

# Abstract

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Planning for electrical power systems has tended to analyse the system both from short-term and long-term perspectives, with the latter setting up targets and goals for the former. Bulk of the short-term planning frameworks have modeled the system in detail, addressing issues like hydro-thermal scheduling, voltage limit violations, reactive power flows etc. On the other hand, long-term planning frameworks have tried to evaluate the global needs for network expansion so as to work out the basic guidelines for future network expansion, leaving out the details for the former.

Planning over the years has also evolved from disaggregated modeling frameworks, wherein issues pertaining to generation, transmission and distribution were addressed independently to integrated resource planning frameworks of recent times. While the former could account for greater set of issues, the latter have been forced, by dimensional problems to remain gross. However, with the development of more sophisticated tools and or approaches, like decomposition techniques and heuristic algorithms, planning for electrical power systems has gone a long way in meeting all system requirements.

The present work, tries to capture this developmental or evolutionary approach to planning, from disaggregated framework to integrated ones. Initially separate generation and transmission planning frameworks have been developed to analyse a whole host of issues that characterise the disaggregated system. The efforts have indicated an urgent for supporting all generation capacity addition plans by subsequent transmission expansion plans, to meet the system demand requirements more effectively. The benefits that accrue in the process can further be enhanced, and the investment suggestions, given more meaning when these issues are addressed in an integrated manner. An attempt in this direction to include generation, transmission and fuel supply options has indicated the possibility of a greater role for imported coal based generation options in the future.

However, dimensional problems have limited the details that have been accounted for in the process. Further, the objective of the work has been to develop the basic guidelines for future network expansion, apart from bringing out the various problems and issues that arise in all such expansion planning studies. To that extent the exercise is not complete in itself. A logical sequence would be the utilisation of the suggested planning targets to develop more detailed short-term planning frameworks, incorporating various technical details. None-the-less, care has been taken to incorporate the various system characteristics, while arriving at the policy implications.

Summarizing, the single factor that is seen to play a crucial role in the future is the role of the government and the broad guidelines that it envisages for the development of this sector.