

Accelerated Transmission Development For Accelerated Power Development

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Abstract: Due to our lack of vision, planning and other mistakes, Nepal is in a very serious situation of load shedding. The nation is about 200 MW deficit of power supply. Hydropower development is an endeavor related with several sectors. It cannot be taken as only a commercial sector considering that businessmen will make all necessary things when there is a demand. In the past, the transmission sector has not been given due importance. Because of the complex nature of transmission, there should only be one transmission operator in the country. Based on the periodic basin-wise generation plan of the nation, we should prepare an accelerated Development Plan. The Basin Plan should indicate how and where local level, regional level and national level hydro plants will be connected to the grid, and the sequence of developing the basin transmission network.

Key words: Basin transmission plan, accelerated transmission development, and accelerated power development

Although bestowed with ample hydro resources, Nepal today is facing a year round capacity deficit and about half of a year energy deficit in the Integrated Nepal Power System (INPS). The amount of energy shedding in terms of duration is increasing almost daily and we are heading towards a very undesirable and unpleasant situation. We all know that this situation was not created in the last two or three months. Every present is total sum of our past activities. In our 97 years history of hydropower, Nepal has developed only about 560 MW of installed capacity. What has gone wrong?

- Lack of vision
- Lack of planning
- Petty vested interests (*Lobhi papi man*, in Nepali)

Mistakes of the past

Without thinking about next day, hydropower was declared commercial sector. The New Electricity Act of 1992 was passed stating that anybody could develop any facility in the power sector (for power generation, transmission and distribution). The electricity market was viewed much like the potato market with the assumption that if there is demand, businessmen will manage the supply on the very next day (like they would with potatoes). But electricity is not potato. Even if there is demand, the development and production of electricity takes many years involving huge amounts of money and associated investment risks. Thus, the whole process lacked change management while changing the market.

Without assessing the ground realities regarding the capacity of developers and financing institutions, infrastructure and legal framework, regulating mechanism, and other supporting issues such as environmental provisions and tax policy related to hydropower development, we planned the energy sector in Tenth Periodic Plan. That ambitious plan failed behind the assumption that out of 314 MW of expected periodic demand growth, 214 MW would be developed by independent power producers. As a result, we are now facing about 200 MW deficit supply. This shows that our estimate of demand growth was correct but that the strategy and line of action to meet the demand was childish.

Every idea, strategy and action plan is good provided that it is implemented at the proper time; but we selected a right strategy at the wrong time. Not only this, we spent the last two years defending our “right plan at the wrong time”, even though its result had become apparent. Had we taken corrective action in last two years we might be seeing light at the end of the proverbial tunnel. Still we are not restrained from saying that “Government is not for running businesses like biscuit factories and power stations.” Who dares to teach us that power is the basic requirement for other industries, so it cannot be compared with biscuit or potato?

Let us take an account of what has been done to support the development of hydropower during Tenth Plan period?

- Issued license of many thousand MWs without evacuation study.
- Issued stringent provisions on environmental issues that make hydropower development almost impossible.
- Changed tax policy out lined in relevant Act by circulars.
- Remained reluctant to give proper legal protection and facility to developers at site whereby demand of individual or group of individuals, whether relevant or irrelevant, was to be satisfied by developer
- Sidelined the NEA (Nepal Electrical Authority) in a mindset of developing competition instead of using it as backstopping instrument for change management.

Our thematic apperception of a competitive power market super ceded everything, without preparation and further support. In fact our activities have (knowingly or unknowingly) discouraged the development of hydropower.

Learning from the past we should now be very clear on the following points:

- *Do we want development or conservation?*

If conservation is the priority, forget hydropower and other developments; but, if we want development, then hydropower should be given priority, as it is the engine for other developments. Access and use of public or forest land for hydropower-related construction should be simplified so that the long tedious process of acquiring private land may be avoided. If the government easily

provides public land for development, then developers will plan accordingly and hydropower development will accelerate.

- *Do we want regionally balanced or haphazard hydropower development?*

If we issue licenses without a regional balance concept, how shall we optimize transmission? Who will develop a transmission network for unplanned and unbalanced haphazard generation development? Is it possible?

- *Do we want one or many transmission operators?*

If anybody can develop and operate transmission facility, how shall we measure the wheeled energy of different producers through a transmission segment that lies in ring? Developing a delivery transmission line up to grid point by generator may be understood - but should we continue having many transmission operators and grid owners? What is the interpretation of the Electricity Act of 1992 in this debate? The power system and network cannot operate like a fish market.

- *Do we want a basin wise planned development of hydropower and related transmission facility, or a haphazard system?*

Today the nation develops 5 MW in a basin and constructs a transmission network sufficient to that. After two years we develop 30 MW in the same basin and develop a new transmission network to that capacity, and throw away the old one. Similarly, every time we develop a new generating facility in a basin we throw away the previous network. Is this what we should be doing? If not, then why don't we have a basin-wise transmission development plan and implement it so that generation development of the basin follows it?

- *Are we waiting generation development for transmission to come or otherwise?*

Are we confused with chicken or egg first story? There is nothing to be confused about. In case of hydropower, generation leads transmission during the planning phase, as planning a transmission network where there is no generation potential has no sense. But during the implementation phase, it is transmission network that leads and attracts generation.

Way forward

Keeping the environment and public land access and use issue for separate discussion, we should now concentrate on transmission. We should first outline some broad policies. Such broad policies might be:

- We shall have regionally balanced generation and transmission development. This means we shall project regional periodic demand for all five regions and plan generation development to supply this periodic demand.
- We shall prepare a basin wise transmission plan according to the potential of the basin. Then in view of periodic generation plan of the region, we shall prepare a periodic transmission development plan as part of a basin master plan.

- Since study for generation development at many sites have been completed and we cannot wait for complete basin wise transmission development plans, we should go for an 'Accelerated Transmission Development Project' (ATDP) for immediate relief. If this ATDP is completed within five years time, as well as the preparation of a basin wise transmission development plan, we can expect speedy and systematic hydropower development for next 15 years.
- There should be only one transmission operator within the country. Private investors may contribute in transmission development by taking part in a competitive 'Build and Transfer' (BT) mode. The State Transmission Operator would publish notice for development of a transmission segment on the BT mode. Interested parties can then bid for their expected project cost and return on investment. The successful bidder would then develop the transmission segment and hand it over to the State Transmission Operator. The Transmission Operator would make regular payments to the developer based on terms and conditions of the BT agreement.
- However, generators might develop the transmission segment up to nearest grid point for the delivery of their generated power in the grid. In such cases the transmission segment is part of the Basin Transmission Master Plan and is to be used for other generators as well. The line could be handed over to the Transmission Operator on a deferred payment basis.
- Preparation of the Basin Wise Generation and Transmission Development Plan and approval of construction of generation and transmission facilities would be authorized to some powerful entity. This entity would focus on optimization while developing the facility. The entity should include well known and reputed experts with power system planning and operations experience.

Now let us see how a Basin Wise Transmission Plan would look. We have five major river basins; viz. Koshi, Gandaki, Karnali, Mahakali and Southern Rivers. Except for the Southern Rivers Basin, most rivers of these basins originate from the Himalayan region. While flowing down, small streams in the Himalayan region join together to shape a river. As these rivers flow downward through the hills, midlands and Mahabharata or Churia range, many join together to shape larger rivers. While entering the Terai region from the Mahabharat or Churia hills, these very large rivers and basins are named after the large associated rivers. Small streams of the Himalayan or hill region are suitable for development of local level hydropower plants up to 5 MW. Rivers in the upper hills are suitable for regional level hydropower plants up to 50 MW, and rivers in the lower hills and the south are suitable for large national level or export level hydropower plants. Thus, generation and transmission plans for a particular basin should address the need for development of local, regional and national level power plants as well as identify export level plants. This means that the Basin Transmission Plan should indicate how and where local level, regional level and national level plants will be connected to the grid. Questions to be addressed include: Which part of the basin network will be completed

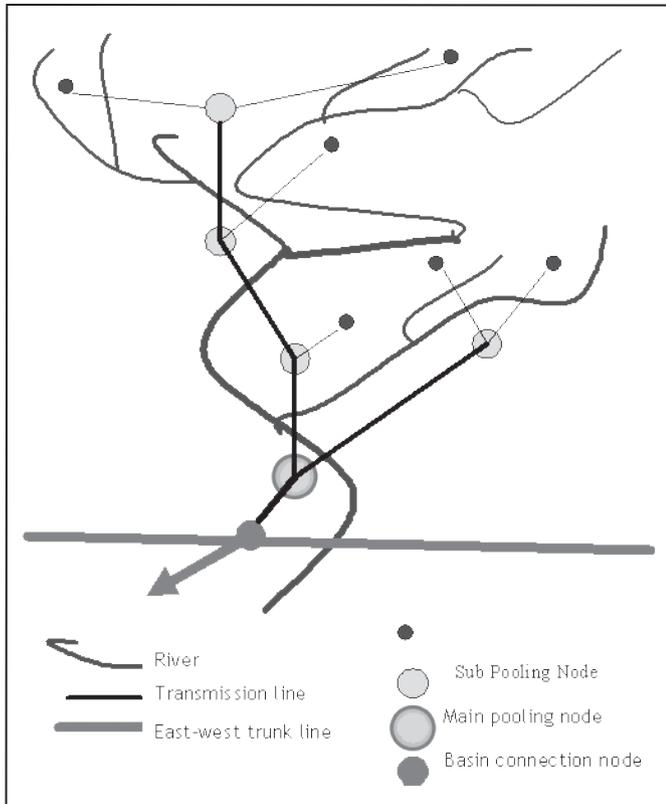


Fig1: Basic Transmission Plan

first? And, what will be the sequence of developing the Basin Transmission Network? For export-oriented projects we should be very clear that:

- Generation of medium sized export oriented plants and our seasonal or time of the day surplus could be transmitted to India through already planned cross border links.
- According to our level of access in Indian short term or day ahead market, we can develop more cross border links for the basin wise export plan.
- But, in case of large export-oriented projects that will

usually enter the long term Indian market through long term Power Purchase Agreements; we need not invest in capacity addition of our transmission system. A dedicated transmission line at developer's cost from plant to Indian grid would be better option.

So in a basin there will be following nodes in the network plan (see Figure 1).

- **Mini-pooling nodes** to interconnect the local level plants with the grid. These nodes should be strategically located in a circular range of about 30 km radius and close to the local load center. All local level plants should be connected at mini-pooling nodes and no plant will be connected to a distribution line.
- **Sub-pooling nodes** mainly to connect the regional level plants with the grid, and should be strategically located to serve as regional grid substations. Local level plants in the vicinity should also be connected to the sub-pooling node. Mini-pooling nodes should be connected to nearest sub-pooling node.
- **Main pooling node** to connect mainly to the national level plants with the grid; but regional plants in the vicinity should also be connected at main pooling node. Sub-pooling nodes should be connected to the nearest main pooling node.
- **There will be a mid-hill and a southern east-west trunk line**
- **Basin connection node** to connect the main pooling node to the east-west trunk line. The basin connection node should also serve as an export node for the basin, where the cross border link should also be connected.

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