

Review of Policies, Programs and Initiatives regarding Growth and Development of Hydropower in India with special reference to State of Uttarakhand

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ABSTRACT

Energy is the key infrastructural input for any nation. It is one of the pivotal factors in determining the growth of the economy. India is one of the fastest growing economies in the world with increasing energy demand year by year. Indian power sector has seen a growth trajectory over the recent decades in its entire value chain like generation, transmission and distribution. World-wide all the countries are focusing on energy security and sustainable development. India as a nation committed towards promotion of Green Energy and has targeted 175 GW of renewable capacity addition by 2022. In the recent past policy makers have taken many initiatives towards increasing generation renewable sources of energy like Solar, Wind, Biomass and Hydro. As the largest renewable energy comes from the proven technology Hydro Power, over the years various policy level changes have been incorporated for harnessing & exploiting maximum available hydro power potential in the country. This paper reviews the available literature on several policies and initiatives regarding growth and development of hydro power in India with special reference to Uttarakhand.

Keywords: Hydro Power, Policies, Uttarakhand.

INTRODUCTION:

Energy is the key infrastructural input for any nation (Bergasse, 2013). With the growth in economy the energy demand also increases, as both complement to each other (Bergasse, 2013). Indian economy is one of the fastest growing economies in the world with increase in the energy demand year by year (Sedehi, 2015) (Us et al., 2015). The Indian power sector has seen a growth trajectory in the entire power value chain and has witnessed several policy-level changes and initiatives for offering several new opportunities to the market players and various stake holders. These changes yield long term implications and contribute a major role in decision making for developing power sector (Us et al., 2015) (Daruka, 2015).

With the increase in energy demand, power sector in India went on adding the installed capacity year on year, the key energy resource used for generating electricity has been from conventional sources (Daruka, 2015). As on 31-1-2017 the total generation installed capacity in India is 330 GW with a contribution of 66% from Thermal energy, 13% from Hydro power, 19% from renewable sources (Wind, Solar, Small-Hydro, Biomass) and 2% from nuclear (Central Electricity Authority, 2016). The energy mix manifests that India is primarily dependent on thermal power.

World-wide countries are majorly focusing on sustainable development and energy security and as a responsible nation, India is poised towards promotion of Green Energy, with a massive target for renewable capacity addition of 175 GW by 2022 (Rushworth, 2016) (Block, 2468; "Government of India: Ministry of New and Renewable Energy," 2009, "Power – Renewable Energy," 2017; Government of India, 2016; IEA, 2015; NITI Aayog, 2017; Sachs & States, 2015; Smart, 2017; U.S. Energy Information Administration, 2016). In the recent past several initiatives have been taken for increasing the renewable generation in the country.

Out of many sources of renewable energy the largest chunk is contributed by hydropower, which has a proven technology.

India has around 150 GW of Hydro potential, out of which only 45 GW utilized so far and this contributes only 13% in the total energy mix at present (Ramanathan, 2007) (Central Electricity Authority, 2016). In case of Uttarakhand the total available hydropower potential assessed is 18,175 MW, out of which only 3988.05 MW is the current utilized in the State leaving around 71.25% of the available potential unutilized (House, 2008; Mecon Limited, 2015; Ramanathan, 2007; Secretariat & Roorkee, n.d.). It is in the best interest of the nation as well as mankind to optimally harness the hydropower available at its disposal, as it is a source of clean energy.

Starting with enactment of Electricity Act 2003 into the State level policies, many ambitious targets and aggressive initiatives were undertaken by the policy makers for harnessing and developing the available hydropower in the country, especially in Himalayan states.

2. Policy-Level Initiatives for development of Hydropower

2.1 Electricity Act 2003: The act came into force from 2nd June 2003. It is a comprehensive enactment replacing the existing Electricity Act 1910, Electricity Supply Act 1948 and Electricity Regulatory Commission Act 1998 (Us et al., 2015). The objective of the act is to introduce competition, protect consumer's interests and provide power for all (Us et al., 2015) (Ministry of Power, 2003).

The Act provides for National Electricity Policy, Rural Electrification, open access in transmission, phased open access in distribution, mandatory SERCs, license free generation and distribution, power trading, mandatory metering and stringent penalties for theft of electricity (Us et al., 2015) (Ministry of Power, 2003). The aim is to push the sector onto a trajectory of sound business growth and to enable the States and the Centre to move in agreement and coordination (Us et al., 2015) (Ministry of Power, 2003).

Electricity Act 2003, mandates for hydropower generators, to get concurrence from concerned authority by submitting required documents, a scheme estimated to involve a capital expenditure exceeding such sum, as may be fixed by the Central Government, from time to time, by notification and further for optimal utilisation of resources such as coal, natural gas, nuclear, hydro and other renewable sources (Ministry of Power, 2003). It also mandates the Central Government to prepare National Electricity Policy and Tariff Policy from time-to-time in consultation with the State governments and the authority for development of power system (Ministry of Power, 2003). The Act has also emphasized on the development of hydro power and safety of the structures including dams etc (House, 2008) (Ministry of Power, 2003).

2.2 National Electricity Policy: The policy was formulated in the year 2005, which concentrated on quality and reliable power supply to every household at affordable price (Ministry of Power, 2005). It encourages private participation in generation, transmission and distribution sectors keeping in view large investments required for the development of the whole power sector (Ministry of Power, 2005). The policy suggests the Central and State governments to develop workable and successful models for encouraging public private partnership (Ministry of Power, 2005).

The policy also focuses on Hydropower development by considering it as clean and renewable source of Energy and addresses several points that help in the development of Hydropower in the country (Ministry of Power, 2005).

- a) Harnessing hydropower potential speedily will also facilitate the economic development of States particularly, North-Eastern States, Sikkim, Uttarakhand, Himachal Pradesh and J&K (Ministry of Power, 2005).
- b) Hydropower projects require huge investment. Therefore, debt-financing of longer tenure would need to be available for these projects (Ministry of Power, 2005). According to the NEP, Central government is

- committed to policies that ensure development and financing of viable hydro power projects (Ministry of Power, 2005).
- c) State governments should provide approvals or clearances, such as Forest/Environmental Clearances and need to review the procedures for land acquisition, for speedy implementation of Hydropower projects (Ministry of Power, 2005).
 - d) Central government to support the State governments for expeditious development of their hydro power projects by offering services of central public service undertakings like National Hydro Power Corporation (NHPC) (Ministry of Power, 2005).
 - e) Adequate safeguards for environmental protection with suitable mechanism for monitoring implementation of Environmental Action Plan and National Policy on Rehabilitation and Resettlement (R&R) in this regard so as to ensure that the concerns of project-affected families are addressed (Ministry of Power, 2005).

National Tariff Policy:

The Central Government has notified the National Tariff Policy in continuation to the National Electricity Policy according to section-3 of Electricity Act 2003 (GOI, 2016) (General, Policy, & Servicing, 2006). The Policy has set some objectives like assured electricity to consumers at reasonable and competitive rates, financial viability of the sector, promoting transparency, consistency and predictability in regulatory approaches across jurisdictions and encouraging competition (GOI, 2016) (General et al., 2006).

The Policy deals with the general approach to the determination of tariff and all the components of Tariff like Return on Equity, Working Capital, Depreciation, Operation and Maintenance expenses, Interest on debt and variable costs for the project developers (GOI, 2016). On generation, the policy talks about setting up of separate capacities for meeting peak demand and introduction of differential rates for peak and non-peak power (General et al., 2006).

The policy has a resolution passed on 31 March 2008 on Hydropower, which also helps in the development of Hydropower. It is primarily focused on the determination of tariff by the appropriate commission, concurrence of CEA, financial closure, award of work, long term PPA (35 years), free power for the State in which the project is constructed (up to 13%) and R&R issues ("Published in the Gazette of India, Extraordinary, Part 1, Section 1 dated 31," 2008). It is also mentioned in the policy that the cost of project developers will include 10% contribution to the power reform programs like RGGVY, DDUVY etc., in the affected area as per project report sanctioned by Ministry of Power (MoP) ("Published in the Gazette of India, Extraordinary, Part 1, Section 1 dated 31," 2008).

National hydro Policy:

The successive governments have accorded a high priority to the development of the hydro potential and taken a number of policy initiatives to address the issues impeding the hydro power development (House, 2008) from time to time. This Hydro power policy is one such initiative which seeks to induce substantial private investments in Hydro power development (House, 2008). The Government of India has set the following broad policy objectives for accelerating the pace of hydro power development (House, 2008) in the Country:

- i) Inducing Private Investment in hydro power development
- ii) Harnessing the balance hydro electric potential
- iii) Improving Resettlement and Rehabilitation
- iv) Facilitating financial viability

Hydro policy has been planned and targeted for the long term development of hydropower and it is expected that by the end of 14th Plan the entire feasible hydro potential could be exploited (House, 2008). With the objective of achieving the target and expediting the Hydropower generation in a systematic manner, CEA completed the ranking (study based on weightage criteria for various aspects involved in development of Hydropower projects) of balance hydro potential sites for all the basins in the country and these basins have been graded in A, B and C categories in order of their priority for development (House, 2008). The policy has recognised the importance of private investments and suggested for Central Government to prepare several models to improve the private sector investment and public private partnerships (House, 2008). Even though public sector organizations would continue to play an important role in the development of new schemes, this alone would not be adequate to develop the vast remaining hydro potential (House, 2008). Greater investment from private sector players is needed for the development of hydro potential in the country (House, 2008).

Huge financial requirements, preparation of DPR, resettlement and rehabilitation issues, locational disadvantages, geological surprises, schedule delays etc., are some of the barriers in setting up of Hydro power project. Adoption of Ultra mega power projects (UMPP) model for hydropower projects, capacity building and employment generation for project affected people, institutional mechanism for co-ordination among developers in a basin, river basin development are some of the measures suggested in the policy, for reducing the barriers that are hindering the development of hydropower in targeted way (House, 2008).

India Action plan (2017-2020):

India action plan is a three year agenda formulated by Niti Aayog, based on extensive discussions with and inputs from central ministries and State governments ("India Three Year Action Agenda," n.d.). The Three Year Action Agenda offers ambitious proposals for policy changes within a relatively short period, in which some may be fully implemented during the three-year period, implementation of others would continue into the subsequent years ("India Three Year Action Agenda," n.d.). Provisions have been made for the State Governments to complement the efforts of the Central government, wherever required.

The objectives of this three year action plan is eliminating poverty in all its dimensions such that every citizen has access to a minimum standard of food, education, health, clothing, shelter, transportation and energy has been at the heart of India's development efforts since Independence ("India Three Year Action Agenda," n.d.). The plan also targets to add 61.6 GW electricity generation capacity through all conventional sources and also targets to realize generation capacity of 6.9GW through large hydropower projects ("India Three Year Action Agenda," n.d.). It also suggests the governments to make efforts to expedite progress on capacity under construction through satisfactory Resettlement and Rehabilitation implementation ("India Three Year Action Agenda," n.d.). Recommendations have been made for the central government to improve the renewable power by achieving the 175GW target by 2022 and also for balancing solar power in decentralized locations with target of 5000 MW from Small hydro power (SHP) projects by 2019-20 by viability gap funding and tariff support ("India Three Year Action Agenda," n.d.).

Draft National Energy Policy:

The draft Policy was released on 27th June 2017 which aims to chart the way forward to meet the targets of government in the energy sector. Keeping in view the climate change concerns, it also aims at increasing the contribution of hydro and other renewable sources in the installed capacity energy mix in India (NITI Aayog, 2017). Promoting flexible demand and supply resources to the power systems, especially those with a high share of renewable energy, require access to sufficient flexible resources (e.g., demand response, gas turbines, flexible thermal generation, hydroelectricity, etc.) to ensure continued stability of the grid at each moment (NITI Aayog, 2017). Recognition of power generation through, hydro resource has a large number of co-benefits including containment of flood, irrigation, fishery, ground water etc., and dedicated for proper attention in developing Hydro power generation (NITI Aayog, 2017).

Draft national hydro Policy 2017:

New Hydro Policy 2017, a draft proposal was prepared by the Ministry of power for the development of Hydro power sector. According to the new policy Hydro power is considered as renewable energy irrespective of the capacity of the plant (Power, 2017). Under the policy, the government will provide interest subvention of 4 per cent during construction for up to 7 years and for 3 years after the start of commercial operation to all hydro power projects above 25 MW (Smart, 2017). Hydro power fund would be created under Ministry of power for giving assets to the ventures under this policy (Smart, 2017). Also the funding for these projects will come from Coal cess or national clean energy fund or non-lapsable central pool of assets for Northeastern states till 2024-2025 (Smart, 2017). The policy also ensures the purchase of hydro power by implementing hydro Power obligation for projects above 25 MW, under which all the DISCOMS are mandated to purchase certain amount of power from these projects (Smart, 2017). The benefits under this policy would be available to hydro power developers, which would be able to begin the operation of the plant after five years of notification of this policy (Smart, 2017).

POLICY-LEVEL INITIATIVES IN UTTARAKHAND:

Uttarakhand is a Himalayan state, endowed with perennial rivers and several water streams and has a large potential for generating power through hydro resources ("Micro & Mini 0-2 MW Hydro Power policy 2015.pdf," n.d.). The State has an estimated potential of 18000 MW, in which 15000 MW is in large hydro

segment and remaining 3000 MW of hydropower in the small, mini and micro hydro segment. Out of this only about 3988.05 MW of hydro power projects have been installed in the State which also includes small and mini hydro power plants(UJVNL).

There is a huge untapped potential of hydropower in the State. This potential if harnessed efficiently, can help immensely to fulfill Central government's goals like "24X7 Power For All by 2022", rural electrification, revenue generation, employment generation and up-liftment of livelihood("Micro & Mini 0-2 MW Hydro Power policy 2015.pdf," n.d.)("POLICY ON HYDROPOWER DEVELOPMENT (25 to 100 MW)," n.d.)(Mecon Limited, 2015). Government of Uttarakhand recognized the threat of climate change and envisaged development of hydropower in the State as one of the key mitigative measures for sustainable development through promotion of the hydropower projects.

It has made several policies according to the capacities ("POLICY ON HYDROPOWER DEVELOPMENT (25 to 100 MW)," n.d.)("Micro & Mini 0-2 MW Hydro Power policy 2015.pdf," n.d.)(State, Government, Period, & Gou, 2002)("02-25 MW Hydro Power policy 2015.pdf," n.d.) such as:

- i)Policy for development of mini and micro hydro power projects up to 2MW-2015
- ii)Policy for development of small hydropower projects of capacity above 2 MW and upto 25 MW.
- iii)Policy for development of hydro-power in Uttaranchal through Projects of Capacity 25MW and above
- iv)Policy for development of hydro-power in Uttaranchal through Projects of Capacity 100MW and above.

Incentives/Benefits for the Private Developers for the development of Hydro Power in Uttarakhand				
Incentives/ Benefits	Projects upto 2MW	2MW to 25 MW	25 MW to 100 MW	100 MW and above
Taxes	No entry tax will be levied by state government on Power generation transmission equipment and building material for projects	No entry tax will be levied by state government on Power generation transmission equipment and building material for projects	No entry tax will be levied by state government on Power generation transmission equipment and building material for projects	No entry tax will be levied by state government on Power generation transmission equipment and building material for projects
Royalty Charges	No Royalty charges	No royalty charges for projects which are under 5MW. For the Projects above 5MW royalty charges are exempted for first 15 years and from 16 th year 15% of the net generated energy would be charged by state government.	For the first 15 years 12% of the net generation and from 16 th year it is 18% of the net generated energy.	12% of the electricity generated shall be made available free of cost to the state during the entire life of project.1% per year on the 12% free power for each year of earlier completion. Delay will also entail penalty of 1%
Wheeling of Power	Not allowed	Allowed by paying wheeling charges	Allowed by paying wheeling charges to UPCL	Allowed by paying wheeling charges to Central/State and also allows own evacuation
Water cess Charges	Exempted	Exempted	Not Exempted	Not Exempted
Banking	Banking is allowed	Banking is allowed	Not allowed	Not allowed
Open Access	Not allowed	Allowed	Allowed	Allowed
Sale of Power	Any consumer(Intra-State), Captive or Guarantee by UPCL	Any consumer(Intra-State), Captive or Guarantee by UPCL	Any consumer(Inter-State), Captive or Guarantee by UPCL	Any consumer (Inter-State). No Guarantee of power purchase from UPCL.

The government of Uttarakhand formulated these policies according to the capacity with proper scope and objectives for the development of hydropower in the State. Several initiatives and attractive arrangements for private sector investment and public participation are incorporated under these policies.

- a. The micro/mini hydro power projects upto 2MW are reserved for Panchayat Raj Institutions, in which first priority will be given for the Gram Panchayat (GP) in which the proposed complete project site is located[12]. If the complete proposed project site comes within two or more gram panchayats preference will be given to the GP within whose area the power house is located[12].
- b. As per the MoEF and CC, GoI, no prior environmental clearance is required for micro and mini hydropower projects as these projects will come under eco-friendly projects.
- c. In case of force majeure conditions like floods, fires, wars or revolutions, epidemics, quarantine restrictions and freight embargoes etc., the developer may surrender the allotment to the Government of Uttarakhand subject to the acceptance by the Nodal Agency[12].
- d. Incentives, tax benefits, royalty benefits, guaranteed purchase of power by the State, assistance for approvals or clearances from forest/environmental agencies and other such benefits by the State Government are provided for the development of private investments in the State.

CONCLUSION:

Electricity has been recognized as a basic necessity and key input to the economy. Right from enactment of EA-2003 till new draft hydro policy 2017 the policy makers of the Country had always been interested in enhancement of hydropower in the energy mix. However installed capacity figures show that there had been continuous decline in the share of hydropower. Where as in the year 1962, it was at 50.62% the share declined to 43% in year 1970, 25.42% in the year 1997 it stands at 13% as on date. The decline is due to existence of strong barriers to development of hydropower such as regulatory issues, transmission /power evacuation issues, environmental concerns, inter-state perspectives, law and order issues, dearth of good contractors, natural effects, political issues, land acquisition problem, resettlement and rehabilitation issues, locational disadvantages, budgetary requirements, private sector involvement and longer gestation period. Until and unless concerted efforts are made by policy makers with substantial incentive to stakeholders including proactive plan for removal of barriers by State and Central Government the pace of development of hydropower shall remain sluggish and its share shall continue to decline.

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