

Analysis of Rural Electrification Policy Provisions in Nepal

Madhusudhan Adhikari¹, Bharat Raj Pahari², Rajendra Shrestha³

^{1,3} Department of Mechanical Engineering, Central Campus, Pulchowk, Institute of Engineering, Tribhuvan University, Nepal

² Department of Civil Engineering, Central Campus, Pulchowk, Institute of Engineering, Tribhuvan University, Nepal

Corresponding Email: madhusudhan.adhikari@yahoo.com, bharatpahari@gmail.com, rsfluid@hotmail.com

Abstract: Developing counties are thriving to develop good policies to cope up with the increasing need of infrastructure development. Making access to modern energy to the rural population is one of the daunting tasks, the main blame for poor rural electrification in Nepal goes poor policy framework. It is found that Hydropower Policy 1992 and Electricity Act 1992 are the main Act and Policy documents which have made different provisions of generation and distribution of hydro electricity in general.

Whereas Rural Energy Policy 2006 is dedicated in the development and use of renewable energy technologies and it also covers rural electrification. These policies have made basic provisions but are lack in the clear plan of action and tools to achieve them. Water Resources Strategy 2002 and National Water Plan 2005 bring out some planned statistics of hydro power generation and percentage of household electrification. Other Acts like local self governance Act 2056 simply mentions that DDC and municipalities can generate their own energy or electricity and use in local level. Community Electricity Distribution Bye Laws, 2060 had made provision to buy electricity in bulk from Nepal Electricity Authority and use for rural electrification network and manage the distribution system locally, these provisions are also now are not continued and so not very effective. A quick analysis of the policies and provisions for rural electrification it is found that there are a numbers of issues which need to dealt to develop an integrated rural electrification master plan to achieve it.

Keywords: rural electrification, energy, policy, regulations, demands etc.

1. Energy Use Situation in Nepal

By definition energy is capacity to do work. In the micro level we need energy to move our arm, whereas in macro level, energy is driving economy. Energy fuels economic growth and poverty reduction. Reliable and efficient energy services underpin the expansion of economic and employment opportunities, the continuing progress in social development, and the sustained improvement in standards of living. Nepal is suffering from significant energy poverty and pervasive energy deficits. The per capita energy consumption in Nepal is merely 14.8 GJ which is one of the lowest values in South Asian region. Nepal's consumption is merely one fifth of the world's average and less than half of the Asian's average. In the context of electricity consumption, Nepal's case is the worst with just 90 kWh per capita (IEA, 2010). One of the main reasons for this is the fact that about 33percent of households still do not have access to electricity and those who are connected to national grid has in average more than 8 hours load shedding per day (CBS 2011).

There is a stark disparity in terms of access, where almost 90 percent of urban households are connected, rural has just 30 percent (CBS, 2011). The share of traditional biomass resources, commercial energy resources and renewable energy resources are 87%, 12% and 1% respectively. Lack of modern means of usage of traditional biomass results in environmental

degradation and reduced production from agro and allied sectors. There has also been adverse impact on the health of rural population mainly women and children because of in-efficient use of traditional energy resources.

Electricity demand of Integrated Nepal Power System (INPS) in fiscal year 2012/13 is estimated at 5,446 GWh, out of which only 4,218 GWh (77.5%) could be supplied. The rest 228 GWh (22.55%) deficit was resorted to load shedding. Of the total supplied energy volume 3,468 GWh (82.56%) was contributed by domestic generation and 792.5 GWh (17.44%) by import from India. Domestic supply included 1,176 GWh (34%) from Independent Power Producers (IPPs) and rest 2,292 (66%) from Nepal Electricity Authority (NEA) owned power stations with a share of 2,273 GWh from hydro and 18.82 GWh from thermal. The energy demand of INPS in fiscal year 2012/13 grew by 7.7% over previous year's energy demand. (NEA2012/13)

Barriers in the development and use of modern energy-electricity include subsidies for conventional forms of energy, high initial capital costs coupled with lack of fuel-price risk assessment, imperfect capital markets, lack of skills or information, poor market acceptance, technology prejudice, financing risks and uncertainties, high transactions costs, and a variety of regulatory and institutional factors. Many of these barriers could be attributed to poor policy framework and legal and

institutional arrangement to implement the available policies those are in place.

2. Rural Electrification Policy Pathway

Enthusiasm for electricity dates back in time and in 1885. Rural electrification is defined here as the process by which access to electricity is provided to households or villages located in the isolated or remote areas of a country. Scaling up electricity access is an enormous responsibility. The stark reality is that 1.4 billion people across the globe still lack access to electricity. The direst situation is in Sub-Saharan Africa, where more than three quarters of its 587 million citizens in both rural and urban areas are without electricity. Two-fifths of South Asia's people, mostly rural residents, have no connection. By 2030, the International Energy Agency estimates that, under business-as-usual projections, electricity access will only keep pace with population growth. (IEA 2014)

Remote or rural regions lacking electricity supply are often characterized by well identified challenges. They may lie at a reasonable distance from national or regional electricity grids may be difficult to access or may suffer harsh climatic conditions that render electrification through grid extension a perilous task. Rural communities are also often highly dispersed with a low population density and characterized by a low level of education low load density generally concentrated at evening peak hours and low revenues. Adding to these challenges, the rural poor without access to electricity either spend relatively large amount of their scarce financial resources on energy or a disproportionate amount of time collected firewood. In light of these challenges, electricity provision to the world's rural poor calls for a committed and long term action plan. The benefits that electricity access brings to households and communities are justified not only on social and economic grounds but also on grounds of equity objectives.

One important aspect of modern energy systems – apart from the increase in amounts of energy used – is the improved quality of energy and its prompt availability throughout urban and rural areas. In this respect, the real last energetic breakthrough has been the process of electrification. Electricity is the most versatile form of energy used to ‘feed the socio-economic metabolism’ (Haberl, 2001) while being contemporaneously a precondition to expand economic activities and the result of economic development

The USA stands out as the country that first completed the urban and rural electrification process (Nye, 1992). Electricity became commercially available in the 1880s and the electrification process ended in the middle of

the following century (1960) when the grid reached virtually every rural community. Electrification in the USA did not spread evenly nor was it a smooth and spontaneous process (Tobey, 1996). Factories received electricity towards the end of the nineteenth century and urban businesses after 1910. Electricity became available to the majority of rural households and farms only after 1935 (Nye, 1992). The experience of the USA stands in stark contrast to the situation in rural areas of many developing countries nowadays – especially in Africa and South Asia – where full electrification is not yet a reality and energy poverty is exemplified by the lack of access to electricity (IEA, 2010). Countries embarking on providing electricity to their poorest populations face significant challenges. One is deciding how to create or modify existing institutions and policies to support rural electrification initiatives. Existing electricity companies often have a tradition of serving mostly urban populations and thus may be reluctant to support rural electrification programs. Scaling up electricity access in rural areas may require creating independent institutions or setting up special programs within electricity companies. Complementary solutions, involving both grid and off-grid approaches, may be needed. Grid extension should be pursued as a least-cost option in more densely populated and economically advanced areas, where power demand and load densities are high. Where grid extension is not least-cost or reaching remote communities through grid network expansion is economically impractical, off grid technologies and business models involving renewable energy or even small diesel systems should be adopted to provide basic levels of electricity service.

Unfortunately, many countries have experienced various institutional or financial problems in expanding electricity access, particularly in rural areas, where the pace has been painfully slow. Countries with inadequate or small programs often have poor electricity policies, such as inadequate initial subsidies or pricing that prevents companies from charging a cost-recovery tariff, thereby limiting service to higher-income households. Privatized utilities, in particular, often lack incentives to expand into poorer areas where customers cannot afford the upfront connection costs and low load factors result in small returns on investment. In other cases, politicians may distort electrification extension and interfere with pricing, bill collection, and disconnection policies. Available subsidies may be captured by the middle class instead of the poor. Or the problems of local communities may be overlooked, resulting in disputes over rights of way. Recently, many countries have embraced both grid and off-grid approaches, executed by various types of institutions that might include public or private

companies, along with large and small nongovernmental or micro-finance organizations. The approaches involve a variety of technologies, service levels, and costs.

3. Policies Related to Energy in Nepal and Provisions of Rural Electrification

Decision makers in governments around the world are confronted by an array of complex challenges as they endeavor to predict the impact of existing and prospective policies on future social, economic and environmental well-being. The ability to estimate accurately the impact of a given policy is essential since it increases the likelihood that the most suitable policy instruments are chosen and applied, assisting governments in allocating their and society's scarce resources in the most effective and efficient manner (Zurich, 2006).

The 1990s saw an explosion of energy policy changes around the globe (Marriot et. al, 2002). Driven by economic, environmental, security, and social concerns, energy regulation has been in great flux. Many of the changes are having a profound influence on renewable energy, both from policies explicitly designed to promote renewable energy and from other policies that indirectly influence incentives and barriers for renewable energy. The need for enacting policies to support renewable energy is often attributed to a variety of "barriers" or conditions that prevent investments from occurring. Often the result of barriers is to put renewable energy at an economic, regulatory, or institutional disadvantage relative to other forms of energy supply.

Energy policies development in Nepal started from the Fifth Plan (1975-1980) which incorporated the first sector specific policy statement in the energy sector. In the plan, the government emphasized the need to reduce heavy dependence on traditional source of biomass and imported oil, and increase the supply of renewable energy sources including hydropower to meet the increasing demand for energy.

In Nepal, policies in the energy sector currently are scattered in various documents and executive orders. These include policy statements of the government made in periodic development plans, subsector policies, government orders and notices, and laws passed by the legislature. Experience in the past showed that any change in energy policy direction (e.g. adjustments to energy prices, shifts to alternatives like nuclear, or policies directed at the environmental aspects of energy utilization) had unexpected and unpredictable effects. Energy price increases had

profound flow on effects every economy, but also influenced the social and political situations (WECS, 2010).

The policy documents related to hydropower, energy or electricity development and use have different objectives, strategies, policies and plans in them.

The provisions specifically related to rural electrifications are summarized below.

3.1 *Hydropower Development Policies 1992 and 2001*

Objective: To render support to the development of rural economy by extending the rural electrification.

Strategies: To extend hydropower services to the rural economy from the perspective of socio-equity with the realization of the fact that development of power sector, having a direct concern with agricultural and industrial development, is a pre-requisite.

Policies:

Electrification of remote rural areas shall be encouraged by operating small and mini hydropower projects at the local level.

Rural electrification shall be extended in order to make electric service available to as many people as possible. In addition to mobilization of public participation, a Rural Electrification Fund shall also be established for the purpose.

The existing institutions in the public sector shall be restructured to create competitive environment by encouraging the involvement of community/cooperative institutions, local bodies and private sector in generation, transmission and distribution of hydropower in order to extend reliable and qualitative electricity service throughout the Kingdom at a reasonable price.

Development of Rural Electrification:

His Majesty's Government shall gradually extend rural electrification. Appropriate institutional arrangement shall be made for this.

- Appropriate arrangement to undertake rural electrification shall be made while awarding the distribution license.
- Rural electrification shall be encouraged in the rural areas affected directly from the electricity generation project. Energy royalty on the electric energy consumed in such an area shall be exempted. Such exemption shall be given until the first fifteen years of the commencement of commercial production.

- One per cent of the royalty obtained by His Majesty's Government from a hydropower project shall be provided to the Village Development Committees that are directly affected by the hydropower infrastructure with the sole purpose of expanding electrification of these Village Development Committees.
- A Rural Electrification Fund shall be established for the development of micro hydropower and rural electrification by pooling in a certain percentage of the amount received as royalty.
- His Majesty's Government shall provide grant through the Alternative Energy Promotion Center to the domestic private sector to generate and distribute electricity by building hydropower center of up to 100 kW capacities at the rural level. Moreover, such projects shall be included in the prioritized loan sector, and facilities shall be provided to such projects accordingly.
- Electricity shall be supplied from small hydropower projects in the mountainous rural area falling outside the access of the national power system. Provision shall be made to hand over the responsibility of operation and maintenance of such small hydropower projects to the local cooperative groups and these groups shall also be involved in the course of formulation and implementation of plans.
- For the private sector operated hydropower projects with capacities up to one MW and not linked to the National Grid System, the private producer may sell and distribute the electricity by determining the tariff rate of the electricity on its own.

Provision on License:

- Provision shall be made such that the local people can also be directly benefited from the operation of the hydropower generation project. Such provision shall be included in the agreement to be made with the licensee. In addition, ten per cent of the amount obtained for royalty shall be provided to the District Development Committees of those Districts affected from the dam, reservoir and powerhouse constructed for the generation of hydropower, to be spent in development and construction work of those Districts, pursuant to the Local Self-governance Rules.
- No license shall be required for hydropower project up to a capacity of one MW. Such hydropower project shall be registered with the

District Water Resources Committee prior to commencement of the works of such project. Information of such registration shall be given to the Department of Electricity Development. The basis for registration of such projects shall be as determined by His Majesty's Government. Such projects shall be entitled to the facilities in accordance with this Policy.

3.2 Water Resources Act 1992

Priority Order on the Utilization of Water Resources is forth after drinking, irrigation, animal husbandry and fisheries. No license shall be required for running water-mill or water-grinder as cottage industry.

3.3 Electricity Act 1992

No person shall be entitled to conduct survey, generation, transmission or distribution of electricity without obtaining license under this Act. Provided that no license shall be required to be obtained by a national or a corporate body for the generation, transmission or distribution of electricity up to 1000 kilowatt and for conducting necessary survey thereof. Before generating, transmitting or distributing hydroelectricity of the capacity ranging from 100 kilowatt to 1000 kilowatt, information to that effect shall be given to the prescribed officer in a manner as prescribed.

Royalty to be Paid

The licensee shall have to pay royalty to His Majesty's Government at a rate of Rs. 100 for each installed kilowatt of electricity per year plus 2 percent of the average tariff per unit per kilowatt hour) for a term of up to fifteen years from the date of generation of electricity for commercial purpose.

The licensee shall have to pay royalty to His Majesty's Government at a rate of Rs. 1000 for each installed kilowatt of electricity per year plus 10 percent of the average tariff per unit per kilowatt hour).

Facilities Relation to Income Tax and Other Tax and Charge-No income tax shall be levied to a person or a corporate body who is generating, transmitting and distributing hydropower up to 1000 kW.

Sale of Generated Electricity - If any person desires to sell in bulk the electricity generated pursuant to this Act, His Majesty's Government may purchase or cause to purchase such electricity to the national grid.

No Nationalization to be made

The land, building, equipment and structure related to electricity generation, transmission or distribution

should not be nationalized. Provided that the land, building equipment and structure related to the generation, transmission or distribution of 1000 kilowatt or less of hydro-electricity, His Majesty's Government may, for the extensive public use take over such property and develop and develop that itself.

Purchase of Electricity Generation Plant etc.

In case where the licensee is going to distribute electricity in an area where any person or corporate body is already distributing electricity by generating up to 1000 Kilowatt of hydro-electricity, such person or corporate body who is generating hydro-electricity up to 1000 Kilowatt if desires to sell the hydro-electricity plant, transmission and distribution line which is operated by him, the said licensee shall have to purchase such hydro-electricity plant, transmission and distribution line on the price after deducting wear, tear and general depreciation) as fixed by mutual agreement.

Security of Electricity Structure:

- His Majesty's Government may make necessary arrangement for the security of any electricity generation plant, transmission plant, sub-station, or any reservoir made for generating electricity or any other structure related to electricity, on the request of the licensee or by itself, if it deems it necessary to provide such security.
- If the security arrangement is made on the request of the licensee, all the expenses incurred for such security shall be borne by the licensee.

3.4 National Transport Policy 2001

Policy: The utilization of means of transport to be conducted by the solar power and electricity shall be expanded throughout the Kingdom.

Action Plans-Transport infrastructures -Where major projects such as for agriculture or hydro power development are to be implemented in areas with little or no transport infrastructure, the provision of basic transport infrastructure serving the locality shall be included in the project, and from part of the It economic cost/benefit Analysis for the project.

Sector Transport Policy - Rail Transport: Taking in mind the reasonable utilization of hydropower production electrical rail service shall be developed.

3.5 Water Resources Strategy 2002

Water Sector Needs and Issues: Hydropower Issues

- Improving power system planning, . Increasing access to electrification in rural areas, Encouraging

private investment in hydropower. Reducing cost of development.

Output 5: Cost-Effective Hydropower Developed in a Sustainable Manner - Activities -Develop cost-effective small (including micro- and mini-) and medium hydropower projects to meet domestic demand at an affordable price.

Indicators - by 2007, 820 MW hydropower capacity developed to meet projected demand, including 70 MW for export; 25% of households supplied with electricity;

- by 2017, 2230 MW hydropower developed to meet projected demand of 2230 MW, including 400 MW for export; 38% of household supplied with electricity;
- by 2027, 60% of households have access to electricity;

3.6 National Water Plan 2005

- **Hydropower Development - Rural electrification** is a costly investment but at the same time essential for the economic uplift of the rural people. In order to make rural electrification more cost effective and financially sustainable in terms of O&M, this programme needs to be expanded and linked up with rural economic activities.
- **Targets** -By 2007: Up to 700 MW generating hydropower capacities are developed to meet the projected domestic demand at base case scenario without export. 35% of the households are supplied with INPS electricity, 8% by isolated (micro and small) hydro system and 2% by alternative energy. Per capita electricity consumption of 100 KWh is achieved.
- By 2017 : Up to 2035 MW hydropower electricity is developed to meet the projected domestic demand at base case scenario, excluding export.55% of households are supplied with INPS electricity, 12% by isolated (micro and small) hydro system s and 3%by alternative energy.^a Per capita electricity consumption of 160 KWh is achieved. And NEA is corporatized.
- By 2027: Up to 4,000 MW of hydropower is developed to meet the projected domestic demand at base case scenario, excluding export.75% of the households are supplied with INPS electricity, 20% by isolated (micro and small) hydro system s and 5% by alternative energy. Per capita electricity consumption of over 400 KWh is achieved.

3.7 Rural Energy Policy 2006

Goal:

The overall goal of this policy is to contribute to rural poverty reduction and environmental conservation by ensuring access to clean, reliable and appropriate energy in the rural areas. In order to achieve this goal, the “Rural Energy Policy 2006” will have following

Objectives:

- To reduce dependency on traditional energy and conserve environment by increasing access to clean and cost effective energy in the rural areas.
- To increase employment and productivity through the development of rural energy resources.
- To increase the living standards of the rural population by integrating rural energy with social and economic activities.

Policies:

- Emphasis will be given to the development of the environmental friendly Rural Energy Technologies.
- The capacity of the local bodies will be improved for playing a leadership role in rural energy project planning, implementation, monitoring and evaluation at the local level and involvement of cooperatives, user groups, NGOs, private sector will be increased.
- Rural Energy Fund will be established at the central level to mobilize financial resources to be availed from various sources and fund will be expanded to the local level as per need.
- Alternative Energy Promotion Centre under Ministry of Environment, Science and Technology, Government of Nepal will provide necessary support to the local bodies to develop its capacity to formulate and implement rural energy programmes.
- Emphasis will be given in the development of affordable and suitable rural energy resources.
- An arrangement will be made for increasing human resource capacity of rural population for rural energy development through human resource development activities that are integrated with activities of academic institutions for skill enhancement training and awareness improvement.
- Economic activities will be implemented in integrated way for increasing energy consumption capacity at rural level by development of Micro

and Mini Hydro, Biogas, Improved Cook Stove, Improved Water Mills, Solar Energy Systems, etc. and expansion of the central grid.

- Private sector and non-governmental organizations will be involved in the rural energy development for development and expansion of new technologies. In this activity, the role of the Government of Nepal will be that of facilitator and promoter.
- Economic and industrial activities based on rural energy technologies will be encouraged.
- Community management through social mobilisation will be encouraged in activities of rural energy development and dissemination.
- Emphasis will be given to increase private sector participation by motivating the involvement of private sector in manufacturing of equipments related to rural energy.
- Economic instruments will be used to mobilize the capital from banks and financial institutions, internal capital market, community capital for rural energy development.
- The local body, cooperatives, private sector, user organization or community management will be encouraged to purchase and distribute electricity from electricity production.
- The efficiency of rural energy technology will be increased and diversification of the productive end-use will be encouraged.
- A special emphasis will be given to bring improvement in social, economic and environmental aspect by coordinating rural energy with local bodies.
- The emphasis will be given for development and management of new technology to increase efficiency of use of traditional energy. Similarly the emphasis will be given for Research and Development of rural energy technology.
- Special programmes of promotional activities will be implemented that emphasize on access to rural energy and role of rural energy in sustainable development, poverty reduction and positive impacts on women and children.
- In order to ensure quality of rural energy, an arrangement will be made for quality standard tests and quality control by increasing capacity of Renewable Energy Test Station.
- Off-grid and small rural energy system can be integrated mini-grid with national grid.

3.8 Local Self-Governance Act, 2055 (1998)

DDC: To formulate, implement, operate, distribute and maintain and repair projects on mini and micro hydropower and other energy, and cause to be done the same.

Municipality: to generate and distribute or cause to be generated and distributed electricity in the Municipality area.

3.9 Community Electricity Distribution Bye Laws, 2060

- To promote public participation for bringing effectiveness in the present distribution arrangement by reducing theft and conducting maintenance and distribution system on community basis through the Distributing Institution.
- To encourage community management in the extension of distribution lines through the Distributing Institution in the protection and promotion of electricity distribution system.
- To attract private investment in the field of rural electrification through the Distributing Institution as the pace of rural electrification in the present context has been very slow to meet the need of the people.
- To promote technical and managerial capability of rural community in the field of electricity distribution through Distributing Institution.

4. Analysis and Discussion of issues in Energy Policies

A quick review of the existing energy related Acts and Policies bring some of the issues those need to be looked into in the future energy policy formulation.

4.1 Lack of integrated dynamic modelling in energy forecast

Energy policies are formulated in the ad hoc on the crisis management basis; there is lack of integrated policies based on the various dimensions of economic as well as climate change issues. It is important however to distinguish between an integrated and comprehensive approach to policy and planning. By definition, comprehensive means all-inclusive. In contrast, the integrated approach while similar to the comprehensive approach, does not seek to analyze all components and interconnections, but concentrates on those that are critical to the policy issue or set of issues being analyzed.

4.2 Gap between policy and law

Many policies suffer from weak implementation because of absence of timely reform in law. On the other hand people suffer from weak implementation of the law. As it is seen that Hydropower Development Policy 1992 and Electricity Act 1992 has made most of the provision but the regulatory framework to implement them are weak or not exiting, no plan of action to achieve envisaged objectives.

4.3 Policies focus of hydropower development

Though Nepal has huge hydro potential but hydro development is long and resource intensive. Despite the focus on hydropower development for meeting domestic needs, implementation has been weak. Either there is total lack of energy planning or is not working. Weak implementation of one-window policy and lack of consistency or continuity of taxation policy on energy generation have been identified as causes for slow rate of progress in implementing planned hydropower projects. Hydropower Development Policy 1992 and Electricity Act 1992 has made most of the provision for development and use of hydro power no other new and renewable energy technologies are mentioned or thought of in the major polices.

4.4 Not addresses special issues of rural electrification

The issues of rural electrification are special on their own, high infrastructure costs due to sparsely distributed settlements and need of long transmission and distribution networks, low consumption of electricity mainly for lighting purpose only. So separate set of rural electrification policies which use combination of off grid and on grid electricity to serve rural areas are in need. These rural electrification policies should have objective to increase access to electricity to rural areas for social cause and then slowly it should increase economic activities for other developments. Rural Energy Policy 2006 states many important provisions for the rural electrification by use of renewable energy solutions but no clear plan of resources and action to achieve tangible results. Community Electricity Distribution Bye Laws, 2060 provisioned rural electrification modality to sell bulk electricity to community/co-operative and to rest the responsibility to manage distribution on them so working but needs sufficient financial resources and more robust mechanism to control tariff collection and payment to NEA and off course sufficient power in national grid. Many provisions were made in the different policy documents on rural electrification but lack sufficient had institutional back up and integration

to avoid duplication and make state subsidy and user's equity economically viable and technologically sustainable rural electrification.

4.5 Energy Security and energy mix

There is absence of a clear policy and law on storage of fossil fuels. Oil is a strategic source of energy and Nepal is hundred percent dependent on imports, so energy security should be of high concerns. Even in hydro generation which plan for 30-40 years climate change effect must be considered for long term security of energy generation. Similarly, no policy in the proper energy mix based on the available resources and technologies to make uninterrupted energy supply for modern society.

4.6 Energy generation and climate change

Energy generation is main source of carbon emission and global warning. Effect of global warming in rainfall patterns and glacier melting is major concern of hydro energy developers. But, Nepal lacks good homework and clear policies in hydro energy development and climate change issues. No policies have made the mitigation and adaptation measures to minimise the effect of climate change in the hydropower generation.

4.7 Regulation of the petroleum sector

Petroleum products occupy an important place in the supply and distribution of energy in the country. There is lack of clear policy, law for regulation of this sector. It suffers from lack of transparency and political intervention in its management import and pricing. The import of petroleum products has increased by five folds since 2000 and in terms of value exceeded the total export earning to import it, but there exist no clear petroleum policy and strategies to replace it by other energy system.

4.8 Lack of a clear policy on sustainable forest use

Biomass or forest product is the main source of current energy (more than 75%), there is lack of clear policy and laws on the use of biomass as energy source. Forest policies do not focus on sustainable forest management and strategies to replace cooking fuel by electricity.

4.9 Energy Efficiency economy

Energy efficiency is the most effective source for reducing the supply gap, carbon emissions and reliance on expensive imports of petroleum products. No serious attention has been paid in the demand side

management. Both supply and demand side efficiencies need to be addressed but no such policies to encourage efficient appliance and technologies to save scarce energy. A substantial portion of electricity is misuse through theft but strong measure to implement to stop it.

4.10 Energy-sector reform and restructuring

There is lack of effective implementation of power sector restructuring programmes. Nepal Electricity Authority (NEA) is sole agency to transmit and distribute electricity in Nepal reforms in this sector include unbundling the power utility (NEA), creating an independent regulatory mechanism, and introducing competition in power generation. Especially the unbundling of NEA for its generation, transmission and distribution functions is needed. Progress has been slow partly due to delays in enabling legislation and lack of time bound roadmaps and political will. A number of policy decisions are made in this direction but poor implementation has not realised it. No major reform and restructuring power sector even after acute load shedding for many years.

4.11 Research and Development in energy

There is lack of research and development activities in energy sector for national capacity building and adaption technologies. There is virtual absence of a policy that promotes research on technology promotion and use of modern technologies and to improve on the existing issues and problem for adoptive research to localise the energy technology.

4.12 Regional Cooperation for power exchange

Regional cooperation can play an important role in ensuring energy security in the region. Sub-regional power trade can be an effective way of meeting energy demand by utilizing complementary technologies and power utilization patterns. By utilizing different peak times of neighbouring countries, regional power trade can reduce the need for building new power generation plants in each country and reduce energy crisis.

5. Conclusion

It is found that Hydropower Policy 1992 and Electricity Act 1992 are the main act and policy documents which have made different provisions of generation and distribution of hydro electricity in general. Whereas Rural Energy Policy 2006 is dedicated in the development and use of renewable energy technologies and it also covers rural electrification. These policies are made basic provision

but are lack in the clear plan of action and tools to achieve them. Water Resources Strategy 2002 and National Water Plan 2005 bring out some planned statistics of hydro power generation and percentage of household electrification but the figure are inconsistent and not reflected in periodic plan and budget published every year. Other Acts like local self governance Act 2056 simply mentions that DDC and municipalities can generate their own energy or electricity and use in local level. Community Electricity Distribution Bye Laws, 2060 had made provision to buy electricity in bulk from Nepal Electricity Authority and use for rural electrification network and manage the distribution system locally, these provisions are also now are not continued and so not very effective.

For the given the complexities and connection of different aspects continuation of past ad hoc and piecemeal approaches to energy policy formulation and implementation will lead to outcomes that does not best serve Nepal. An integrated approach requires which covers the whole range of economic, social and environmental values to be considered and evaluated. Further this integrated approach requires, strong legal and implementation framework and strong political will to implement the provision of different policies are very important.

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Reviewed Energy Policies of Nepal

Hydropower Development Policies 1992 and 2001

Hydropower Development Policies 1992 and 2001

Forest Sector policies and Forest Act, 1992

Water Resources Act

Electricity Act 1992

National Transport Policy 2001

Water Resources Strategy 2002

National Water Plan 2005

Rural Energy Policy 2006

Nepal Electricity Regulatory Commission Bill

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Local Self-Governance Act, (1998

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