

T&D contractors find positive changes in policy framework



Augmenting power transmission capacity is one of India's foremost objectives as the country strives to transfer an ever growing quantum of power—from generation centres to far-flung consumption areas. Laying overhead power transmission lines is a highly land-centric activity, which is often fraught with difficulties and unpleasant surprises. *T&D India* got in touch with leading power transmission contractors to understand the ground-level challenges and how the fraternity is working towards surmounting them.

A special story by **Venugopal Pillai**

Drone being used to string power conductors for a project in Bhutan. Project contractor and source of photograph: KEC International

India has planned to invest Rs.2,54,000 crore (around \$37 billion) in its power transmission infrastructure during the period 2017-22. Nearly 90 per cent of this would go towards the above-220kV grid. The physical target for the period is around 1 lakh ckm of power transmission lines and 3.3 lakh MVA of transformation capacity. This target includes HVDC power transmission infrastructure corresponding to 14,000 mw capacity. In the past five years (FY14 to FY18), around 1.16

lakh ckm of transmission lines and 3.5 lakh MVA of transformation capacity has been added. This clearly shows that in the next five years, the achievement of the past five years will be replicated.

In the context of India's power transmission ambitions, T&D contractors have a very critical role. Power transmission is a land-centric activity and as such, all the difficulties associated with an already-difficult subject like "land" come into play. Dealing with land-related issues has

never been easy in a country like India. Apart from ownership-related issues, India's diverse landforms that could include dense forests, hilly terrain, water bodies, etc pose physical challenges as well.

Securing right-of-way is considered as the biggest impediment while planning and executing power transmission projects, especially overhead lines. India is moving to extra high voltage (EHV) and ultra high voltage (UHV) lines so as that more electricity

Government initiatives have had a positive impact

There is no doubt after the new government established in 2014; it has initiated several initiatives and policies for the development and improvement of power sector. Through series of notifications, the environment ministry has eased rules for mining, roads, power and irrigation projects and diluted a host of regulations related to environment, forest and tribal rights for easy implementation of projects. The necessary approval from Railways, National Highways Authority of India and other government authorities has become smooth for power transmission projects. Major policy is formulated or amended, like Electricity Act, Tariff Policy, formulation of National Electricity Plan, and standard bidding documents (SBDs) for carrying out competitive bidding for procurement of power transmission services etc. The Electricity (Amendment) Bill, 2014 have a profound impact on the Indian power sector.



— Subhash Sethi, Chairman, SPML Infra Ltd

Besides, HTLS (high-temperature, low sag) conductors are replacing conventional conductors. These conductors are light and have the capacity to carry more power. Their lightness requires transmission towers to have a smaller base, thereby reducing the land footprint, notes Kejriwal. (Full interview presented in this story.)

Speaking to *T&D India*, D.C. Bagde, CMD, Transrail Lighting Ltd, said, "When it comes to right-of-way it finally boils down to how much corridor you can reduce. There are two ways of achieving this. The first is to take transmission lines on monopoles. The second is to replace conventional cross-arms and go in for insulated fibre-glass cross-arms."

Concurring with this view was Subhash Sethi, Chairman, SPML Infra. According to Sethi, nowadays narrow-based multi-circuit towers are available even for EHV lines. Such towers take lesser area for foundation and also reduce the project gestation period. Even for EHV substations, gas-insulated switchgear (GIS) is preferred over the conventional air-insulated substation (AIS), resulting in much lesser geographical footprint, observes Sethi.

When transmission lines pass over sensitive areas like agricultural fields, there are greater difficulties

than just securing right of way. It is the potential damage caused to the land during construction, including the stringing phase. It is here that technology has come to rescue. It is not just the lines that are overhead even the stringing activity has become overhead—thanks to the use of drones or unmanned aerial vehicles (UAV). Stringing is the activity of securing power conductors on transmission towers.

According to P.K. Paine, COO – T&D, Sterling and Wilson, aerial technology in which helicopters are used for stringing is gaining currency in India. Such technology is quite commonplace overseas. "This technology can easily reduce the number of approvals required and can be done without damaging the land," notes Paine.

Kejriwal of KEC stressed on the use of technology to surmount land-related impediments. "We use UAV/ drones to string power conductors, which have been especially beneficial in hilly terrains as it minimizes the damage caused to the environment. We use advanced survey techniques such as LiDAR (Light Detection and Ranging) in inaccessible and difficult sites, which helps in precision planning, enabling us to minimize our footprint and damage caused to the ecosystem, while also leading to efficient project management," he elaborated.

can be transmitted with using the same geographical footprint. For interregional lines, 765kV has since long become the norm and today this voltage is considered even for intrastate lines.

According to Vimal Kejriwal, MD & CEO, KEC International, innovative tower designs and digital interventions have greatly helped in reducing the transmission corridor. Narrow towers and monopoles that have a small base are being increasingly used. This reduces the requirement of land.



1200kV Wardha Aurangabad Transmission line. Project contractor and source of photograph: Transrail Lighting Ltd

EXPEDITING CLEARANCES

Land-related issues are not limited to the construction phase. Even before the first pour of concrete, overhead power transmission lines need to deal with several clearances. Securing these clearances does not strictly fall within the purview of the contractor but is more within the domain of the developer (owner of the transmission line.) All the same, contractors are affected as timely clearances always mean faster project implementation and, in turn, faster return on investment to the developer.

Much of India's power transmission infrastructure still lies within the public sector ambit—both Central and state—although private sector developers are fast making their presence felt. Securing mandatory clearances and obtaining right-of-way (RoW) has traditionally been a contentious issue. When transmission lines pass through ecologically sensitive areas like forests, the clearance process can get further delayed. Has there been any improvement on the right-of-way and clearances front was the question posed to the participating T&D contractors; the response was

mixed. Much has been done but there is more to do was the general perception conveyed.

Vimal Kejriwal acknowledged that there was some visible progress such as faster forest clearances. The government is also supporting policy

rollouts that address land-related issues—crop compensationschemes, for instance. All said, “There is still non-clarity on discretionary elements of supporting policies and problems caused due to influential landowners still exist,” cautioned Kejriwal.

Subhash Sethi of SPML Infra was clearly appreciative of the government's effort. “Through a series of notifications, the environment ministry has eased rules for mining, roads, power and irrigation projects and diluted a host of regulations related to environment, forest and tribal rights for easy implementation of projects. Securing necessary approvals from Indian Railways, National Highways Authority of India and other government authorities, has become smooth for power transmission projects,” was how Sethi put it. The SPML Infra Chairman strongly felt that the new NDA government, after coming to power in 2014, has initiated several reforms in the power sector, which have been addressing various issues quite closely.

Echoing the positive sentiment was P.K. Paine of Sterling and Wilson who recalled a time when almost 20 government clearances were required for transmission projects, which potentially derailed project schedules. However, matters are changing for the better. “The government has significantly reduced the number of clearances hereby enabling an easier and faster clearance process,” felt Paine.

Contrary to the popular sentiment, D.C. Bagde held the view that not much tangible has taken place on the clearances front. “There have been no tangible improvements,” Bagde asserted.

GLOBAL OPPORTUNITIES

Much like India, several developing nations are upgrading their power transmission infrastructure to support their growing economies. It is indeed heartening to note that equipped

Transrail's most challenging project

From execution point of view the most challenging project Transrail Lighting Ltd has executed is the 400kV D/C Punatsangchhu 1- Sunkosh transmission line in Bhutan where each and every project location was inaccessible due to mountainous terrain. Transrail was the first company to install ropeways in Bhutan to transfer material to the tower locations instead of manual head-loading or use of animals. The company used spider excavator to overcome the challenging terrain. Transrail's main learning from this was that mechanisation and modernisation helps bringing efficiency to construction.

(As told by D.C. Bagde, CMD, Transrail Lighting)



400 kV DC twin-moose transmission line from Chittorgarh to Bhilwara in Rajasthan. Project contractor and source of photograph: SPML Infra Ltd

with rich experience in domestic projects, Indian EPC contractors are exploiting opportunities overseas. In fact, some EPC contractors have a larger share of foreign projects than domestic ones.

KEC International, for instance, has wide exposure in the global power transmission contracting market. Vimal Kejriwal, the company's MD & CEO, was of the view that between now and 2025, regions where significant opportunities exist in the power transmission EPC contracting space are SAARC countries, Asia, Middle East, Africa and North America. "SAARC, in particular,

RoW is a significant concern

Right of way (RoW) is one of the most significant concerns while undertaking power transmission projects. Issues of RoW can be resolved to a large extent with suitable tower design and configuration strategies. One such technology used overseas is known as aerial technology wherein helicopters are used to lay power transmission lines. This technology can easily reduce the number of approvals required and can be done without damaging the land. With the changing requirements and development of new technology, major industry players such as Sterling and Wilson are also evolving to adapt to the increasing demand.



— P.K. Paine, COO – T&D, Sterling and Wilson

is a potential growth market and is expected to grow at over 20 per cent between FY18 and FY22. There are large capacity interconnections already existing between India, Bhutan, Bangladesh and Nepal, and additional high capacity lines and grid reinforcements are in the pipeline."

Subhash Sethi of SPML Infra felt that countries where power-sector projects, including transmission, are backed by funding from World Bank or its associates, represent good business opportunities for Indian contractors. "Countries such as Afghanistan, Bangladesh and several African nations where these projects are being funded by World Bank or Asian Development Bank etc. have good opportunities for

power EPC companies," said Sethi in elaboration.

The important aspect to be looked into is whether Indian EPC contractors are generally competitive in the global market. D.C. Bagde of Transrail, while corroborating with the fact that several geographies like Africa, South East Asia, SAARC region and Eastern Europe do offer opportunities, it is not always easy going for Indian contractors. "Indian companies have to compete with other global players, especially Chinese companies, which can be a big challenge," averred Bagde. Indian EPC contractors would do well to further improve their project execution capabilities so as to become globally competitive. "Although during last few years, Indian industry has improved substantially in terms of project completion including quality and safety still there is long way to go to increase the use of mechanisation in foundation, tower erection and stringing if they have to compete with global players," was Bagde's advice to the contracting fraternity.

On the same lines was Paine's opinion who felt that Indian EPC contractors that are inclined to align themselves with global technology and practices stand a good chance for overseas contracts, especially South Africa, South America and even European countries where opportunities abound.

Much done but more needs to follow

Although during last few years, Indian industry has improved substantially in terms of project completion, including quality and safety, there is still a long way to go to increase the use of mechanisation in foundation, tower erection and stringing if they have to compete with global players. We need to improve the facilities offered to our manpower at site and the client should set standards by having stringent requirement in the specifications. Use of LiDAR technology for survey and use of helicopter for erection and drones for stringing will bring down completion timelines and also reduce accidents. Moreover, it would have lesser environmental impact.



—D.C. Bagde, CMD, Transrail Lighting Ltd



Our thrust on digitalization has been a key enabler

— Vimal Kejriwal, MD & CEO, KEC International Ltd

What comes to your mind as the most challenging overhead power transmission line project that KEC International has executed so far?

It is difficult to talk about just one challenging project given our wide range of projects executed. However, in the last few years, we have successfully executed several iconic projects across the globe. Some of which are:

- India's highest altitude 220kV GIS Substation and 220kV Leh-Khalsti transmission line in Jammu & Kashmir, which passes through extreme mountainous terrain and faces harsh weather conditions for a major part of the year.
- The 400kV Haldia river-crossing towers in the middle of the Hoogly river, the height of each tower is about 73 per cent of the Eiffel Tower
- The 765kV transmission Line at Vemagiri, which demonstrates our superior engineering & design capabilities. Here, we customised the tower designs to optimize the weight of the tower
- 400kV Jigmeling-Wangdue transmission line in the extreme terrains of Bhutan, which demonstrates superior construction efficiency; we used a drone to string about 60 per cent of the line-length, cutting across deep valleys and river crossings
- Restoration of the 400kV transmission lines in war-torn Iraq—360 km line length was rebuilt in four months

What has been the major learning from these projects?

KEC International is a \$1.5-billion infrastructure EPC major, which is today present in diverse verticals—power transmission & distribution, railways, solar,

cables, civil and smart infrastructure.

We have built extensive capabilities over the last seven decades—robust project management, operational excellence, advanced engineering and design capabilities, and a commitment to quality and excellence, all of which have enabled us to deliver complex projects in every corner of the world. Our wide-ranging and diverse experience has led us to outperform in extreme conditions—be it, climactic, geographic or hostile terrains.

Through years of experience and expertise, we have learnt the importance of effective project planning, adoption of innovative designs, comprehensive route surveys and use of technology to aid in faster and smoother execution.

We continue to augment our competitive edge across our business verticals, making us a robust, agile and a visionary organization committed to quality and excellence.

How is technology helping reduce RoW constraints for power transmission projects?

At KEC, our thrust on digitalization has been a key enabler in our efficient, faster and superior delivery of projects across geographies. Various initiatives taken towards innovative tower designs and digital interventions have helped us address RoW issues to a large extent.

We use UAV/drones to string power conductors, which have been especially beneficial in hilly terrains as it minimises the damage caused to the environment. We use advanced survey techniques such as LiDAR (Light Detection and Ranging) in inaccessible and

THE CULTURE DIFFERENCE

Most of the EPC contractors that T&D India interacted with had significant global exposure behooving one to understand how varied was the experience while executing government-backed power transmission projects in India and overseas. P.K. Paine felt

that while the processes are generally more streamlined overseas, material clearances are easier in India. He also was of the view that safety norms are relatively more stringent in overseas projects and there is generally more emphasis on health and environment-related norms.

Bagde from Transrail brought out some finer aspects. He explained that in Indian projects, all design approvals are either given by the client or the clients give their own designs. As such, the client interface with the contractor is substantial. However, in most overseas projects, owned by their respective

difficult sites/areas, which helps in precision planning, enabling us to minimize our footprint and damage caused to the ecosystem, while also leading to efficient project management.

Additionally, innovative tower designs like monopoles and narrow towers, which reduce the base of the tower; HTLS conductors, which are light conductors with the capacity to carry more power with smaller towers, consequentially reducing the area that is required to erect a tower; covered conductors for crucial crossings; advanced software like PLS-Tower to optimise tower-width for narrow corridors; and survey equipment like GPS for accurate route finalisation, help increase efficiency and reduce RoW constraints.

Do you feel that the process of securing various mandatory government clearances for power transmission has become faster in recent years? Please discuss.

KEC generally undertakes projects as contractors, so basic approvals, including environmental clearances are secured by the developers. Having said that, we are beginning to see greater efforts by the government in supporting policy rollouts such as land (and crop) compensation. However, the actual impact on ground is incremental. Issues such as non-clarity on discretionary elements of supporting policies, and problems caused due to influential landowners, still exist.

We are seeing some improvements in issues, such as faster forest clearances. However, further improvement is needed on matters related to RoW, land acquisition, road/rail approvals, etc.

How do you gauge the opportunities for power transmission EPC contractors in the overseas market? What are the major geographies where such potential exists?

The global power transmission market is poised for favourable growth between 2018-2025, with significant opportunities in the regions of SAARC, Asia, Middle East, Africa and North America.

Asia is seeing an increase in demand for power. SAARC, in particular, is a potential growth market and is expected to grow at over 20 per cent between FY18



and FY22. There are large capacity interconnections already existing between India, Bhutan, Bangladesh and Nepal, and additional high capacity lines and grid reinforcements are in the pipeline. KEC has already executed around 6-7 interlinking projects with various Indian neighbouring countries.

Similarly, we are executing large cross-country interlinking projects in Africa, in Senegal-Gambia and Kenya-Ethiopia. Electricity demand in the Middle East will continue to be strong. Saudi Arabia, UAE, Kuwait and Oman will require the bulk of these investments.

Significant investments are also expected in the North American region, to replace and upgrade the existing infrastructure to improve system performance.

Brazil continues to be an important market in the South American region, with large expansion for power transmission & distribution expected in the next five years.

governments, consultants are given the approval of design, supervision of works, recommendation for passing of bills etc. Government agencies are involved directly only in clearing right-of-way, noted Bagde.

KEC International's MD & CEO, Vimal Kejriwal, made a general

remark that since every country has its own set of mandated rules, there would naturally be some difference whilst executing government-backed projects overseas, and back home. However, Kejriwal made a subtle observation about pace of project execution and the extant power situation in that country. For

example, as Kejriwal noted, it is easier to move machinery in Africa because the region is power-starved and there is inherent need for faster execution of projects. "On the other hand, if you consider the Middle East, the pace of execution depends on the priority of the government," remarked Kejriwal. ■