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### **REMEDIAL MEASURES TO MEET CHALLENGES IN TRANSMISSION SYSTEM**

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#### **Abstract**

Due to increase in Electricity load day by day the power system network is changing regularly. A power system designers, Engineers must familiar himself regarding advancements and presently deregulation environment in competitive electricity markets. The power system expansion faces challenges like Right of Way(R.O.W) need to be met through the planning and adoption of latest technologies. In this paper remedial measures are presented to meet these challenges .

**Keywords:** Transmission system, Right of Way, multi-circuit line etc.

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#### **Introduction**

The developing country like India is still unsuccessful to bridge the gap between the power demand and supply. This gap largely affect the economic and development of the country. Despite the total installed capacity of over app 250 MW India is able to meet a demand of only 127 MW . The reason for this is lack of strong transmission network. During 10th and 11th plan periods transmission infrastructure development did not match with generation capacity. As per report of power system corporation limited around 30 transmission lines in the country are overloaded and stressed. So, transmission planning is an important part of the power system planning [1].The main reason for expansion of transmission network extends to competitive network also[2]. The present deregulation scenario in electricity markets increases competition in generation and distribution sectors with a centralized regulation of transmission network. The Indian transmission line currently operating at 132KV,220KV,400KV,500KV and 765KV Single circuit and double circuit lines around 15 years ago. Apart from classification based on voltage level, the transmission lines are differentiated by flow of the current whether alternating current (AC) and direct current(DC). During execution of these transmission lines a lot of problems are faced by different power transmission developers. The important steps in the development of the transmission line is thoroughly review of the existing system and present global trends in the design of transmission line design.

#### **Transmission Line Components**

The common components of a transmission lines are towers, conductors, earthwire, insulators and other hardware fittings and accessories. The function of tower is to withstand the safe transfer of various loads such as wind load, dead load, Live load due to deviation etc. Towers rest on a foundation, which transfer all types of loads coming from the structure to the ground safely. Conductors are used to carry the power. The use of insulators are to provide the electrical insulation between the live conductors and earthed structure under all operating conditions. The earth wire provide the protection against lightning flashovers and a path for fault current. Hardware fittings do not contribute as much as other components but are equally important.

#### **Challenges In Transmission Network**

Transmission network faces a various issues and challenges during the stages of project implementation. These challenges are classified as technical and administrative challenges etc [5].Technical challenges mean lack of skilled manpower. Transmission projects are widely spread over an area which include different terrain and remote locations, the power system developer faces issues in transportation of equipment along with manpower to the work site. An administrative challenge arises due to lack of government support and absence of necessary laws. Currently there is no proper compensation policy for the right of way (R.O.W) which is major issue in transmission projects. In comparison to public sector companies the private developers faces a large problem. Availability of cheap labour, land acquisition and social activism are other issues faced by developers besides the above two main challenges.

## Case Study

Here two case are being discussed which could not be completed due to the lack of R.O.W problem and clearance certificate from the forest department [5]. The first example of Western Region System Strengthening II project (WRSSS) taken by the Reliance Infrastructure. It comprises a total line of 1532 km out of this 1045 km line in Maharashtra and remaining 487 km line lies in Gujarat. The line which is in Maharashtra has been commissioned and the Gujarat portion of line is only partially complete due to lack of forest clearances. The second example consists two critical lines of Pune-Aurangabad and Pune-Parli projects, these were located in the industrial areas. There exists a R.O.W. related agitation by the landowners. Objections are also raised by the Maharashtra Industrial Corporation which also owned some part of above land. Due to this both double circuit lines were converted into multi-circuit lines. All basic things such as foundation design, tower design and tower testing were repeated. This also result in delay in completion of the project.

## Remedial Measures

To meet the above challenges following measures need to be implemented [2][4] :-

- There must be a transmission policy in which transmission and distribution should declare as critical important segments.
- To handle R.O.W issue compulsory land compensation should be standardised for the stake holders like contractor, landowners etc.
- To set up the special training institute to give latest knowledge in the power transmission projects.
- There must be full co-operation between the generation (suppliers) and transmission network.
- A time bound process for environmental, aviation process, railway authorities, power line crossings, highway authorities and forests clearance is important to ensure timely completion of projects.
- For higher efficiencies and to overcome R.O.W problem High voltage transmission system must be adopted. Power transfer capacity and R.O.W. required for different voltages level are shown in table 1[4].
- Use of underground cables to minimize issue of aesthetics and land availability.
- Switch to Gas insulated sub-station where land acquisition is a major issue, as this substation require less space compared to conventional substations.
- Use of multi-circuit lines.
- Power system developers bringing major technological changes in tower construction and transmission line design. New conductor materials, Light detecting and ranging survey (LIDAR) and transmission line stringing with the use of helicopters to reduce the problem of R.O.W.
- Compact towers, delta configuration towers and narrow based towers are being introduction.

*Table 1 ROW required for different voltage levels*

Voltage level	400kv AC	765KV AC	+/- 500KV AC	1200 KV UHVAC	+/- 800KV HVDC
ROW(m)	46	64	52	92	70
Capacity(MW)	1000	2300-2900	2000-2500	6000-8000	6000-6400
MW/per m	15	45	48	87	90

## Conclusions

Despite the challenges in transmission system segment there is a significant investment in transmission infrastructures in the next 5-6 years in India. The transmission sector is poised for a significant growth. The challenges in evacuation of transmission projects and their remedial measures are presented in this paper. The investor from private sector will play an important role in the transmission segment. This paper will be helpful for the power system designers and investors.

## References

1. Seyed Mohammad Ali Hossein, "Transmission network expansion planning in the competitive environment", A reliability based approach IEEE Transaction, vol.13, July 2011.
2. Raminder Kaur, ,Maneesh Kumar, "Transmission expansion planning in Indian context: a review", International conference on Recent advances and trends in Electrical Engineering(RATEE-2014).
3. <http://www.cea.nic.in>
4. <http://www.powergridindia.com>

5. Power line magazine vol.18, no.10 June 2014.
6. Power line magazine vol.19, no.10 June 2015.