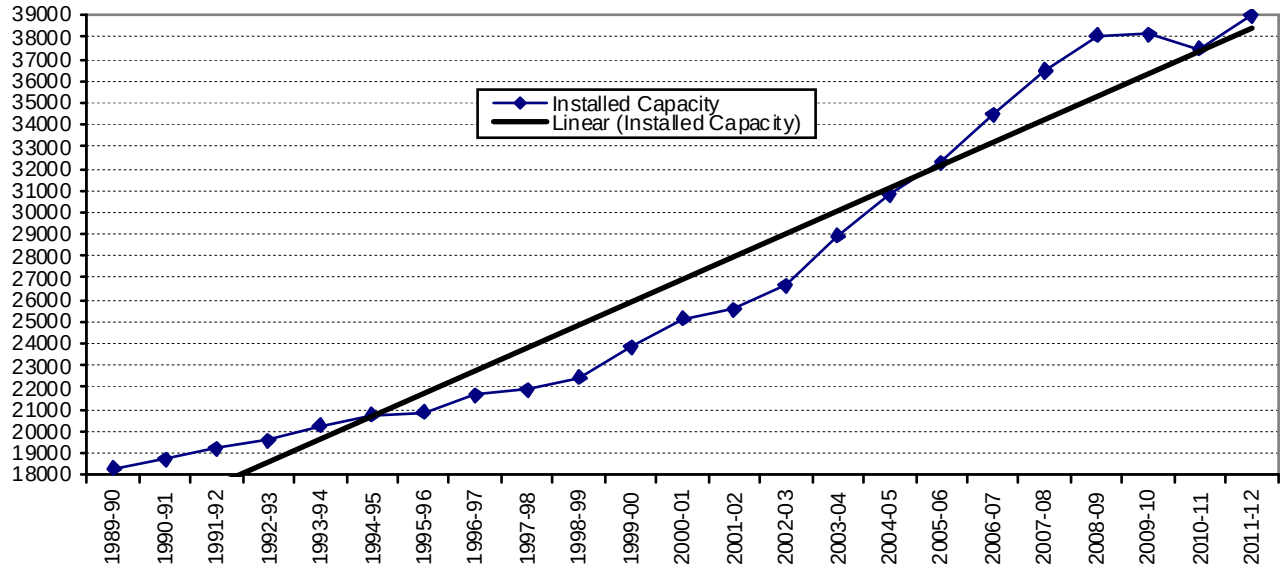
SOUTH ASIA NETWORK ON DAMS, RIVERS AND PEOPLE

Project office: 86-D, AD Block, Shalimar Bagh, Delhi 110 088. India
Ph: (+91 11) 2748 4655. ht.sandrp@gmail.com, www.sandrp.in

Diminishing Returns from Large Hydro

The Union & state governments and power sector establishment in India have been pushing Large Hydro projects as if they are good in themselves. See the graph below that shows the rapid increase in installed capacity of large hydro projects in India[1].



However, there has been no attempt at credible performance appraisal of hydropower projects in India. SANDRP has been doing performance appraisal of large hydropower projects of India for some years. In the graph given below we have plotted the Million Units (MU, one unit is equal of one kilowatt hour of power) power generated per Mega Watt (MW) installed capacity of all operating hydropower projects in India. We have done is based on the official data from Central Electricity Authority for total annual power generated by existing operating hydropower projects of India and total installed capacity of such projects, for each of the last 18 years from 1993-94. The total installed capacity of large (installed capacity over 25 MW) hydro projects in India as on March 31, 2012 is 38948.4 MW.

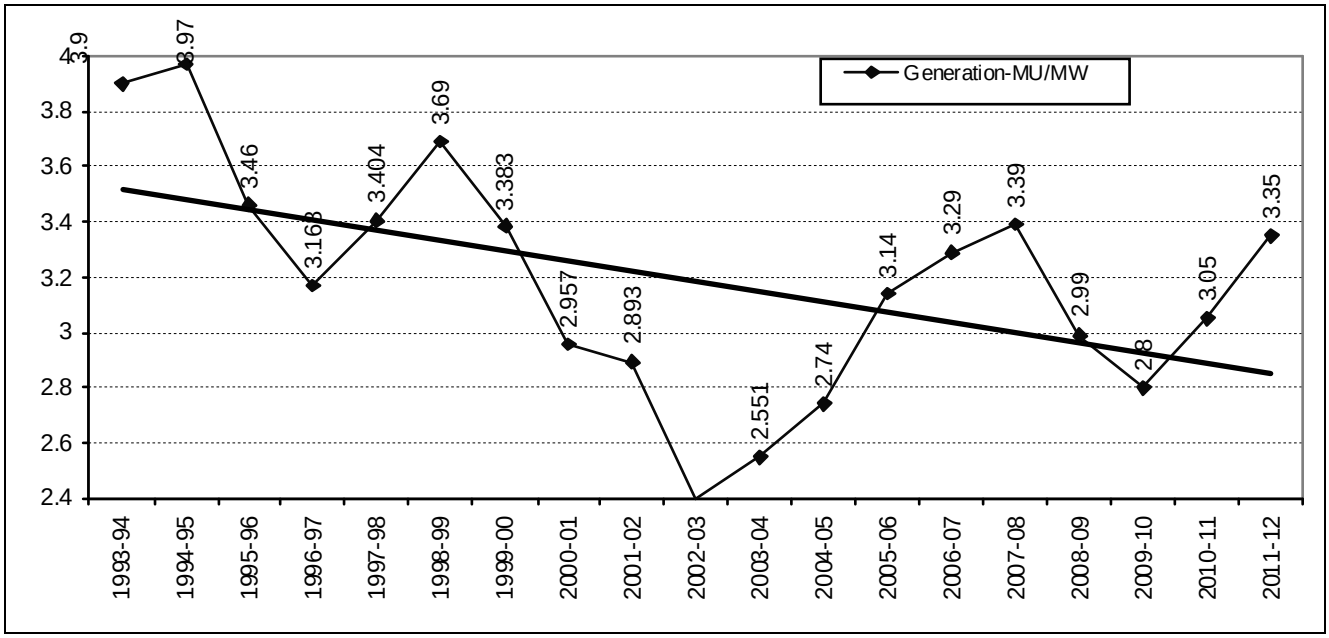
The graph also shows the trend line of power generation of Big Hydropower projects for the last 19 years, it is clear the trend-line shows diminishing generation from existing hydro power projects of India.

- It shows that per MW generation in 2011-12 has dropped by a huge 16% from the generation figure for 1993-94. This should be a matter of serious concern, but the CEA, Power Ministry or none of the other bodies are doing such an analysis. Such an analysis can also help us try and understand why this is happening and what needs to be done to reverse this trend. The falling generation cannot be attributed to lower monsoon rainfall, since rainfall has been average or above average in most of the years under consideration.

A separate analysis showed that 89% of the projects generate at below the design or promised generation level at 90% dependability. Each hydro project is given techno economic clearance based on a promise at appraisal stage that the project will generate certain amount of power in

[1] The slight dip in installed capacity in 2010-11 is because in the capacity monitored by the Central Electricity Authority, the CEA that year excluded some of the small hydro projects (capacity below 25 MW) that was included in its monitoring matrix earlier.

90% of the years. When we compared that figure for actual generation figure for the last 26 years for each of the operating projects, we found that 89% have been under-performing. And among the under performing projects, 50% were generating below the 50% of the promised power generation. And yet no questions are asked, no accountability fixed, in fact such an analysis is not even done by the official agencies. This means, for example that a lot of the projects that are being set up now are UNVIABLE projects or that the installed capacities are way above optimum levels.



There are many reasons why this is happening: unviable projects, unviable installed capacities, optimistic hydrological assumptions, over development (development beyond the carrying capacity of the basin), catchment degradation, high rates of sedimentation, inadequate Repair & Maintenance, Run of River projects (this phrase is a misnomer, these projects do not generate power from the run of the river but through a dam and a tunnel), etc.

There is no doubt that more detailed state wise, basin wise, type wise, age wise, etc analysis would help, some of which are available in "Hydropower performance" section of SANDRP website[2]. However, to continue to push large hydro without such informed analysis would only lead to bad decisions, leading to avoidable social, environmental, economic and opportunity costs.

Are HEPs providing peaking power?

- One of the most important justifications put forward for taking up hydro projects is that it can provide peaking power, unlike the coal and nuclear power projects.
- An important question here is: how much of the power generated by existing Hydro projects is available during peaking hours? Unfortunately, such an analysis is not being done currently by any of the official agencies. This is shocking since, this means that we do not even know if the hydro projects are operating to maximise power generation during peaking hours.
- We are unable to do such an analysis since it requires a lot of data which is not easily available in public domain.
- However, anecdotal evidence suggests that indeed a large number of hydro projects are performing as base load stations when they can provide peaking power.
- For example, the Central Electricity Regulatory Commission has noted that some of the largest capacity hydropower projects like Nathpa Jhakri (1500 MW) and Tehri (1000 MW), were not generating peaking power when they could and in stead were operating as base load stations.

[2] http://sandrp.in/HEP_Performance/

- The peaking power generation capacity of Giri Bata Hydro project will be destroyed if the proposed Renuka dam for supplying water to Delhi comes up.
- A large number of ROR hydro projects cannot even claim to be in a position to generate peaking power, since they are so situated along the river that the downstream projects often get water only during off peak hours. This would very much be the case in Sutlej, Ravi, Beas, Chenab, Bhagirathi, Alaknanda and Teesta basins. However, the impact of upstream project releases on generation profiles of downstream is not being assessed by anyone including CEA, MEF, or others.
- There is no case for pushing more HEPs under the assumption that they are going to provide peaking power unless we start assessing and optimizing peaking power from existing hydropower projects.
- There is no doubt that peaking power generation profile of hydropower projects has additional adverse impacts on the downstream areas. The MEF also needs to include such assessments as part of EIA.

Considering the diminishing returns from existing hydropower capacity and serious underperformance from 89% of existing projects, the first priority should be to optimise generation from existing projects instead of pushing for new large hydro without advance comprehensive impact assessment and public consent in both upstream and downstream areas. There is also a huge potential of sub MW capacity hydro projects in most of the Himalayan and other mountain areas. These projects would have least costs, least impacts, and could be implemented with full involvement of the benefiting local communities. Such projects should also be a priority before taking up larger projects. Unfortunately, MEF, CEA and other agencies are sanctioning projects without considering any of these issues.

The Ministry of Environment and Forests today does not even require environment impact assessment for projects below 25 MW, assuming that such projects are environmentally benign. This is clearly a completely false assumption. Anyone familiar with the construction of such projects would know that each of these projects have adverse social, environmental and biodiversity impacts. They also have adverse impacts on generation profile of downstream projects. MEF urgently needs to change the EIA notification to include all projects above 1 MW for environment clearance.

Himanshu Thakkar (ht.sandrp@gmail.com)
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