</td>
<td>11,400</td>
<td>10,860</td>
</tr>
<tr>
<td>2</td>
<td>Sapat Gandaki</td>
<td>20,645</td>
<td>6,660</td>
<td>5,270</td>
</tr>
<tr>
<td>3</td>
<td>Karnali &amp; Mahakali</td>
<td>36,180</td>
<td>26,570</td>
<td>25,125</td>
</tr>
<tr>
<td>4</td>
<td>Southern Rivers</td>
<td>4,110</td>
<td>980</td>
<td>878</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>83,290</strong></td>
<td><strong>45,610</strong></td>
<td><strong>42,133</strong></td>
</tr>
</tbody>
</table>

*Source: Hari Man Shrestha, “Cadastre of Potential Hydropower Resources in Nepal”*

Based on installed hydropower generation capacity, Nepal’s hydropower project categories can be broadly divided into three segments. (See Table 5)

Table 5: Size and cost of Hydropower projects in Nepal

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Size of Hydropower Plant (MW)</th>
<th>Total installed capital cost range (in USD)</th>
<th>Installed capital cost per unit range (in USD)</th>
<th>Operation and maintenance cost (%/year of total installed cost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Large (&gt;50 MW)</td>
<td>&gt;75 million</td>
<td>1-1.5 million</td>
<td>2-2.5%</td>
</tr>
<tr>
<td>2</td>
<td>Medium (10-50MW)</td>
<td>20-75 million</td>
<td>1.2-1.8 million</td>
<td>2-3%</td>
</tr>
<tr>
<td>3</td>
<td>Small (&lt;10MW)</td>
<td>&lt;20 million</td>
<td>1.5-2 million</td>
<td>2-4%</td>
</tr>
</tbody>
</table>

Only one plant i.e. Kali Gandaki exceeds 100 MW in size. Until 2015, Kali Gandaki, which has an installed capacity of 144 MW, provided 30% of the electricity for the national grid, making the entire electricity system highly dependent on one plant and extremely vulnerable to its inefficiencies.

1.3 Current demand and supply

As per the annual report of the Nepal Electricity Authority (NEA), the annual peak power demand of the Integrated Nepal Power System (INPS) in 2014-15 stood at 1,291.8 MW, with 585 MW load-shedding. NEA’s own hydropower projects supplied 357.68 MW, independent power producers (IPPs) contributed 124.71 MW and 224.41 MW of electricity was imported from India. In 2013-14, the peak power demand was at 1,200 MW, which shows that it registered a growth rate of 7.56%.

Figure 2: Peak demand and total energy available

*Source: Nepal Electricity Authority Annual Report 2015*

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Even though annual electricity production has been increasing, demand for electricity far exceeds the supply, with the NEA resorting to daily power cuts to offset the excess demand. The demand-supply mismatch in electricity production is a major barrier for Nepal in terms of overall economic development.

1.3.1 Future forecasts

NEA forecasts the demand of energy. Based on the demand accrued in its current installed capacity, it projected the demand for electricity to grow by an average of 8.7% per annum and will reach 2,978 MW by FY2024/25 (see figure Figure 3). From NEA’s calculations, if all the projects under construction are ready by that period, Nepal will be able to meet its electricity demand; however, considering that the hydropower projects in Nepal are Run-of-River, the short supply will remain in the dry months. Additionally, NEA’s calculations do not take into consideration the increase in per capita consumption of electricity, especially in the urban areas, if Nepali’s were to have access to electricity 24 hours.6

Figure 3: Load forecast demand projections

Furthermore, an independent study jointly conducted by the National Planning Commission (NPC) and the Investment Board Nepal (IBN) in 2016 has made a forecast that per capita electricity consumption will reach 700-kilowatt hour per year (kWh/year) by 2030, which can be met through total installed capacity of 8,000 MW. In addition, the National Energy Crisis Reduction and Energy Development Decade Plan 2016 has estimated that by 2018 the annual peak power demand will reach 1,837MW and that NEA will only be able to provide 830MW on its own. IPP’s are expected to contribute 600MW, bringing total energy generated in the country to 1,430MW. The forecast shows that a demand deficit of 407MW is likely to continue unless necessary steps are undertaken.

1.3.2 Latent demand

Calculating more accurate statistics for future electricity demand requires us to think in terms of latent demand, i.e., demand capable of emerging but which is not yet active. This should, for example, take into account the possible uptake of electrical goods such as air-conditioners, microwave ovens and other household appliances. Currently demand for

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these goods is limited because electricity shortage compromises the function utility of these goods. For instance, 64% of the total households in Nepal have mobile phones while only 7.16% of the total households have refrigerators.

If Nepal’s middle class grows by 20% in the forthcoming two decades so will the demand for electricity. People with more disposable income demand cleaner, more efficient sources of energy. Nepal will need an installed electricity capacity of 10,092 MW by 2030, if its Gross Domestic Product (GDP) grows at a constant 5% per year, a study on energy demand has revealed. The survey jointly conducted by the National Planning Commission (NPC) and Investment Board Nepal (IBN) showed that the power demand forecast made by the Nepal Electricity Authority (NEA) was suppressed. An absence of these types of considerations by top-level decision makers inhibits the electricity crisis from being properly addressed.7

1.4 Market players

Hydropower projects in Nepal are either operated by Nepal Electricity Authority (NEA) or Independent Power Producers (IPPs). Some of the micro-hydro projects are operated by the private sector and local communities. NEA is a major player in the electricity sector with 65% of hydropower projects in operation being owned by it. IPPs, on the other hand, comprising primarily of private players, own the remaining 35% of hydropower projects in operation.

1.4.1 Nepal Electricity Authority (NEA)

Nepal Electricity Authority (NEA) was established in 1984 as a state-owned entity responsible for the generation, transmission and distribution of electricity. NEA is the sole buyer of electricity in the Nepali market; it holds a monopoly over power producers, additionally it is also involved in hydropower generation. NEA is also responsible for energy exchanges with India and imports electricity from the Indian grid as per its requirement. While NEA is fraught with in-house inefficiencies and limited financial capacities, therefore resulting in projects being delayed and incurring high cost over runs, it still manages to reserve good profitable projects for itself. NEA also has long term financing sources at interest rates lower than the market as it has access to soft loans from the government and its subsidiaries.

As of May 2016, the Ministry of Energy (MoE) is preparing to unbundle NEA and form three separate companies for energy generation, transmission and trade, which would operate parallel to the NEA.8 However, the existing NEA Act must be amended before these three companies can start operations. As per this Act, only the NEA is allowed to generate, transmit and trade electricity.

1.4.2 Independent Power Producers

The hydropower sector in Nepal consists of over 100 IPP’s; one of the highest in all SAARC countries.9 IPPs generate electricity and then sell it to the NEA. All the IPPs in Nepal have the requisite purchase Power Purchase Agreement (PPA) with NEA.10 The electricity buying rate is fixed between NEA and IPPs for summer and winter months. All of the hydropower projects developed by IPPs in Nepal are Run-of-River River type projects as the geographic structure of the country is most suitable for the natural flow of rivers for electricity generation.

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9 IPPs considered here have PPA in place with NEA. IPPs without PPA have been excluded.
10 A Power Purchase Agreement (PPA) is a contract between two parties where one generates electricity and one is looking to purchase electricity.
1.5 Role of the private sector

Until the 1990s, the hydropower sector was under the domain of government utility. Nepal Electricity Authority (NEA) was the sole player responsible for generating, transmitting and distributing electricity in the country. After the Hydropower Development Policy (HDP) was initiated in 1992, hydropower development was opened to the private sector. The private sector was allowed to participate in the hydropower generation sector, whereas the distribution and transmission is still under the domain of NEA. These private players who are operating under the hydropower generation domain are called the Independent Power Producers (IPPs).

The private sector has had a key role in the development of hydropower projects since 1990s. It has been constantly increasing its investment in the hydropower sector. According to IPPAN, the private sector has invested NPR 55 billion in 25 hydro projects till 2013 since the first private power plant was established in 2000. According to interviews with experts, to generate 1 MW of electricity via hydropower, the private sector spends NPR 15-20 crore. This level of investment shows that the private sector can make a significant difference in the hydropower sector. Also, even though the private sector entered the market only 20 years ago, it has almost equaled what the government achieved in the last 100 years. Beyond various challenges, the private sector invests 30% of the total cost as equity and 70% in the form of loans.

Considering the inefficiencies in NEA and its hydropower projects, the private sector can play a major role to bring about changes in the energy sector of Nepal. The private sector does things for profit – and to make profit, one must be cost effective. Therefore, if hydropower plants are built by the private sector, it will be more cost effective and faster – which means the cost of generating electricity from its hydro plants will be lower; this lower cost also means the consumer gets to enjoy electricity for at a lower price. The private sector had been investing mainly on developing small-to-medium hydropower projects due to lack of capital and technical expertise until now. Therefore, if Nepal is to meet its future energy demands, it needs private sector investments.

Experts are of the view that the government should focus on regulating the sector rather than competing with the private sector. However, it is clear that in Nepal, rather than complementing each other, the private and government sector compete with each other in the hydropower sector. They believe that the government should be involved in developing hydropower projects only if they are costly as the private sector is less likely to build very costly hydropower plants unless there are incentives. Projects like Budhi Gandaki Hydropower Project can be difficult for the private sector to finance as a result, government backing is required.
2. Trends in hydropower financing

Hydropower projects are capital intensive and access to capital at various stages of the hydropower project is critical for enterprises operating in this sector. In case of Nepal, debt has been used more widely than equity to finance hydropower projects. The three key trends that can be observed in hydropower financing of Nepal are as follows:

a) Capital Market emerging as a key source of hydropower financing

The trend of hydropower companies raising funds from the primary market has expanded in recent years. Many hydropower projects are seeking to issue shares to the public to raise additional capital as there has been oversubscription of the Initial Public Offerings (IPOs). Hydropower companies such as Chilime Hydro Power Company, Nyagdi Power Group Limited, Arun Valley Hydro Power Corporation, National Hydro Power Company, Sanima Mai Hydro Power Company, Ridi Hydro Power, Barun Hydro Power and Api Hydro Power have successfully raised funds from the capital market.

Table 6: IPO offering of the latest hydropower companies to the general public

<table>
<thead>
<tr>
<th>Year of Issuance</th>
<th>Company Name</th>
<th>Requested Amount (NPR)</th>
<th>Oversubscribed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 2014</td>
<td>Ridhi Khola Hydropower Company</td>
<td>1.17 million</td>
<td>91.5 times</td>
</tr>
<tr>
<td>April 2015</td>
<td>Barun Hydropower Company</td>
<td>9 million</td>
<td>61 times</td>
</tr>
<tr>
<td>August 2015</td>
<td>Api Hydropower Company</td>
<td>3 million</td>
<td>30.43 times</td>
</tr>
<tr>
<td>April 2016</td>
<td>Nyagdi Power Group Limited</td>
<td>9.05 million</td>
<td>85.72 times</td>
</tr>
<tr>
<td>April 2016</td>
<td>Khanikhola Hydropower Company</td>
<td>9.31 million</td>
<td>73 times</td>
</tr>
</tbody>
</table>

As per the latest report, three new hydropower companies will be offering shares to the public which are: Arun Kabeli Power Company Limited, Synergy Power Development Limited and Himalayan Power Partner Limited.

b) Increase in finance by the BFIs in hydropower sector

After 1996, the private sector investment in the hydropower sector has gradually increased. Local BFIs have been eager to increase their lending portfolio and diversify investments. Along with the Hydropower Policy, the introduction of Build, Own, Operate and Transfer (BOOT) framework also gave the private sector plenty of scope.

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13 Share Sansar, “Nyagdi Power IPO allotment: up to NPR80,000 under lottery; above that flat 1.16% to all the investors.”, 2016, accessed on May 25, 2016, http://www.sharesansar.com/nyagdi-power-ipo-allotment-up-to-rs-80000-under-lottery-above-that-flat-1-16-to-all-small-and-big-investors/
15 "A form of project financing, during which the concession period the private company owns and operates the facility with the prime goal to recover the costs of investment and maintenance while trying to achieve higher margin on project" Wikipedia.
In order to capture the potential growth in the investment of BFIs in the hydropower sector, Table 7 below projects the available financing for the sector, assuming the average five-year historical growth rate of deposit and credit.

Table 7: Projection of financing available for the hydropower sector (in NPR billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposit</td>
<td>2,116</td>
<td>2,526</td>
<td>3,016</td>
<td>3,601</td>
<td>4,299</td>
</tr>
<tr>
<td>Credit</td>
<td>1,578</td>
<td>1,849</td>
<td>2,168</td>
<td>2,541</td>
<td>2,978</td>
</tr>
<tr>
<td>Credit to the sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 10%</td>
<td>158</td>
<td>185</td>
<td>217</td>
<td>254</td>
<td>298</td>
</tr>
<tr>
<td>Up to 5%</td>
<td>79</td>
<td>92</td>
<td>108</td>
<td>127</td>
<td>149</td>
</tr>
<tr>
<td>Up to 1%</td>
<td>16</td>
<td>18</td>
<td>22</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

As per the projection in Table 7, assuming BFIs invest up to 10% of their total credit to the hydropower sector, a back of the envelop calculation (assuming it will cost NPR 200 million to develop 1 MW of hydroelectricity) shows the Nepali BFIs have the ability to finance up to 790 MW of hydroelectricity in the year FY 2015/16. Similarly, if the hydropower sector invests up to 10% credit in the sector, BFIs will have the ability to extend financing for 1,490 MW of hydroelectricity in FY 2019/20 alone. The forecast indicates that Nepali BFIs are developing the capacity to finance small and medium hydropower projects as well as the mega hydropower projects.

Likewise, hydropower financing can expect to expedite amidst enhancement in banks capital base. NRB has made special provision for the sector to increase their exposure to an individual borrower or group of borrowers at 50% of core capital fund. Similarly, in a bid to increase investments into productive sectors, NRB has directed BFIs to increase their lending to productive sectors, namely: agriculture, energy (hydroelectricity and renewable energy), tourism, small and cottage industries sector, by 20% of their total loan portfolio.

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17 Assuming NPR 200 million (USD 2 million) is required to finance 1 MW of hydroelectricity.
3. Licensing regime

3.1 Provision for license and its types

The Electricity Act 1992 states that no person is entitled to conduct survey, generation, transmission or distribution of electricity without obtaining a license. The Act further states that an individual or corporate body will not require a license for the generation, transmission or distribution of electricity up to 1,000KW. However, approval regarding the project needs to be mandatorily approved by the Department of Electricity Development (DoED) and Ministry of Energy (MoE).

For the generation of electricity greater than 1,000KW, a person or a corporate body who wishes to conduct survey, generation, transmission or distribution of electricity, is required to submit an application to the prescribed officer along with economic, technical and environmental study and with other given particulars on the relevant subject. The application format and required particulars for the survey and generation license is stated in Electricity Regulations 1993.

The Electricity Regulations 1993 has identified two types of license to be issued for projects greater than 1,000kW. The figure below shows the types of licenses issued for hydropower projects.

Figure 5: Types of licenses in the hydropower sector

The DoED issues licenses once the hydropower project fulfills certain criteria set by the government. Projects must complete feasibility study and Environment Impact Assessment (EIA)/Initial Environment Examination (IEE) and then sign Power Purchase Agreement (PPA) before applying for the generation license.

3.2 Application for survey and development license

Table 8: Application requirements for survey and development license

<table>
<thead>
<tr>
<th>License Type</th>
<th>Application as per</th>
<th>Information Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey License</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity Generation</td>
<td>Schedule 2</td>
<td>Rule 4</td>
</tr>
<tr>
<td>Electricity Transmission</td>
<td>Schedule 3</td>
<td>Rule 5</td>
</tr>
<tr>
<td>Electricity Distribution</td>
<td>Schedule 4</td>
<td>Rule 6</td>
</tr>
<tr>
<td>Development License</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity Generation</td>
<td>Schedule 6</td>
<td>Rule 12</td>
</tr>
<tr>
<td>Electricity Transmission</td>
<td>Schedule 7</td>
<td>Rule 14</td>
</tr>
<tr>
<td>Electricity Distribution</td>
<td>Schedule 8</td>
<td>Rule 14</td>
</tr>
</tbody>
</table>

Source: Procedures for License Application for Hydropower Development in Nepal, DoED, 2005

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20 Survey means acts of survey relating to the generation, transmission or distribution of electricity and shall also denote the acts relating to feasibility study, detailed engineering design and the works of investigation regarding thereto.
21 All survey and distribution license procedures are derived from the handbook provided by the government of Nepal.
22 Refers to the format prescribed in the required schedule as per the Electricity Rules 1993.
3.3 Terms of license

a) **Survey license**: Survey license is issued for a maximum of 5 years.

b) **Development license**: As per the Electricity Act 1992, the terms of license to be issued for generation, transmission and distribution of electricity was fixed at 50 years’ maximum. However, the Hydropower Development Policy of 2001 changed the terms of development license to 35 years.

In case a license is issued for a term less than prescribed period, it is required to be renewed before one year of its expiry as stipulated in the license. If the license is not renewed, the license becomes void.

3.4 Status of licenses

The table below shows the number of survey, generation and transmission license currently issued by the DoED as of June 13.

<table>
<thead>
<tr>
<th>Table 9: Number of license issued for survey, generation and transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
</tr>
<tr>
<td>Survey License issued for Generation (below 1MW)</td>
</tr>
<tr>
<td>Survey License issued for Generation (1-25MW)</td>
</tr>
<tr>
<td>Survey License issued for Generation (25-100MW)</td>
</tr>
<tr>
<td>Survey License issued for Generation (&lt; 100MW)</td>
</tr>
<tr>
<td>Construction license issued for generation</td>
</tr>
<tr>
<td>Transmission survey license issued</td>
</tr>
<tr>
<td>Transmission construction license issued</td>
</tr>
</tbody>
</table>

**Source**: Department of Electricity Development, 2016

3.5 Problems associated with licensing

Some of the problems which have cropped up with respect to licenses in the sector are:

a) **Holding of licenses**: A major problem associated with licensing is that promoters who gain licenses hold on to their license despite the fact that they will not be able to build these projects or without putting an effort to develop these projects. This leads to blocking others with the required capacity to access these sites.

b) **Issuance of survey licenses**: A significant part of the current energy crisis can be credited to the gap between survey licenses issued and such license holders graduating to developer of hydropower projects. Survey licenses that have been issued are floating around without being developed. Steps have not been taken to conduct feasibility studies on these projects, which could then lead to construction and generation of electricity from the project.

c) **Lack of mechanism to test capability of applicants**: The Department and ministry which issues licenses have no mechanism prescribed for the purpose of evaluating applications to ensure that an applicant has the capability to implement the full project. A mechanism to test the financial and technical capability of the applicant to conduct the feasibility study and eventually mobilize necessary resources to implement the project is needed.

d) **No guarantee of development license**: Issues also arise from the Electricity Act 1992 which has not placed any guarantee on issuance of development license and also casts a shadow on the return on initial investment, which is uncertain. In reality, licensing in two phases makes little sense. The hydropower sector can follow the bidding process as is done in the case of petroleum exploration. By doing this, one does not only optimize generation and resource but also encourage competition and recover the cost.

e) **Delays in issuance of license**: According to the Electricity Act 1992, it is mandatory for the government to issue a survey license within 30 days of receipt of an application. However, applicants usually receive the license after the specified period. This failure to issue a survey license within 30 days can be viewed as an abuse of authority on the part of the government. In addition, the government department do not give any explanation or reasoning for its failure to issue a license, which increases lack of transparency.
4. Policy formulation and implementation process in Nepal

4.1 Policy framework

Policy making and regulation in Nepal is a centralized process. Most of the policies that are formulated follow a top-down approach. The Ministry of Energy (MoE) is the apex policy formulation body. It is responsible for formulating policies, plans and implementation for conservation, regulation and utilization of the energy sector as a whole. They also conduct surveys, research and feasibility studies on production of energy including hydropower. Ministry of Finance (MoF) deals with the subsidies and taxation policies. Besides these government agencies, organizations like Alternative Energy Promotion Centre (AEPC) are also utilized to frame the policies in the energy sector. Water and Energy Commission Secretariat (WECS), on the other hand, conducts policy research in the hydropower sector.

Figure 6: Schematic representation of stakeholders in policy making

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On an institutional level, Ministry of Agriculture and Cooperatives, Ministry of Finance, Ministry of Environment, Ministry of Local Development, Ministry of Foreign Affairs and Ministry of Forests and Soil Conservation are some of the government agencies involved in framing and supporting the policies in the energy sector.

4.2 Policy formulation process

4.3 Key institutions involved in hydropower policies, plans and projects

a) Ministry of Energy (MoE): The Ministry of Energy manages Nepal’s energy sector. Its role is to develop energy resources in the country via policy development, planning, energy conservation, regulation; research and studies for energy and its utilization; construction, operation, maintenance and promotion of multipurpose electricity projects. They ensure that indigenous resources are used by the domestic, commercial, and industrial sector for the generation of economic and affordable electricity. They also create a transmission network and promote efficiency in power generation.

b) Water and Energy Commission Secretariat (WECS): The Water and Energy Commission Secretariat was established by the Government of Nepal (GoN) and its main function is to review and recommend the multipurpose, mega and medium scale water resource projects before they are sanctioned by the GoN. They also formulate, analyze, and enact the necessary laws pertaining to the development of water resources and energy and establish coordination among national and sectoral policies.

c) Department of Electricity Development (DoED): As a department under MoE, Department of Electricity Development (DoED) is responsible to ensure transparency of the regulatory framework; accommodate, promote and facilitate private sector participation in the power sector by providing a ‘One Window’ service; and issue licenses for power projects.

d) Nepal Electricity Authority (NEA): NEA is 100% Government of Nepal owned utility. It is the sole buyer of all the grid power produced in Nepal and has a monopoly in the transmission and distribution of electricity. As the sole buyer of grid electricity in Nepal, NEA has set out clear Power Purchase Agreement (PPA) policies for hydropower projects up to 25 MW. The Ministry of Energy (MoE) is currently preparing to unbundle the NEA into three companies.

e) Alternative Energy Promotion Centre (AEPC): Established in 1996 by GoN to promote the use of renewable energy and - efficient use of energy, particularly in the rural areas, AEPC is a semi-autonomous government body under
the Ministry of Environment. It is governed by a board comprising of nine members representing the government, private sector, non-governmental organizations (NGOs) and financial institutions.

f) **Investment Board (IB):** Investment Board (IB) was established in 2011 and it functions directly under the chairmanship of the Prime Minister of Nepal as a ‘one window’ for infrastructure projects including large hydropower projects. The IB functions as a parallel ministry alongside MoE to attract investors in the hydropower sector. However, due to limited human resources and probable jurisdiction clash with MoE, there are concerns regarding its achievements.

Apart from these institutions, some other key organizations that investors need to get clearances from are: the Ministry of Environment, the Ministry of Land Reform and Management and the Ministry of Forest and Soil Conservation. Some of the other major stakeholders are Energy Development Centre (EDC) and Independent Power Producers’ Association (IPPAN). Shortcomings in formulation and implementation procedure of policies and Acts have been identified in section 10.
5. Comparison of South Asian countries

5.1 Overview of the power sector

The diagram below gives a brief overview of the power sector in the South Asian countries.

**Afghanistan:** Small Power System (1341MW), High Electricity Imports, Hydro Dominated

**Bhutan:** Small Power System (1614MW), Hydro Dominated, Surplus Hydro, Exporting to India. Leading Exporter of Hydro Electricity

**Bangladesh:** Gas Dominated, Resource Crunch, Imports Electricity from India and in future will remain as one of the Leading importer of electricity

**India:** Large Power System, Coal dominated, reducing deficits, Long term electricity demand are huge and potential large market, The Leading importer & exporter of electricity, 42GW of RE, De-centralized market

**Nepal:** Small power system (765MW), Hydro based, High deficits, Importing Electricity from India, Potential exporter of Hydro Electricity in medium term and importer of electricity in Short-term

**Sri Lanka:** Hydro dominated but the mix is changing, High peak demand
South Asian countries are endowed with huge hydropower potential and not limited to fossil fuels. The hydropower potential of the region is largely untapped due to inadequate investment and lack of development in transmission infrastructure to provide power to the load centers.

While some countries in the region depend significantly on coal, others depend on hydro resources to generate electricity. As seen from the figure above, Bhutan and Nepal rely on hydro resources to generate electricity while Bangladesh, the Maldives, and Sri Lanka are largely dependent on fossil fuels. Sri Lanka’s power demand has exceeded the capacity of viable hydropower projects, and, therefore, it is banking on thermal power plants, based on imported coal and diesel. Bangladesh, which relies on gas for about 63% of its power generation, is rapidly consuming its reserves and is already facing electricity shortages; with demand expected to almost triple in the next decade.

Countries with large potential for hydropower generation can seize large benefits by connecting their hydropower stations to trans-boundary power grids and trading electricity with other nations. Possible shortcomings in terms of regional and domestic uncertainty should be addressed in designing and implementing trans-boundary power grids so that these impacts are prevented or mitigated.

5.2. Regional initiatives - South Asia Regional Initiative for Energy Integration

South Asia Regional Initiative for Energy Integration (SARI/EI) is one such initiative designed to move South Asian countries towards increased regional energy security. The program aims to address policy, legal, and regulatory issues related to energy in the region; promote transmission interconnections; and work towards establishing a regional market exchange for electricity. The USAID launched a program that covers all the SAARC countries. The program is divided into four phases:

I. Cross-border energy trade (CBET)
II. Energy market formation
III. Regional Clean Energy Development
IV. Advancing regional energy integration and increasing CBET

Phase I started in 2001 and by 2004; it offered opportunities for exchanging information and building skills in analysis with a view to enhance the understanding of the energy sector and create a pool of conscious stakeholders. Phase II laid the foundation for increased clean energy access and improved market structures to facilitate regional investment in energy trade. It focused on improving policy, legal, and regulatory framework for cross-border energy trade. Phase III focused on enhanced regional energy security through mutual cooperation and was marked by several tangible accomplishments. The SARI/EI is in its final phase with the phase being launched in 2012 and is expected to be completed by 2017. The main goal of the final phase is to further earlier objectives of the program such as energy integration and CBET.25

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6. Key hydropower sector Acts/policies

This section reviews the key policies and Acts introduced to bring about development in the hydropower sector of Nepal.

6.1 Water Resource Act 1992

6.1.1 Background

The Water Resource Act 1992 (2049 BS) is an umbrella Act, governing not only drinking water, but other uses of water and overall water resource management in Nepal. The Act gives priority to the right to use water for drinking purposes over any other domestic or commercial use. There are two regulations under the Act, for drinking water purposes: the Water Resource Regulation 1993 (2050 BS) and the Drinking Water Regulation 1998 (2055 BS).

The overall national objective of the Water Resource Act 1992 focuses on management and utilization of the available water resources for safe drinking, increasing agricultural production and generation of hydroelectricity as means of substituting the imports of petroleum materials.26 It also makes appropriate legal arrangements for determining beneficial uses of water resources, preventing environment and other hazardous effects and keeping water resources free from pollution.27

6.1.2 Achievements

Some of the key achievements of the Act are as follows:

- **Public interest given greater importance:** This Act was the first comprehensive attempt on using water resources concentrating mainly on the customary water use right recognized legally by the National Legal Code 2020 (1963). This Act provided greater importance to public interest than the interest of individuals and also vested the government the power to take any kind of natural resources from the country by giving adequate compensation to the local people. Giving public greater importance regarding water resources provided a greater scope of water security for the public than previous acts such as the Essential Commodity Protection Act 1955 could.

- **Greater emphasis given to prioritization of water use:** The Act also determined which use of water is given priority and in what order. The use of water for drinking and domestic purpose is given first priority with irrigation, agricultural use and hydroelectricity following afterwards. By prioritizing water uses, the Act gave a clearer view on what sectors should be given greater importance when water resources are considered. Therefore, water resources could be directed more efficiently to each sector according to its requirement.

- **Regulation of water use:** The Water Resources Act 1992 provided a set of instruments for regulation of water use. As the ownership of water resources is vested on the government, the use of water is regulated through a system of permits. This Act allows the use of water under two conditions: one, through license issued by the prescribed authority, and second, without license, for individual for drinking, household purposes, running household water mill and boating for transportation.

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The system of permits allowed for greater efficiency regarding use of water resources and provided clearer guidelines regarding license requirements for using water resources.

6.1.3 Limitations

- **Defunct water user groups**: This Act allowed formation of Water User Associations when a group of individuals wished to make use of a water resource for their collective benefit. Water User Associations must be registered, which provides the government with a mechanism to regulate the collective use of drinking water. However, most of the Water User Groups were found to be defunct with the association. The constant unrest among water user groups as well as their inability to hold conclusive meetings led to failure of these water groups.28

- **Role of state and service user left unclear**: The policy on water pricing and cost recovery also required clearer provisions with respect to the roles of both the state and the user.

- **Inefficient pricing system**: Water pricing systems in Nepal follow traditional cost accounting approach, which is closely linked to the cost recovery method.29 Regarding the policy on water pricing, the Water Resource Act 1992 failed to realize that most people in rural areas view water as a free commodity and therefore will be hesitant to pay for it. This, therefore, hampered revenue collection and affected the cost recovery method employed by the Act, resulting in inefficient pricing system.

- **Rigid priorities**: The Act was also criticized for being too rigid with the priority of water uses while considering water resources' availability and its prioritized need in each province of the nation. For example, a province having less agricultural land may need water at higher priority for hydroelectricity than irrigation for its economic prosperity.30

6.2 Electricity Act 1992 & Electricity Regulation 1993

6.2.1 Background

The main legislation governing hydropower in Nepal is the Electricity Act 1992 and its regulation, the Electricity Regulation 1993. The Electricity Act 1992 deals with the management of electricity in Nepal, including the survey, generation and distribution of electricity. It regulates the electricity sector by a system of licensing. The Act applies to the entire electricity sector, not just electricity generated by hydropower. Furthermore, it also provides directives on licensing of electricity and standardizing and safeguarding of electricity services.

The Electricity Regulation 1993, supplements and supports the Electricity Act 1992, sets out procedures for obtaining license for hydropower projects which is required according to the Electricity Act 1992. Furthermore, it also sets out the powers, functions and duties of the license holder while also setting out guidelines regarding acquisition of land for hydropower development and compensation.

It also set out certain financial incentives to encourage investment in hydroelectricity including incentives regarding income tax, customs and sales tax and foreign currency. This Act and Regulation set out functions, duties and powers of the state in relation to hydropower, including license issue, ownership, electricity purchase, development of hydropower, generation of electricity and maintaining quality standards.

6.2.2 Achievements

- **Allowed entry of the private and foreign investors into the energy sector**: The introduction of the Electricity Act 1992 gave domestic and foreign investors an

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28 The Water Resource Act 1992 (2049 BS) provides for the formation of Water User Associations when a group of individuals wish to make use of a water resource for their collective benefit.

29 Under a cost recovery method, a business does not recognize any income related to a sale transaction until such time as the cost element of the sale has been paid in cash by the customer.

opportunity to invest in the hydropower sector of Nepal. This allowed private companies to develop and run hydropower projects.

6.2.3 Limitations

- Few policy directives left unclear: The Electricity Act of 1992 failed to lay out clear policy directives and set out roles for all cross-institutional stakeholders within each component of the electricity market — sources of energy, generation, transmission, distribution and retail, captive generation, tariff, export/import, role of regulator, rural/urban electrification, irrigation, infrastructure and transport, consumer and environmental protection, and judicial services for energy issues.31

- Issue of license: The Electricity Act aimed at making the process of issuance of licenses transparent and less burdensome to the applicant, while promoting foreign investment. It permitted any person or entity to apply for survey license. Initially very small domestic companies, which did not have the technical expertise and financial capacity, were granted licenses. They are still holding on to these licenses despite the fact that they will not be able to build these projects. This resulted in blocking others with the required capacity to access these sites. Furthermore, this Act failed to issue licenses within the periods specified in the Electricity Act, namely, 30 days for a survey license, and 120 days for generation, transmission or distribution license.

- Royalty payment: The payment method related to royalty was very traditional and not linked with the payback period of the project. It had the same provision for all types of projects i.e. RoR and storage.

- Burdensome Environmental Impact

Assessment: The Electricity Act 1993 contains provisions to minimize soil erosion, floods, air pollution and damage to the environment while producing and transmitting electricity (Section 24). Furthermore, the Electricity Regulation 1993 stresses on environmental analysis, which should include environmental mitigation measures to minimize adverse impacts likely to occur while developing hydro-electricity (Rule 12 and 13). According to IPPAN, this burdensome process of Environmental Impact Assessments (EIA) for small projects made hydropower investors think twice before making investment.32

- Problems in negotiation of project development agreements: The negotiation of project development agreements between the Government of Nepal and investors proved to be an issue. Due to lack of institutional support, lack of clarity on legal aspects, and lack of capacity in negotiating project development agreements, government was not able to invite many hydropower developers for negotiations.

6.3 Hydropower Development Policy (HDP) 1992

6.3.1 Background

After democracy was restored in 1990, Nepal government focused on participatory development with a liberal economic policy. To harness the potential of natural water resources, hydropower sector was made a priority, and a Hydropower Development Policy 1992 was announced. This policy aimed to create an investment-friendly environment to encourage the rapid development of hydropower sector.33 The policy also aimed to involve private investment in hydropower generation and in order to fulfill these objectives the concept of BOOT (Build, Operate, Own and Transfer) in developing hydro projects was introduced.

This policy was considered to be very progressive; development oriented and provided

excellent incentives to develop hydropower in Nepal. Some of the major incentives provided by the policy included: generation license validity of 50 years, income tax holiday of 15 years, income tax (when applicable after 15 years) at the rate of 10% below prevailing corporate income tax, energy rate to allow 25% return on invested share capital, 1% customs duty only on imported goods for the project, exemption on import license and sales tax, and government land to be readily available on lease for the duration of license.

6.3.2 Achievements

- Entry of private sector in the hydropower industry: This policy was successful in opening up the hydropower sector for the private sector. This policy was implemented for nine years before the Hydropower Development Policy 2001 was endorsed. Two major projects with foreign investment (Khimti - 60 MW, Bhotekoshi - 36 MW) and a few projects with local finance such as Indratwati Project were able to reap the benefits of this progressive policy of the government. Provisions considering licensing requirements for projects less than 100KW as well as generation and licenses on feasibility studies were important in drawing the private sector towards hydropower projects.

6.3.3 Limitations

- Limited scope: This policy, which was formulated in 1992, has often been criticized for having limited scope. It failed to attract significant investment because it particularly promoted small scale projects to meet the demand of hilly and remote areas where electrification was lacking. The policy did not focus on the promotion of medium or large projects to provide electricity for export.34

6.4 Hydropower Development Policy (HDP) 2001

6.4.1 Background

The government formulated the Hydropower Policy in 2001. This revised policy incorporated the lessons learnt from 1992 policy implementation and legal provisions like Environmental Protection Act and Rules (1997) and Local Self-Governance Act (1999), and private sector demands as well. The main objectives of this policy were to develop hydropower as an exportable commodity, generate electricity at low cost by utilizing the water resources, tie-up electrification with the economic activities and extend reliable and better electricity service throughout Nepal at a reasonable price.35

The policy provides direction on vital issues such as development of multipurpose plans for maximum utilization of available water resources, appropriate sharing of benefits, role of the public and private sector, utilization of internal as well as external markets, and clarity and transparency in activities with the private sector.

6.4.2 Achievements

Studies show that there have been a few remarkable achievements from the implementation of the hydropower policy in the form of power generation, royalty collection, private sector encouragement in hydropower development and capacity building. This has ultimately contributed to social and economic transformation of the country.

6.4.3 Limitations

On the other hand, this policy has also been criticized for hindering the growth of the sector in the last decade. After reviewing the policy in detail, the key limitations of the policy are given below:

- Inconsistent government policy: Critics claim that as this policy revoked some of the progressive provisions of the 1992 policy, investors in the field were discouraged. This
policy reduced the validity of hydropower generation licenses from 50 to 35 years, introduced an incremental royalty payment, scrapped an income tax holiday and brought hydropower projects under the usual corporate tax net of 21.5%. In 2006, government introduced an ordinance negating all previous relevant policies and made value added tax (VAT) applicable to all hydropower projects above 3 MW. This led to an immediate 13% escalation of costs. This change in the financial plan and policy changed the scenario altogether and is said to be one of the reasons for the stymied growth of the power sector in Nepal in the last decade.

- Short license period: The license period of 35 years is said to be inadequate for IPPs to hedge against generation uncertainties and improve profit margins.

- Institutions yet to be established: Under the institutional arrangements, HDP 2001 recommended replacing Electricity Tariff Fixation Commission with the regulatory body, Nepal Electricity Regulatory Commission (NERC). However, the commission is yet to be established. The bill is still pending in Parliament. As a result, monitoring and regulation of the electricity sector is still weak.36

- Performance of established institutions not up to the mark: The Department of Electricity Development (DoED) and Water and Energy Commission (WEC) have been established as per the policy, which can be considered a good initiation, but both the organizations are not functioning as per the mandate, due to which energy planning and private sector promotion in hydropower development is still not up to the mark. For it to be effective, institutional strengthening and capacity building of these organizations are essential.37

6.5 Water Resources Strategy 2002

6.5.1 Background

Water Resources Strategy was formed in 2002 for the overall development of water resources; the National Water Plan 2005 was also prepared to implement the strategy. The strategy identified the key sectors of water uses with their interdependence, inter-linkage and priority.38

With the goal of meeting water supply needs and achieving long-term sustainability, the Water Resources Strategy aimed to provide a systematic framework for water resources development and identify action plans to avoid and resolve conflicts, and achieve Nepal’s water-related development objectives.

Water Resources Strategy 2002 formulated 10 different strategies, out of which the strategy for hydropower development aims to achieve greater access to electrification of rural areas, participation of the private sector in hydropower, cost effective hydropower development and better power system planning.39 The strategy has given short-term (5 years), medium-term (15 years) and long-term (25 years) strategic plan of hydropower development. The target of the strategy is:

- 2007 - to develop hydropower capacity to meet projected demand of 820 MW, including 70 MW for exports.
- 2007 - laws making national contractors/consultants’ participation mandatory in all types of projects promulgated,
- 2017 - 25% of households supplied with electricity,
- 2017 - 2,230 MW hydropower developed to meet projected demand including 400 MW for export,
- 2017 - 38% of households supplied with electricity,
2027 - 60% of households accessing the grid-supplied electricity, and

2027 - Nepal exporting substantial amount of electricity.

The strategy aimed in identifying and developing cost-effective small and medium hydropower projects that are capable of meeting domestic needs at affordable prices in the first five years. In the following ten years, WRS aims to realize substantial benefits by maximizing hydropower development for different markets, including energy-intensive industries and power exports.

6.5.2 Achievements

Identifying institutional framework: The Water Resource Strategy of Nepal 2002 was able to profoundly highlight the absence of an appropriate institutional framework for effective integrated water resources management in the country. It also highlighted the need for creating new organizations, and redefining functions and structures of some existing organizations to achieve objectives enumerated in the strategy document.

6.5.3 Limitations

The major limitation of the Water Resource Strategy 2002 is that an effective implementation of the strategy requires intensive strengthening of Nepal’s human resources capacity at all levels of government, in the private sector, community based organizations and in NGOs. Such drastic changes in government and other sectors are not possible due to the current economic and political climate of the country.

With regards to the targets set by the strategy concerning hydropower development, it can be seen that most of their targets have not been met. A majority of the targets set by the strategy have not been met or are in no condition to be met in the future.

- Capacity has not been developed to meet demand as of 2007: Electricity generation targets have not been met as of 2007 with Nepal still facing persistent load shedding problems. Targets such as generating 820MW of electricity are yet to come to fruition, mostly in part due to inefficiencies on the part of the NEA and the shortcoming of the financial institutions.

- Export of electricity still not possible: Exporting electricity to India also seems impossible due to the current situation of the hydropower sector, which is struggling to cope with domestic demand. Instead of exporting electricity, Nepal currently imports electricity from India to meet demand. Therefore, if the goal of exporting electricity to earn national revenue is to be met, hydropower projects need be undertaken and greater emphasis needs to be given on completion of these projects.

- Rural electrification still in its infancy: The strategy aimed to supply energy to 25% of households in rural areas by 2007, and 38% by 2017, but studies shows that this number stands at 30% as of 2011. If the strategy is to succeed in its aim of providing electricity to 60% of rural households by 2027, drastic development needs to occur in the hydropower sector of the country.

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7. Key hydropower sector programs in Nepal

7.1 National Electricity Crisis Resolution Action Plan (2009)

7.1.1 Background

To improve the power generation situation and provide incentive to private sector participation, the government implemented a 38-point Electricity Crisis Resolution Action Plan in 2009 to provide immediate, short-term and long-term programs. This resolution was only passed in 2013.

Immediate Programs: The principal concerns under immediate programs include determining a Power Purchase Agreement at a flat rate for power plants up to 25 MW, 7 years’ income tax holiday and waiver of the provision for conducting Environmental Impact Assessment (EIA) for power projects. Such a power project will be required to do Initial Environmental Examination (IEE) only. It included plans to import more power from India, build 200 MW thermal power plants and encourage power generation through captive plants by subsidizing the additional cost involved in producing power from oil, and strengthen and add transmission capacity. It will also encourage solar and wind power generation through various concessions and facilities. Importance has been given to encouraging efficiency through the use of low energy consumption bulbs, initiate a system of energy audit, implement a code of conduct to save energy, and raise public awareness for demand management. The concession included 80% subsidy for micro hydropower below 1 MW capacity.

Short-term and Long-term Programs: Short-term measures under the plan included building additional transmission lines to import power from India, increase power production through efficient operation of current generation facilities, control technical loss and controlling theft of electricity through cooperation of political parties, the public and local administration. The long-term programs are building high capacity transmission lines between India and Nepal as well as large multi-purpose projects and also adopting national integrated energy policy with short, medium and long-term energy development plan. It also includes financial restructuring of the Nepal Electricity Authority (NEA).

7.1.2 Achievements

- **Increased participation of private sector:** This resolution has played a key part in the growth of private sector activity in hydropower generation in the last three to four years in Nepal. Subsidizing of micro-hydropower projects has helped in making the hydropower sector more investment friendly for private investors. In addition, waiver of the EIA is expected to reduce the time in the development stages of future hydropower projects.

- **Expected increase in hydropower development:** Tax benefits, provision of subsidies, priority sector lending for hydropower and provision of IPO during construction period and other policies supporting the hydropower sector indicate that the hydropower sector is likely to achieve high growth in the near future.

7.1.3 Limitations

- **Resolution officially passed only in 2013:** Although the resolution had good provisions for solutions to the energy crisis, it was

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42 The purpose an IEE is to provide information about the general environmental setting of the project area, identify impact of the project activities on the biophysical, socioeconomic, and cultural environment of the project and prepare an environmental management plan.

not implemented because of a change of government that occurred in 2009. Due to this, the resolution was only passed in 2013 leading to a delay in the implementation of the proposed plans.

- Criticism regarding development provisions: The resolution faced immense criticism from analysts regarding its failure to realize the need of time demarcation and project identification for power plant development.

### 7.2 National Rural and Renewable Energy Program (2012)

#### 7.2.1 Background

In 2011, the Government of Nepal, and a few development partners like Danida, DFID, the Norwegian Ministry of Foreign Affairs, and UNDP jointly agreed to support the formulation of a five-yearly program called the National Rural and Renewable Energy Program (NRREP), which would act as a single umbrella program where the Government of Nepal committed itself to reform the subsidy system and finance a higher portion of the subsidies for Renewable Energy Technologies (RET). Alternative Energy Promotion Center (AEPC) was chosen as the executing partner of this program.

A distinctive feature of NRREP is that it will be a single program modality where AEPC will commit to include all future programs and projects under NRREP. This is done to remove inefficiencies, duplication, lack of coordination, and fragmentation of aid to the rural and renewable energy sector in Nepal.

- The development objective of the NRREP is to improve the living standard of rural women and men, increase employment of women and men as well as productivity, reduce dependency on traditional energy and attain sustainable development through integrating the alternative energy with the socioeconomic activities of women and men in rural communities. Furthermore, NRREP has a clear emphasis on effectively reaching out to the more remote and poorest parts of the country; it plans to apply demand led approaches in actively involving beneficiaries in decision making, and support the use of energy for productive purposes leading to increase in income and employment in rural areas.

Under the NRREP, the UNDP funded Renewable Energy for Rural Livelihood (RERL) project is an integral part. The RERL supports the development of mini/micro hydro and solar PV systems, productive energy uses and formulation of innovative financial mechanisms to attract private sector investment. This project supports NRREP to develop 10 MW of mini-and micro-hydropower, 2.5 MW of solar PV systems and establishment of mini-grids connecting Micro-Hydro Plants of 300kW capacity to pool energy. The project will also support to build up capacity of local fabricators, installers & system integrators.

#### 7.2.2 Achievements

- **Strengthening of the RET sector:** The second component of this program, Technical Support Component, plans to strengthen the RET supply sector. Through the use of the private RET sector, its capability will be increased to supply higher quality RETs as well as potentially carry out innovation activities. With the substantial support provided to the various RETs and with the high number of beneficiaries of NRREP, this green economy sector will be stronger at the end of the five years NRREP implementation period. This provides opportunities for RET suppliers to have a foundation for increasing supply to the non-subsidized markets. The RERL project has already achieved the following:
  
  - **Policy Formulation:** RERL worked with

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46 The Technical Support Component aims to accelerate renewable energy service delivery with better quality, comprising various technologies, to remote rural households, enterprises and communities.
Institution Development Component of NRREP to prepare and finalize a draft Renewable Energy Policy as well as a draft Renewable Energy Subsidy Policy and Delivery Mechanism.

- **Public Private Partnerships (PPP):** RERL also prepared PPP Framework and Guidelines for development of mini-hydropower in Nepal. This is likely to pave the way for attracting private investment through formation of Special Purpose Vehicle to implement mini-hydropower projects in selected areas.

- **Mini Hydropower Development:** RERL is working to support mini-hydropower development in Nepal. So far RERL supported pre-feasibility study of 7 mini-hydropower projects. RERL also undertook detailed feasibility studies of 5 potential projects with the aim to develop these projects in the near future.

- **Formation of Special Purpose Vehicle:** RERL is supporting the communities of Tara Khola Mini Hydro to form Special Purpose Vehicle as required by financial institutions to provide credit and business opportunity assessment to demonstrate positive cash flow and revenue generation. \(^47\) NRREP is promoting development of the 3,945 kW Tara Khola mini-hydropower.

### 7.2.3. Limitations

- **Assumptions made by NRREP may change:**
  The key assumptions made by the NRREP during its formulation process are open to change. The NRREP assumes that the renewable and rural energy sector will be given high priority and that commitment level to the NRREP will be high, but such assumptions cannot stay constant as political changes can lead to these assumptions being nullified.

- **Distortion of the RET market:** The large amount of subsidies and credit provided to drive the market for RETs, can potentially distort the market and encourage market inefficiencies, including an increase in RET prices. Such distortions can hamper growth of RET’s in Nepal.

- **Bureaucracy:** The inherent bureaucracy rife in the government may lead to slow implementation of reforms to make AEPC autonomous which can then damage NRREP’s aim of making AECP an efficient service institution in the renewable energy sector.

- **Other Renewable Energy Programs:** Renewable Energy programs outside of the NRREP, which are also supported by development partners, can lead to unevenness in commitment levels.

Section 7.3 and 7.4 will highlight Hydropower Sector Programs, which are yet to be implemented but have been approved or are under discussions.

### 7.3 National Energy Crisis Reduction and Energy Development Decade Plan 2016

#### 7.3.1 Background

The parliamentary cabinet endorsed the National Energy Crisis Reduction and Energy Development Decade Plan in February 2016 with the ambitious target of ending the current power crisis within the coming two years. Budget to implement the plan was announced in Fiscal Policy of 2016/17. However, this is not the first time that a energy crisis is declared. Two separate energy crises were declared when Pushpa Kamal Dahal and Madhav Kumar Nepal were prime ministers, in 2008 and 2009 respectively, but they remained only on paper as these declarations came without any preparation. To make the development of energy productive, the MoE has set out the following plans:

**Key points in the action plan**\(^48\):

- The plan aims to add an additional 839MW of electricity in the next one year during the dry season. It also plans to generate

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\(^47\) A Special Purpose Vehicle is a legal entity created to fulfill narrow, specific or temporary objectives, typically used by companies to isolate the firm from financial risk.

1,339MW during the wet season in the second year.

- 50% of the country's electricity requirement will be fulfilled through energy imports from India in the first year with the government planning to have 1,850MW of electricity flowing in the national grid by 2018.

- 100MW will be generated through solar and wind power in the first year and this capacity will be doubled over the coming year.

- Special emphasis will be given to the immediate construction of five reservoir projects - Budhi Gandaki, Nalsingadh, Sunkoshi, Uttar Ganga and Sarada Babai. This will come under the "Electricity Development Decade Plan", which aims to produce 10,000MW of energy. Separate companies will also be announced to expedite the progress of Budhi Gandaki and Nalsingadh.

- License to quake hit projects will be extended and special loans will be provided to them.

- In order to boost involvement of foreign investors, the government will announce that PPA will be signed in US dollars until the loan payback period.

- Lending criteria for BFIs will be eased to provide loans to hydropower projects with BFIs able to inject 50% of their total lending into hydropower projects.

- Security forces will be mobilized to provide security to hydropower projects previously hydropower investors were bearing security costs. This is expected to lessen the hurdles posed by locals and political parties to hydropower projects.

- An energy coordination panel will be formed under the chairmanship of the prime minister to ease structural and procedural hassles.

**IPPN’s reaction:** As a starting point, IPPAN requested the authorities to declare Energy Emergency until Nepal generates equivalent of 10,000MW. Energy Emergency declared in 2010 achieved very little because of its fragmentation and the fact that it had to pass through a vast bureaucratic maze. IPPAN, therefore, believes that the current declaration of Energy Emergency has to come with concrete action points and time-schedule, which among others shall include formation of a single approval desk, affording one more chance for recently cancelled projects due to CIAA recommendation, provide the private sector to build transmission line under BOOT model, provide NPR 50 lakhs/MW subsidy to those projects commissioned from the date the subsidy was announced during the earlier Emergency in April, 2011.49 In addition, IPPAN has welcomed the decision made by the government to remove conditional PPA, exemption of VAT till 2026, allowing quake hit projects to exercise force majeure and allowing private sector to construct transmission lines.

7.3.2 Limitations

- **Government incompetence:** The main obstacle holding the declaration of the energy emergency is the government’s own ineptitude and ineffectiveness. The Ministry of Energy came up with a to-do action plan along with ‘energy crisis’ declaration with January 14, 2016, as the deadline, in its Energy Development Work Plan 2072 in line with a white paper issued on November 24, 2015. The ministry missed its initial deadline to declare the crisis, which shows ineptitude on the government’s side. These issues can be enough to scuttle the whole plan set out.

- **Lack of feasibility studies:** Although the government has set up ambitious plans to end the power crisis, this could be undermined by the lack of studies conducted to see whether their aims and projects are feasible. The main issue lies with the feasibility of the proposed wind and solar harnessing plan as no study has been conducted in the matter at hand and the country also lacks policy and regulatory

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A lack of feasibility studies can seriously harm the success of the proposed plans.

7.4 Nepal Hydropower Development Program (NHDP)

7.4.1 Background

USAID’s five year, USD 9.9 million, Nepal Hydropower Development Project (NHDP) supports the Government of Nepal’s efforts to develop the country’s access to modern, high quality hydropower services and realize its potential as an energy exporter in South Asia. USAID will collaborate with the Investment Board of Nepal (IBN), the NEA and the Ministry of Energy (MoE), with the aim of helping Nepal enable and encourage private sector investment in hydropower in an environmentally and socially viable manner. The project is expected to be completed by July 2020.

The project provides support to areas such as project appraisal, design and issuance of power purchase agreements. The project will also support the Government of Nepal in transforming the energy sector to create sustainable and efficient national power services and foster electricity trade between Nepal and India.

Major project activities are highlighted below:

- Provide financial advisors to the IBN who are also available to work with the MoE and NEA on key transactions
- Support the Government of Nepal in implementing policy and institutional reforms that address the many challenges in the sector, including poor quality of electricity service and high losses
- Contribute to the successful restructuring of the NEA
- Provide support to the IBN and the MoE to ensure effective public outreach and communications to garner support for hydropower projects
- Provide a full-time legal advisor to the IBN

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8. Long-term energy projects

In this section a few long-term hydropower projects, which are undergoing construction and which are in implementation phase with the goal of providing sustainable energy for domestic consumption and for exports have been identified.

8.1 Hydropower projects under construction

a) Trishuli Basin Hydropower Projects: 
Altogether 12 hydropower projects are under construction in the Trishuli river system as of this year. According to the Department of Electricity Development (DoED), some projects are under construction while construction of others will begin after the acquisition of a generation license. Upon completion, these projects, which are based in Rasuwa and Nuwakot districts, a total of 1,500 MW, will be added to the national grid.52

Four projects: Chilime Hydropower, Trishuli Hydropower, Devighat and Mailungkhola have already started power generation. Syafrubased Chilime Hydropower produces 21 MW of electricity. Likewise, Mailungkhola of Dandagaun generates 5 MW, while Trishuli and Devighat projects are generating 18 MW and 14 MW, respectively. Upon completion, projects on Trishuli River will generate 827 MW, while those on Bhotekoshi will produce 324 MW.

Trishuli 3A (60 MW) is under construction with a concessional loan from Exim Bank of China. Likewise, a South Korean company is developing Upper Trishuli I (216 MW) and Hydro China Corporation is building Upper Trishuli II (102 MW). Other projects that are under construction are Upper Mailung (10 MW), Upper Trishuli 3A (60 MW), Trishuli B (42 MW), Mid-Trishuli Ganga (65 MW) and Galchi Hydropower (75 MW). Electricity generation is expected to commence within the next two years in these projects. Construction of these projects had been halted as a result of the 2015 earthquake and the six month long blockade. It resumed in February 2016 with the help of the Nepali Army.53

8.2 Potential hydropower projects

a) Arun III: The Arun III hydropower project is 900MW Run-of-River (RoR) project in the Arun River. The World Bank was initially conducting the project but pulled out citing political hurdles and opposition from NGOs towards the project.54 Recently the government revived the project and bidding was undertaken for the project where Satluj Jal Vidyut Nigam was awarded the project.55 The main aim of the project is to provide constant supply of electricity to alleviate the energy crisis. It also has to be noted that the Arun III project has come under a lot of criticism especially with regards to the environmental impact it will have and also because it is a RoR project. Implementation of the project is likely to impact irrigation in the region.

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b) Budhi Gandaki Hydropower Development Project

Budhi Gandaki Hydropower Project is a storage type project located in Central/Western Development region on the Budhi Gandaki River of Nepal. This project was identified during the Gandaki Basin Study in late 70’s. In 1984, a prefeasibility study of the project was prepared. The ongoing feasibility study of the project has recommended 1,200 MW capacity plant. The Budhi Gandaki project is expected to cost NPR 250 billion (USD 3.5 billion). According to the Budhi Gandaki Hydroelectric Project Development Committee (BGHPDC), only NPR 94.54 million (USD 1.35 million) or 2.8% of the NPR 3.37 billion (USD 48.1 million) budget allocated for this fiscal year has been spent as of mid-May 2016.  

The BGHPDC has decided to conduct a study for re-regulating the dam planned to be built downstream of the project site. A board meeting of the committee has directed the management of the project to go ahead with the survey.

According to the budget for the Fiscal Year 2016/17, the construction of Budhi Gandaki Reservoir Hydroelectric Project will commence from the next fiscal year. Furthermore, a separate office with full authority will be established to carry out administrative work including distribution of compensation. Furthermore, provisions have also been made for Clean Energy Development, with the budget proposing an infrastructure tax to be levied at the rate of NPR 5 per liter at custom points in the import of petrol, diesel and aviation fuel by Nepal Oil Corporation. The funds generated from this will then be used for the construction of the Budhi Gandaki Hydropower Project.


c) Karnali Chisapani Multipurpose Project

The Karnali Chisapani Multipurpose Project is the largest hydropower project proposed in Nepal with an expected installed capacity of 10,800MW. The project is a storage-based project with a 270-meter high rock fill dam. If correctly implemented the project has the capacity to significantly reduce energy crisis in the country while also providing excess electricity, which can then be exported to India. Average annual energy generation of the project stands at 20,842 GWh. Studies conducted had estimated the cost to be USD 6.834 billion as of 2008. Feasibility studies have also been done and environmental impact studies are being carried out at the moment.

The project will be of immense benefit to Nepal as it is a storage-based project, which can hold up 16.2 billion cubic meters of water for electricity generation throughout the year, regardless of weather conditions. Furthermore, the project could also open up the possibility of energy exports to India.

Added benefits of the project include effective flood control during monsoon and annual irrigation facilities, to a total of 191,000 hectares of land in Nepal. In addition, the budget for the Fiscal Year 2016/17 has also stated that the Karnali Chisapani Multipurpose Project will be a tripartite project between Nepal, India and China.

d) Pancheshwar Multipurpose Project (PMP)

The Pancheshwar Multipurpose Project (PMP) is a bi-national hydropower project to be developed in the Mahakali River bordering Nepal and India. It is being conducted as a mutual interest project between India and Nepal, and is covered under integrated Mahakali Treaty signed between the two, according to which, equal sizes of underground power house of 3,240MW will
be constructed on each side of Mahakali river in India and Nepal.59

PMP has been identified as a huge storage scheme to be developed so as to maximize peak power benefit in the order of 6,720 MW with the Pancheswar High Dam contributing 6,480 MW and Rupaligad Re-regulating Dam contributing 240 MW with an annual average energy production of 12,333 GWh. Recently the capacity of the project was down sized to 4,800MW as previous studies overestimated the generation capacity.60 The project cost is estimated to be NPR 500 billion as per the detailed project report conducted in 2006, with Pancheswar Development Authority, which is made up of both Nepali and Indian members heading the project. Expected construction period for this project is estimated to be 10 to 12 years.

Alleviation of the energy crisis is the main agenda for this project while water regulation for irrigation for lands in both Nepal and India, and flood control are additional benefits.61

e) Upper Karnali Hydropower Project

The Upper Karnali Hydropower Project is a 900MW hydropower project located across the districts of Surkhet, Acchham and Dailekh. The project was awarded to an Indian company, GMR Group through a competitive bid process in 2008 as an export project aimed at the Indian market.62 Upon completion, the project will be the largest hydropower plant in operation in Nepal. The project will use water from the Karnali River, through the Run-of-River method to generate electricity. The project has an estimated total investment of NPR 116 billion with estimated financial benefits within 25 years of completion of the project adding up to NPR 431 billion.

In terms of benefits, the project upon completion and operation will have major financial and social benefits. Financially, the expected benefits to Nepal in terms of revenue from taxes, royalties, free energy and free equity will be around NPR 300 billion. 50% of the royalties will go to the treasury, 38% to the affected region and 12 % to the affected districts of Surkhet, Acchham and Dailekh. Nepal will receive 27% free equity and 12% free energy from the project, which will amount to 108MW of electricity, which is roughly equal to 15% of the current installed capacity. The project is also expected to generate employment opportunities for the local people with an estimated 2,000 jobs being directly available during construction period.

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9. Accountability, integrity and transparency in Nepal’s hydropower sector

Nepal is fraught with the issue of corruption and ranks 130th in the Corruption Perception Index, published by Transparency International in 2015. Currently ranked as the third most corrupt country in South Asia, and lack of transparency, integrity and accountability has been a major hindrance towards overall development in Nepal.63

With corruption rampant in all the major sectors of the economy, it comes as no surprise that the energy and water sector have also been impacted by it.

9.1 Sources of corruption in Nepal’s hydropower sector

In the hydropower sector, institutional and regulatory mechanisms are extremely weak64 which has resulted in rampant corruption and absence of accountability, integrity and transparency. Listed below are some primary areas which give way to corruption in different stages of hydropower project.

Table 10: Sources of corruption at different stages of the project cycle

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<tr>
<th>Stages</th>
<th>Causes of Corruption</th>
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<tr>
<td>Planning, Study &amp; Investigation</td>
<td>Lack of dependable data and manipulation of hydrological data</td>
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<tr>
<td>PPA &amp; Government Concessions</td>
<td>Confusing and unclear guidelines regarding PPAs, Absence of transparency in PPAs, Developers lack protection to risks, Lack of differentiation between good and average projects</td>
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<tr>
<th>Construction, procurement and implementation</th>
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<td></td>
<td>Environmental standard violations</td>
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<td>Inadequate compensation in regards to land acquisition</td>
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<td>False claims</td>
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<td>Unreasonable local demands</td>
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<td>Unwarranted contract variations</td>
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<td>Bias in selection of top officials like board members and CEOs</td>
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<th>Operations</th>
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<td>No fulfillment of social and environmental obligations</td>
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<td>Corruption in procurement, operation and maintenance</td>
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<td>Insurance fraud on equipment and performance guarantees</td>
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<th>Distribution</th>
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<td>Inefficiencies regarding meter reading and billing</td>
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<td>Power theft</td>
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Source: Developing a Strategy to Promote Transparency, Integrity and Accountability in Nepal’s Water Sector, WIN, 2010

Table 11: Sources of corruption arising from financing

<table>
<thead>
<tr>
<th>Source of Financing</th>
<th>Causes of Corruption</th>
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<tbody>
<tr>
<td>National Budget</td>
<td>Use of political influence to affect the budget</td>
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<tr>
<td>Concessional Financing</td>
<td>High level of bureaucracy</td>
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<td>Money disbursement on the basis of false documents</td>
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<td>Grant Financing</td>
<td>Performance pressure</td>
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<td>Misplaced priorities</td>
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<td>Limited bidding</td>
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<td>Private Equity</td>
<td>Lengthy and non-transparent foreign approval process</td>
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<td>Low risk appetite</td>
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<td>High occurrence of inadequacies and lack of commitment</td>
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9.2 Impact of lack of integrity, transparency and accountability on the Hydropower Sector

The presence of corruption, lack of transparency and accountability has led to low integrity levels in the hydropower sector in the country. Some of the major issues which have cropped up as a result of lack of integrity, accountability and transparency in the hydropower sector are listed below:

- Cost overruns and time overruns, which can have a detrimental effect on the overall profitability and efficiency of the project
- Compromise on the quality of products and services
- Low level of credibility and trust
- Foreign and domestic investors alike are discouraged from entering the sector
- Current load shedding problem

9.3. Case Studies

- **Middle Marsyangdi Hydropower Project:** The Middle Marsyangdi Hydropower Project whose estimated cost of completion was fixed as USD 181 million in 2000 increased to USD 400 million in 2008. This cost escalation of 120% was due to the issue of cost and time overrun.

- **Kali Gandaki Hydropower Project:** Contract defaults arising from project management inefficiencies and external risks can also balloon costs of a project. These lead to contract default claims such as in the case of Kali Gandaki Hydropower Project, where NEA paid USD 50 million to an Italian contractor as a settlement to its claim. This payment was equal to 38% of the original contract price.

- **Substandard transformers case:** Commission for the Investigation of Abuse of Authority (CIAA) arrested 21 officials from NEA in the case of purchase of substandard transformers from Chinese suppliers; Hubei Sunlight Electric Ltd. CIAA estimated that the scam was a loss of NPR 411 million to NEA. Corruption charges were filed and they were accused of making personal gain from the purchase of substandard transformers. The 21 officials accused also included high-ranking officials such as Managing Directors and General Managers. This case highlighted the level of corruption inside the NEA and showed how lack of transparency can lead to huge financial losses.

- **Exit of Statkraft:** Statkraft, the Norwegian energy firm, which was developing the 650MW Tamakoshi III project, backed out of the project citing increased technical and bureaucratic hurdles for foreign investment as the reason of their exit.

9.4 Ways to promote transparency, integrity and accountability in Nepal’s hydropower sector

Highlighted below are some of the ways that can promote transparency, integrity and accountability in the hydropower sector of Nepal.

a. **Changes to PPA and pricing methods**

1. A move towards a more objective, practical and receptive PPA will lead to greater investor confidence and also attract more foreign investors.

2. Pricing is to some extent an objective index to increase credibility.

3. Electricity should be charged as a commodity; therefore, the tariff should not be below the production cost.

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b. Role of the government and Integrity Pacts

1. Integrity Pacts should also be considered as an option. Integrity Pacts are a signed pledge between the government and bidders that neither side will offer, demand or accept bribes during the bidding for and execution of contracts. Such practices will help curb corruption during the development phase of hydropower projects.69

2. In addition to this, public procurement should be made more transparent, systematic and uniform.

3. The government can also consider establishment of sub-sectoral ministries to have a stronger grasp at the lower level and curb the spread of corruption.

4. Need for greater coordination between NEA and DoED.

5. FDI approval process should be simplified for hydropower projects. There have been cases of foreign investors backing out of proposed projects due to lengthy procedures.

6. Projects should be subjected to greater inspection by the government as well as independent third party agencies to identify possible fraud and poor governance practices.

7. The National Vigilance Center should be actively engaged in audits and partnerships with private sector entities and any reports compiled in regards to this should be disclosed publicly.

c. Project Completion Report

1. Project specifics and procedures should be documented upon completion for future usage. This practice is normally absent among implementing agencies associated with hydropower. Furthermore, such documentation can act a model for future hydropower projects.

2. Project completion reports can also help in solving project management inefficiencies and external risk events.

d. Strengthening Accountability

1. A move from denial to acceptance of such problems and building a coalition of management, employees and consumers in regards to solving the problem of corruption is also essential. Strengthening of accountability and encouragement of public participation are also important factors that need to be considered.

10. Identification of risk areas in hydropower sector of Nepal

After an extensive review of the hydropower policies and programs the key risk areas identified in the hydropower sector of Nepal have been highlighted below.

10.1 Fiduciary risk

Fiduciary risk deals with the risk of funds not being used for the intended purposes, not achieving value-for-money nor being properly accounted for. Fiduciary risk can be caused by a variety of factors, including weak control systems, inadequate organizational capacities, staff incompetence, bureaucratic inefficiency or corruption. Any circumstance or situation that prevents local bodies from managing the funds in their care in an economically, efficient, effective and equitable manner invites fiduciary risks.70

a) NEA related inefficiencies: Review of previously NEA implemented project by the World Bank has highlighted the weakness in NEA when it comes to project management and contract management processes.71 For example, in one case, a number of distribution transformers acquired and delivered to the NEA were found to have aluminum windings instead of copper windings as stated in the supply contract. It is certainly a violation of the contract conditions due to poor management of contract execution.72 Furthermore, aluminum windings in transformers have been blamed for the excessive power leakages and are also known to explode under heavy loads. The NEA had asked and the supplier had agreed to replace all the transformers delivered with new transformers of copper windings. As of 2015, only 55 out of 735 transformers supplied had been replaced. Due to such negligence and ineptitude in handling important matters, such as an execution of a contract, fiduciary risk in the hydropower sector of Nepal is rated high.

b) Corruption: Like other sectors, officials in the hydropower sector have often turned out to be corrupt. Even the officials in higher positions, such as the Managing Director of NEA, have been alleged to be guilty on being directly involved in intentionally causing loss to the NEA.

c) Preference to the lowest cost bidder: In Nepal, there is a tendency of awarding contracts to the lowest bidder for any project. Cost of the project is given higher weight than the technical and other qualifications. As per clause 25 (evaluation) and 27 (Acceptance of bid and procurement contract) of the Public Procurement Act, 2063 (2007), the public entity shall select the lowest evaluated bid. As a result, most of the projects run into trouble. The contractors are not able to execute the project on time and the problem of cost overrun arises which ultimately gives opportunities for fiduciary risks to creep in.

d) NEA cost overrun issue: Cost and time overrun is a common phenomenon with projects promoted by Nepal Electricity Authority (NEA), which has cost NEA billions of Rupees. Starting from Kaligandaki A (delayed by about one and half years), Marsyangdi (delayed by a year) and Chilime Hydropower (delayed by about 3 and half years), almost all

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the large and recent projects promoted by NEA have fallen far behind schedule. For instance, the Middle Marsyangdi Hydroelectricity Project (70 MW) was expected to get completed by December 2004; however, the project was only commissioned in December 2008. A sub-committee formed under Parliament’s Public Accounts Committee estimated a total accumulated loss of NPR 22 billion due to the delay. Similarly, the under construction Trishuli 3A (60MW) was expected to be commissioned by May 2014, however, the project is far behind schedule, as only 22% of the work had been completed as of May 2013.

Mitigation measures

a) The Fiduciary Risk Reduction Action Plan (FRRAP): The Government of Nepal (GoN) introduced Public Expenditure & Financial Accountability and Fiduciary Risk Reduction Action Plan in 2012. The implementation period of this plan was fixed as March 2012 - July 2015. It provided a concrete framework of action for reducing fiduciary risks and for the implementation of public financial management reform in local bodies. The Fiduciary Risk Reduction Action Plan (FRRAP) identified three major points important to counteract the fiduciary risk.73 They include understanding the fiduciary risk environment, implementing appropriate processes for mitigating the risks associated with the proper use of funds; and reviewing the procedures for monitoring performance on an on-going basis. Fiduciary risks can have both macro-and micro-level causes which ultimately influence the local body financial management. From a mitigation view, FRRAP tries to balance potential benefits of selected actions with the various options, priorities and circumstances of local body operating environments.

b) Change in procurement plans: Awarding of hydropower projects should be based on quality and technical expertise and not on the cost of bid. When technical qualifications are given higher importance, it is likely that the developers will be able to complete the project on time and within the budget, which is actually required to complete the project.

10.2 Political and governance risks

a) Changing government, changing priorities: There is a broad consensus among stakeholders in the Nepalese power sector that political instability is endemic and an important factor in explaining failures for the development of country’s hydropower potential. With uncertainty regarding political and governance systems and high degree of instability during the current transitional period, international and private investors as well as financial institutions face high risks. A change in government brings about a new perspective on hydropower policies in the country, which can have different implications on investment in terms of taxes/tariff rates and development of the sector as a whole.

b) Bureaucratic hurdles: An example of this is the USD 1.5 billion Tama Koshi III project in Dolakha, which would have been the biggest foreign investment project in Nepal. The Norwegian company Statkraft had been working since 2007 on the dam that would have generated 650MW of electricity for export to India. The recent unrest caused by the promulgation of the constitution and the worsening of political ties between Nepal and India led StatKraft to back out of the project.74 It cited bureaucratic hurdles, geo-political instability and fragile political situation as reasons to back out of the project.74

c) Multiple institutions involved: There are a lot of institutions and ministries involved in the development of the hydropower sector in the country. Power developers have to knock the doors of as many as 7 ministries and 23 different government agencies for licensing and permissions.75 This has not only prolonged the process for obtaining approvals from various ministries but also created confusion for the developers and investors as the

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73 The FRRAP provides a concrete framework of action for reducing fiduciary risks and for the implementation of public financial management reform in local bodies.
policies have failed to clearly state the role of institutions and ministries.

Mitigation measures

a) **Political unity**: Convergence of the main political parties towards a common commitment to water resource management and hydropower development as a way of mitigating the political risk. In addition, there is strong commitment from the Ministry of Energy to institute a steering committee for coordination and building consensus among government agencies. Political unity is likely to instill confidence among the developers as well as the investors.

b) **Unbundling of the NEA**: Given the mixed role of the NEA under the vertically integrated structure, the need to restructure NEA’s generation, transmission and distribution businesses and functions have been cited. Necessary steps have been undertaken already, as the Ministry of Energy is preparing to establish three separate companies for generation, transmission and trade. Progress has been slow, as a sudden change in NEA is expected to cause confusion and chaos. The Grid Development Company has been set up under the ownership of the government and board of directors that is currently being formed. A separate Electricity Generation Company is also in the pipeline as the Cabinet has already approved it. The Electricity Trading Company will also be established in the coming months. All these companies are expected to be setup within November 2016.

c) **Risk sharing mechanisms**: Attracting and retaining private investment requires mechanisms for sharing risks. Provision of common infrastructure such as transmission corridors and roads, streamlined procedures, and political risk insurance are some of the ways of risk sharing which is likely to increase the interest of the investors and developers.

10.3 Sectoral strategies and policies risk

The risk from poor implementation of sectoral strategies and policies is substantial. Key proposed policies in the sectors are still weak and needs to be reviewed with consideration to recent developments that have occurred in the country.

a) **Inconsistent policies**: The government has implemented a number of Acts and policies aimed at addressing the nation’s energy demand and hydropower development. However, some of these Acts and policies lack consistency, with some even contradicting each other. An example of this is the case of Hydropower Development Policy 2001 and Electricity Act 1992 which has been explained in the earlier sections.

b) **Outdated acts and policies**: The Electricity Act 1992 and the Electricity Regulation 1993 are major legislations governing the hydropower sector in Nepal till today. With these Acts being over 23 years old, the government has not made any substantial effort to review them and conduct necessary amendments to it. Both the aforementioned Act and Regulation have been criticized for unclear policy directives and problems regarding project development agreements. Such limitations need to be addressed as they are hampering hydropower development while making the sector seem redundant.

c) **Planning deficiencies**: Lack of coordinated planning, arrangement of infrastructural facilities and financing is one of the main reasons for lack of effective policy implementation. Hydropower projects are developed in isolated modes wherein one project ends up bearing the cost of accessible road and transmission line for its power evacuation76.

d) **No regulatory body**: Monitoring and regulation of the electricity sector in Nepal is still very weak. To overcome this, the Hydropower Development Policy 2001 had envisioned establishing a regulating body. This council is yet to be established. The bill has been

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pending in the parliament for more than 9 years.

e) Government has constantly failed in achieving its goals: IPPs are exposed to risks due to the government’s inability to meet their goals. Most IPPs’ plan their project assuming that the government will achieve the goals it has set out to complete during a time frame. When the government fails, it can leave the IPPs’ project in turmoil as its success and profitability depends on government policies aimed at factors like taxes, transmissions and tariff rates. Therefore, the government’s failure to achieve its goals can expose investors to considerable risks.

f) Slow adoption of acts and policies: The government has already prepared new (draft) bills for the Electricity Act and the Nepal Electricity Regulatory Commission Act. But both the Acts have not been yet approved. If these Acts and policies are passed at the right time taking into account the current scenario, then the policies and Acts are likely to be successful in achieving its aims and goals. Delay in implementation of new Electricity Act and Regulatory Act has created an environment of regulatory and legal uncertainty.

Mitigation measures

a) Implementing the holistic basin wise development concept: Currently hydropower project has to bear the cost of constructing accessible road and transmission line for its power evacuation up to substation and hence end up bearing the heavy burden of investment in these infrastructure. To optimize hydropower development, it is vital to pursue a basin wise development policy so that the project infrastructure such as accessible road and transmission line are shared by all projects within the basin.

b) Reconciling the current conflicts in Acts/Regulations: While formulating new policies or amending the old polices, Acts or regulations, the formulating body should make sure that the provisions of new ones do not clash with the old ones.

c) Shorten the procedure: Shorten the procedure for processing of hydropower projects and licensing to avoid chaos and confusion. Also, Acts and policies should be streamlined wherein only a single agency should coordinate with the project developers and investors.

d) Update policies and acts: Amend older Acts and policies to consider the recent developments in the country. The government is working on this currently but a clear consensus is yet to be formed.

e) Set achievable goals: The government needs to set more achievable goals in future Acts and strategies as their failure in achieving the stated goals can have ripple effects throughout the sector.

10.4. Institutional risk

Some of the main institutional risks identified during the course of study are as follows:

a) Off-taker issues: DoED has been issuing survey licenses to new hydropower projects but NEA is not willing to sign the PPA with the developers (projects above 25MW) which have left the projects in limbo. NEA is the only off-taker of power in Nepal. Projects cannot be developed or attain generation license from DoED if NEA refuses to sign a PPA.

b) Weak project development agreements: Department of Electricity Development (DoED) does not sign the Project Development Agreements with the investor which exposes them to risks associated with the changes in law over the duration of the project. In a country, where there is no political commitment, where the legal and institutional set up are still in the evolving stage, PDA can be essential to bring about certainty, predictability, protection and promotion of foreign investment. The only two projects where PDA has been signed are Upper Karnali and Arun III.

c) Political interference: There are concerns of political interference in the management of public utility companies like NEA. The presence of 7 unions with different political

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77 Presentation on Hydropower Related Policy and Legal provisions, Sriranjan Lacoul, Nepal Hydropower Association, accessed on June 23, 2016
affiliations alone speaks volumes about the political interference in public utility. There is lack of financial and management autonomy of NEA. The board of directors of NEA includes members from ministries. Hence, decision making on financial and corporate management is not independent from the MoE.

Mitigation measures

a) Open access for IPPs which will allow IPPs to sell directly to consumers, facilitate power wheeling and access to export markets.

b) DoED should consider drafting a standardized PDA where DoED should be a signatory.

c) There is a need of institutional reform to ensure financial and management independence of NEA from the government.

d) The market should be open to the private sector in the transmission and distribution segment as well.

10.5 Financial risks

Financing a hydropower project is dependent on the management of various types of risks. This involves identification of various risks associated with a project and assessment thereof. Important risk factors regarding the financial aspect in the hydropower sector are listed below with their mitigation measures.

a) IPPs are unable to raise the required equity:
The IPPs do not have the capacity to raise equity required for the project. They are unable to raise equity of 20-30% required by many funds which makes financing projects difficult.

b) Foreign Exchange Risk: A foreign exchange risk is natural in foreign loans due to the fact that foreign currency tends to be relatively strong compared to Nepalese currency. This risk emerges with devaluation if revenue is denominated in local currency while having to service the loan denominated in foreign currency. Similarly, this risk also does manifest in rising cost of imports.\(^{78}\)

c) Interest Rate Risk: Lenders normally offer two kinds of interest rates, floating and fixed rate. Floating rate involves changes in the interest rate during the term of the loan, thereby introducing an element of uncertainty or risk for the borrower. A fixed interest rate involves a fixed rate during the period of the loan.\(^{79}\) For an investor, fixed rate is the best way to mitigate this risk but banks normally offer floating rates, which leave them facing higher risks.

d) Market Risk: It is common knowledge amongst engineers that energy requires a guaranteed market due to the constraints with regard, primarily, to storage and transmission.

Mitigation measures

a) As it is difficult for developers to raise the required capital, fund structure for hydropower projects should be developed with a clear understanding of the market situation in the country.

b) The foreign currency risk can be mitigated by either having the loan denominated in local currency, or by having the rate of revenue denominated in foreign currency. In case of increase in the cost of imports, an insurance coverage against cost escalation would mitigate this risk.

c) Sign a long-term Power Purchase Agreement with the NEA.

d) To mitigate the effect of the NEA’s financial performance, there is an urgent need to reduce the high distribution losses to an acceptable level, reform the NEA’s retail tariff to ensure cost recovery, including a mechanism for foreign exchange risk management, and put in place a trading mechanism to sell surplus electricity to neighboring countries.


10.6 Other risks

a) Hydrological risk: The ‘take or pay’ nature of the PPA guarantees that all energy produced by a plant, depending on the availability of water, regardless of whether the season is dry or wet, shall be turned into cash. However, if there is no water to generate energy due to the change in the level of precipitation, climatic reason or change in the hydrology of the area, then these projects are faced with an uncertain environment.

This risk stems from the fact that seasonal rainfall patterns affect the amount of water available to a hydropower plant and generation may fall below required levels in any season, thus threatening the revenue stream of such projects. Obviously, a dry year will be a disaster for a hydropower plant.

**Mitigation Measure:** The most effective way to mitigate hydrological risk is to gather hydrological data for a reasonable number of past years and design the project accordingly.

b) Construction risk: Time and cost overrun risks are one group of construction risks. Time overrun risk results in loss of revenue and may also raise the cost due to inflation. It also raises the total amount of interest of the debt financing and may even attract penalties for late delivery of energy. Other construction risks include socioeconomic, environmental, geological, performance and design.

**Mitigation Measure:** To mitigate the effects of these risks, insurance coverage can be arranged for risks like Construction All Risks (CAR) and Erection All Risks (EAR). By doing so any loss accrued can be covered for.

c) Environmental, community, forestry and land acquisition risks: Environmental, community, forestry and land acquisition risks are common in hydropower development in Nepal. A major concern is gaining permission to enter a proposed hydropower site for feasibility studies, which requires permission from the Ministry of Forestry; the process of gaining permission is long drawn and filled with bureaucratic hurdles. Problems regarding cutting down of trees and leasing land for the project are also rife with constant delays. Furthermore, compensation paid and relocation process for locals who were displaced by the projects is not effective which results in local opposition against hydropower projects. Concerns are also raised regarding the damage to biodiversity caused by the project. Furthermore, Initial Environment Examination (IEE) and Environmental Impact Assessment (EIA) can be long drawn due to complex procedures and inefficiency in government offices leading to increase in costs.

**Mitigation Measure:** An important measure in decreasing the above-mentioned risks is to make sure that the community that is being affected is better off after the construction of the hydropower project. Provisions regarding transmission facilities that provide up to 3MW for local consumption and allocation of 10% share on equity for the community affected are effective measures to counter local opposition. Grievance mechanisms should also be put in place to further benefit the community and steps should be taken to engage with the community to gain their trust and build community support. In regards to environmental concerns, steps to ensure biodiversity conservation should also be mentioned in IEE/EIA reports.
11. Recommendations for the Development of Hydropower Sector

This section highlights some key macro-level recommendations for the development of the hydropower sector.

11.1 Institutional and Legal

11.1.1 Formation of an effective ‘one-window’ institution

As mentioned above, hydropower investors in the country have to visit as many as 7 ministries and 23 different government agencies to receive license and permission for hydropower projects. To ease this process, the DoED was established as a ‘One Window’ service for issuance of licenses for power projects. However, this policy of ‘One Window’ service has remained largely ineffective as there are many organizations equally powerful that issues clearances for hydropower projects. Similarly, Investment Board Nepal (IBN) was also established with the objective of facilitating large projects and serving as a one window service institution. However, in reality both these organizations have failed and investors still need to visit multiple institutions which not only delay the whole development process but also provide multiple windows for corruption to arise.

Establishing a strong one window institution for all types of investors (small or big) will therefore minimize the chances of emergence of fiduciary risks and also streamline the hydropower development process. Institutions like Investment Board Nepal should be given the power to single handedly manage these infrastructure projects. By mitigating lack of coordination and clash between government departments which is one of the main reasons for delay will entice hydropower developers. This will also lead to lower corruption risks as one institution will single handedly look at projects giving little room for corruption. To maintain the efficiency of the institution, this institution can be made fee-based and time-based.

11.1.2 Define clear terms of reference for institutions

Multiple institutions in Nepal end up doing the same work. There are no clear terms of reference when it comes to the work carried out by government organizations. For example, DoED which was established as a one window institution for issuing license is also involved in construction and generation of hydropower projects and Hydroelectricity Investment and Development Company Ltd. (HIDCL), which was established as a hydropower investment company, is now looking to develop hydropower projects through its wholly owned subsidiary, Remit Hydro Limited (RHL). This provides an uneven playing field in the development of hydropower projects and also creates confusion in the mind of investors. Hence, the terms of reference of institutions should be clearly defined so that they complement rather than compete with each other.

11.1.3 Restructuring the Nepal Electricity Authority (NEA)

Unbundling of NEA has remained a critical issue for full liberalization and growth of the power sector for long. As mentioned above, the unbundling process started in 2016 with the Ministry of Energy planning to establish three separate companies for generation, transmission and trade. The Grid Development Company has already been established with all transmission lines coming under its operation. The company will have an authorized capital of NPR 25 billion and issued capital of NPR 5 billion. Electricity Generation and the Electricity Trading Company are expected to be setup within November 2016. Steps now have to be taken to amend the existing NEA Act, which states that the NEA is the only body allowed to generate, transmit and trade electricity. Having separate authorities for transmissions, distribution and generation would allow NEA to concentrate their effort on resources and other pressing matters instead of being bogged down with issues where they have not been able to perform adequately.\(^{81}\)

Making NEA efficient: Analysts and critics have often claimed that NEA, as an institution, is ineffective because of various reasons. In an interview conducted with former Chief Secretary of Nepal, Mr. Lilamani Paudyal suggested an institutional restructuring of the NEA\(^{42}\) claiming that there are around 3,000 political recruitments in the NEA which are not merit-based and criteria compliant enough to lead an ineffective institution. The solution to this does not entail large-scale layoffs, but a more effective engagement of employees and better hiring criteria. Internally, the Board of Directors of NEA should not be political appointees but rather selected from different sectors based on strict evaluation; each board member should have equal voting right on the decision, the chairman of the board should be appointed by a majority vote of the board members and the managing director should be selected via international competitive bidding. These recommendations can help make performance-enhancing changes in the functioning of the authority. Also, the minutes of NEA board meetings, should show which board member introduced or voted for what agenda and authorized what sort of deals, should be made publicly available, along with the bidding documents of all projects to increase transparency in NEA’s dealings.

Some of the potential direct and indirect benefits from unbundling NEA’s single buyer monopoly and initiating changes on an institutional level are as follows:

**Direct benefits**

Reduce the project financing risk as the unbundled bodies will be able to properly manage the existing problems at NEA.

It is likely to minimize market risk. Since NEA is a sole buyer and does not sign long term Power Purchase Agreement with hydropower projects, unbundling of NEA will help to minimize market risk and provide adequate platform for long term energy market, which will ensure guaranteed stream of revenue from the projects.

**Indirect benefits**

Makes the hydropower market more competitive.

Increased confidence by BFIs for consortium lending; interest premium for additional risk taken could be brought down which leads to lower interest rate risk.

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11.2 Solving the supply-side issue

11.2.1 Issues regarding PPA rates need to be resolved

Nepali IPPs, represented by IPPAN, have been strongly advocating for increases in PPA rates. IPPs contribution to overall electricity supply in Nepal has been on the rise since the 1990’s and have consistently shown to be more efficient in conducting hydropower power projects than the NEA. However, they continuously feel encumbered by the PPA process. Debate regarding whether PPA should be denominated in dollar terms or in Nepali rupee has been ongoing and IPPs feel further annoyed by NEA’s decision to import energy from India rather than giving them better incentives for hydropower power generation.

Also, discrepancies between foreign and local IPPs have cast a shadow over private sector involvement in the hydropower sector. The major concerns for the local IPPs are the discrepancy between foreign and domestic IPPs and low PPA rates which undermine a return on their investments. Also, Nepali IPPs were troubled by the fact that foreign investors had PPA denominated in dollars for projects such as Khairital and Bhotekoshi, while their constant push for dollar denominated PPA have been left unaddressed.83

Therefore, concerns regarding PPA rates need to be addressed and the following recommendations could be considered:

**Reform within the NEA:** NEA should first improve its operational performance, including eliminating all political interference and administrative and financial irregularities.84


PPA with both USD & local currency:
If the NEA is unwilling to offer dollar based PPA, then NEA can enter into PPA, with both dollar and NPR components to ensure free flow of foreign investment and at the same time mitigate foreign exchange risk. For instance, the dollar invested on electromechanical work, which is on average 40% of total project work, could be remunerated in foreign denomination. Likewise, NEA can have USD denominated PPA for projects, until the project has cleared its loan portfolio, i.e., USD based PPA for its payback period. Similarly, NEA can have USD denominated PPA for the funds correspondent to foreign equity only and have the local component in local currency

**Clearer PPA rates:** PPA rates need to be done for RoR hydropower projects over 25MW. Till now the NEA has only set rates for RoR projects under 25MW and storage projects with PPA rates for RoR projects over 25MW are not disclosed. Therefore, NEA should work towards setting clearer PPA rates, as this would ease the process of the project development. Furthermore, aligning PPA rates of both RoR and storage projects to accommodate the effects of weather should be considered.

**Higher PPA rates required:** Higher PPA rates are required if greater private sector participation in the hydropower sector is to be expected. IPPs fear that NEA, with a monopoly in buying electricity, will treat them unfairly as they seek to promote their own projects. For instance, currently there are numerous projects, which have completed initial surveys and are awaiting PPA with NEA. In the absence of a hydropower buyer
11.2.2 Revisit demand forecasts

The latent demand for electricity is much higher than the existing forecasts. The demand is likely to increase based on the ease of obtaining a connection and subsequent energy substitution from LPG and firewood to electricity. Other factors such as upgrading from a two-phase to a three-phase electrical power distribution system, and urbanization with increased usage of electrical appliances, should also be taken into consideration.

NEA’s projection is highly questionable because of the limited scope of the data that their projections are based on. NEA has been basing their demand forecast on their internal calculations rather than conducting national electricity surveys; NEA has never conducted such a survey. Without the survey, the legitimacy of the data can be called into question as it may omit trends in electricity consumption. One of the key issues that the data does not consider is the impact of latent demand on consumption patterns.

The mismatch between forecasts made by NEA and the MoE has led to a state of confusion amongst investors. NEA has stopped signing PPA with projects above 25MW fearing oversupply in the future. Unfortunately, no studies have been conducted to explore the latent demand, especially for energy substitution; therefore, the government needs to revisit its stance on electricity development and demand forecast.

11.2.3 Energy bank between Nepal and India should be established effectively

India and Nepal are planning to set up an energy bank so that they can help each other overcome power shortages. The proposal was discussed at a meeting of the India-Nepal Joint Standing Committee, a bilateral technical mechanism on water resources, power and irrigation projects in May 2016. As per the energy bank concept, Nepal would export power to India in summer and import power from India in winter, when output drops sharply resulting in crippling power shortages. The two countries have conducted informal discussions regarding the energy bank before. But this is the first time that Nepal has made a formal proposal. The Power Trade Agreement (PTA) signed by Nepal and India in 2014 during Indian Prime Minister Narendra Modi’s visit to Kathmandu had opened the way for the two countries to establish an energy bank. The PTA was signed with the aim of Nepal creating a strong base for tackling its power crisis and also for opening the doorway to future energy trades with India and other countries.

India is agreeable to the concept of an energy bank, but the major hindrance point is that there is no open access to India due to legal complications. Therefore, works on regulatory provisions should be carried out immediately. Furthermore, establishment of the energy bank should be done with clear provisions in place regarding the amount of electricity being exported and imported between the nations. An effective execution of the energy bank can help Nepal come out of its current power crisis and also realize its long-term plan of being an energy exporter.
11.2.4 Pursue micro-hydropower projects

According to the NEA, a hydroelectric plant is categorized as “micro” if it has an installed capacity between 10 to 100 KW. Nepal is geographically well suited for Run-of-River (RoR) hydroelectric development, which uses the natural flow and elevation drop of the river to generate power. RoR projects exert minimum impact on the environment and the local population.

Micro-hydro projects (MHPs) generate small amounts of energy, but are perfect for local communities lacking access to a national electricity grid. Instead of connecting to the national grid, MHPs typically supply power through local mini-grids. As Nepal currently lacks a comprehensive or functional national energy grid, a number of communities have already developed micro-hydro projects to gain access to electricity for lighting, refrigeration, cooking, and communications technologies. Existing MHPs provide electricity to Nepal’s far-reaching rural communities that might otherwise take years to gain connectivity to the national grid.

Recently, mini-grid technology has begun to appear as a potential solution to efficiency concerns about micro-hydropower projects. Further, this technology will give communities the option of selling surplus electricity to the national grid, if and when the grid is extended to those rural areas. The first micro-hydro mini-grid was completed in Baglung in the Western Development Region of Nepal in 2011 by the Alternative Energy Promotion Centre (AEPC). This grid connects six MHPs over 8 kilometers and now serves 1,180 households. Mini-grid connectivity has ensured that locals enjoy 24-hour access to electricity and has reduced the monthly cost of electricity from USD 1 to USD 0.80. As mentioned in the previous section, the RERL program is also making large strides in MHP development in rural areas as well. Additionally, according to a World Bank Study, MHP’s are economically viable than the NEA’s grid system and has suggested the following recommendations to accelerate MHP development:

- **Prioritize MHP as the most cost efficient off-grid rural electrification method:** For delivering the same level of services by a typical MHP in rural Nepal, other methods are more than twice as expensive. Therefore, MHPs should be the first choice to deliver off grid electrification where they are technically feasible.

- **Continue subsidy support for MHP to ensure delivery of economic benefits to rural area:** Although rural electrification through MHP returns economic benefits roughly three times larger than the investment and operating costs, MHPs are not financially viable in the conventional sense. Therefore, subsidy should be sustained to support the MHPs development.

- **Scale-up MHP by aggregate demand and optimize site potential:** Smaller plants are usually less viable and cost more to set up than larger plants. The focus of planning for MHPs should be changed from merely meeting the current power requirements of the community to optimize site potential by aggregating demand.

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Establish innovative financing instruments to finance grid connection of MHPs: AEPC should facilitate access to low-cost loans (as well as risk guarantee) rather than providing capital subsidy to the rural communities (or the MHP owners) for grid connections of MHPs.

Harmonize rural electrification programs by effective coordination between NEA and AEPC: Since the government provides subsidy support both to the community based rural electrification program for extending the national grid to rural areas through NEA and to MHPs development through AEPC, it is critical for these two programs to be harmonized so that the subsidies are utilized optimally and the MHP-grid interface issues are resolved in a planned way. Most importantly, NEA and AEPC should collaborate to prepare a national rural electrification master plan.

11.3 Other Recommendations

11.3.1 Improve financial climate for hydropower investment

In Nepal, BFIs have the capacity to finance medium to small-scale hydropower projects. But the financial market lacks the strength to finance large-scale hydropower projects. Additionally, the participation of BFIs in the hydropower sector has not been encouraging due to various holdups. Listed below are some recommendations to improve the financial climate for hydropower investment:

Role of the government

The government needs to play a progressive and active role, by developing a supportive legal and institutional framework, if it is to be successful in attracting private investment in hydropower.

Bureaucratic delays and lengthy decision-making process of various ministries, departments and other government authorities that are involved in granting approvals and licenses at various stages of project development should be resolved. The government should provide tax incentives on bonds and debentures, which can attract funds to finance large infrastructure projects at a lower cost. Likewise, government can provide tax incentive for BFIs investing in large infrastructure projects.

Since NEA is fully owned by the government it should provide guarantee for NEA’s financial and other obligations.

Incentivizing projects that were damaged in the earthquake to get them back in operation fast should be done to help tackle the energy crisis in the country.

The government can provide further incentives for hydropower investors by providing NPR 50 lakhs/MW for hydropower projects intending to supply electricity for domestic use within the next 10 years.

Nepal Rastra Bank (NRB)

Considering the nature of hydropower financing, NRB should relax provisioning requirement for hydropower financing.

NRB should continue with current consolidation drive to merge BFIs as it would help create BFIs with larger capital base and risk appetite which will enhance their capacity to finance large (capital intensive) hydropower projects.

Introduce foreign currency denomination bonds.

Banks and Financial Institutions (BFIs)

Deposits are the primary form of source of funds of Nepali BFIs. Savings deposits are lower cost resources. However, it is short-term in nature while hydropower requires long-term funding. It poses a challenge for BFIs to manage their asset-liability mismatches. This would have a direct impact on the ability of BFIs to provide long term funding for infrastructure projects therefore, the domestic BFIs should be efficient and innovative to enhance the level of longer term deposits, and such funds could be effectively channelized for infrastructure financing.

BFIs need to develop an internal project appraisal system with adequate skills to appraise hydropower projects; adequate training from both internal and external experts would be preferred.

The banking system with the support from NRB should introduce complex instruments, such as credit derivatives, to encourage higher lending to hydropower projects.

The BFIs need to establish a project finance cell with adequate resources and detailed plan of action to ensure effective implementation.

Private investor training

Local stakeholders and project investors should be trained in project management and business skills as they are often less aware about various aspects of hydropower projects and their implications.

Credit rating

For large-scale investments, Nepal has to look to global capital markets. The first challenge it will face is the absence of credit ratings for Nepal. In a country where politics is still unstable and where even the bare minimum enabling environment of a strong rule of law is absent. It is difficult to imagine why investors would be willing to invest such large amounts. Furthermore, an absence of credit rating from global giants like Moody’s or Standard & Poor’s for Nepal, international investors have an added uncertainty to deal with. Further, the absence of credit rating impacts insurance adversely as there are no Nepal specific products available in the global insurance market.

Assistance from multilateral or bilateral partners can help Nepal get credit ratings assigned. Getting credit ratings assigned would put Nepal in international investors’ map and would contribute in accessing international capital more easily which could be channeled into the aforementioned sectors to unleash the country’s productive capacities.