

Infrastructure Business

Infrastructure Business Scenario

Indian Construction Sector

Infrastructure in India has come a long way with consolidation in the last 2 years (i.e.) 2015 – 2017. Order awards especially from the Government including both State and Central have further triggered the momentum in the current year (2018), which is expected to drive robust topline growth of the construction sector in the coming years, given the conversion cycle.

Furthermore, Budget 2018-19 is a pragmatic effort, fine balancing the requirement of fiscal rectitude while keeping in focus the need to connect the missing links in infrastructure and farm sector development.

The budget has reiterated the need for infrastructure investments as the 'sine qua non' for sustained growth with a requirement of ₹ 50 lakh crore, which has to come partly from the Government but importantly through 'crowding in' of investments from the private sector. Much stress has been laid on urbanization through adoption of smart cities and smart infrastructure and construction of

large linear infrastructure projects in transportation like 'Bharat Mala', aviation and ports. More importantly, the attendant structural reforms through the adoption of the IBC and clear emphasis on recapitalization of the banking system and strategic disinvestment targets reflected the long term commitment of the Government. Such incentives will release risk capital, lower risk averseness of the financial sector and lead to the upturn of the private capex cycle.

Global Construction Sector

The global infrastructure segment is more buoyant than it has been for the last few years and the sentiment is positive. Global construction stepped into its stride in 2017 as the economic backdrop brightened and boosted optimism. The USA is enjoying rapid economic growth, European markets are catching up and China continues to surprise.

IMF forecasts global GDP to increase by 3.9 percent in 2018. The construction sector has a strong correlation with economic growth. Construction's share of the economy expands in greater proportion when GDP rises above a moderate rate. Increasing construction activity around the globe is expected to drive with global growth gaining momentum and more importantly developed economies still accounting for about half of global construction.

Finally, though the sharp rise in crude prices is a double edged sword, this raises expectations for the oil and gas sector and infrastructure development in the middle East which would auger well for the construction sector.

Artist's impression of proposed Chhatrapati Shivaji Maharaj Memorial Statue, Mumbai



Indian International Convention Centre, Delhi



Buildings and Factories

Overview:

L&T's Buildings & Factories (B&F) business is known for its capability and expertise in executing airports, hospitals, stadiums, retail spaces, educational institutions, IT parks, office buildings, datacentres, elite residential buildings, high-rise structures, mass housing complexes, factory structures, cement plants and industrial warehouses on an EPC (Engineering, Procurement and Construction) basis. L&T has a track record in successfully addressing tough challenges, and has the unique capability to offer total solutions including 'Design-Build-Commission' expertise, advanced systems like Building Information Modules, procurement from global supply chain and unrivalled project management expertise.

Dedicated engineering design centres, competency cells, advanced formwork systems, mechanized project execution, wide network of consultants and vendors, digitized project control and a talented pool of employees help the business to maintain a leadership position, retain key customers, enter new geographies and secure major orders. Construction excellence – coupled with technology, experience and expertise gained over several decades – has helped the business to continue to be one of the premium contractors in the industry.

The year saw receipt of some breakthrough orders from prestigious clients. Major orders were secured

from esteemed customers for the construction of convention centres in New Delhi and Jharkhand, construction of AIIMS hospital in 2 locations, a store for a retail major in Navi Mumbai and office space for a renowned developer.

Key projects commissioned by the business during the year include:

- Metro facility at Hyderabad
- Convention Centre in West Bengal
- Medical colleges for the Govt. of Odisha
- Kannur Airport
- High-rise residential towers in various parts of the country
- Facility for Asian Paints in Mysore

Business Environment Review

The past two years have been very challenging for the construction industry. The customer base of the business showed a clear shift towards Government clients, as the private sector deferred their investment plans due to uncertainties caused by various economic developments. Though RERA and GST were positives for the industrial growth, the sudden implementation of these policies brought India's economy to a standstill for a few months. The first half of the financial year was quite challenging for the business, which has slowly stabilized, progressing towards healthy GDP growth.

Most of the airport projects that were deferred during the last year have started showing positive movement this year.

ITC Colombo



Orient Cement project at Chittapur in Hyderabad



TCS Customer Care Centre, Chennai



The IT sector in India remained sluggish. The Government has been active in implementing various health care schemes and establishing hospitals. On the whole, the business scenario has been better than the previous year's.

The Qatar embargo had some impact on the ongoing jobs. There were no major orders from the GCC, as the economy is reviving, with crude oil prices stabilizing after a steep fall.

Despite uncertain market conditions, the Buildings & Factories business has managed to win major orders and has continued to maintain its leadership position in the industry.

Initiatives

Apart from continuing its focus on technological advancements and R&D, the business has also introduced major initiatives with the objective of strengthening its customer portfolio, steadying business growth, and expanding into emerging markets. Key moves have been taken to strengthen the organization and follow a focused approach towards projects that complement our strengths. Various digital initiatives that were introduced last year have been successfully implemented, and are operational across all sites of the business. Value engineering, effective procurement and supply chain management, operational excellence, mechanized execution and innovative construction methodologies have improved project cycle times, enhanced profitability and delivered quality. The business is associated with leading universities and industry experts, pioneering use of Robotics and 3D printing in construction.

Safety at work is of utmost importance to L&T's Buildings & Factories business, and the focus continues by organizing

various training and awareness programmes throughout the year. Various initiatives have been taken up to digitally monitor, record and review all safety-related aspects at site.

Awards & Recognitions

For the second time in a row, the business has been awarded the prestigious 'Sword of Honour' from the British Safety Council.

1. B&F received three British Sword of Honour awards and a five star certification from the British Safety Council
2. Ten projects won the Gold Awards from The Royal Society For Prevention of Accidents (RoSPA)
3. 16 projects were awarded by the National Safety Council.
4. Indian Building Congress award for precast initiatives
5. Outstanding Contribution in Commercial Project award from EPC World
6. Two awards for 'Outstanding Concrete Structure' from Indian Concrete Institute and Two Construction Week India Awards

Outlook

With expected GDP growth between 7.0 to 7.8% and with Government's continued focus on reforms, improved World Bank ranking for 'Doing Business' and Moody's rating upgrade is expected to lift investor sentiment and accelerate FDI flows in long-term. Some of the tailwinds are:

- Airport traffic growth in the country will necessitate immediate requirements of airport expansions within the country.

ICC towers, Mumbai



Motera Cricket Stadium, Gujarat



WBHIDCO-Convention Centre at Kolkata



- India is experiencing much growth in medical tourism, and the industry is expected to double its size by end 2018.
- The Government has provided infrastructure status to Affordable Housing. The relaxation of FDI in real estate will steadily boost investment in this sector.

In the international arena, Bangladesh and the GCC offer promising opportunities. The crude oil price is on a rising trend. This is a healthy sign for the GCC's economy and will boost revival of stalled investment plans.

L&T's Buildings & Factories business is a proven player in the construction industry, with an exemplary record of handling major design-and-build projects and executing them within stringent timelines.

Overall, the environment is promising, yet challenging, with a long process duration and increased competition.

Transportation Infrastructure

Overview:

The Transportation Infrastructure business is a well-diversified business in terms of its product range and geography of operations. The business offers its services in the fields of Roads, Runways (Airside Infrastructure) & Elevated Corridors (RREC), railways (mainline and mass transit systems) and international infrastructure. L&T's Transportation Infrastructure business has a presence across India, East Africa and various GCC countries.

The business leverages its vast experience in Project Management, Engineering Design & Construction Management to achieve operational efficiency.

It has Engineering Design Centres in Mumbai, Faridabad and Chennai and Offshore Engineering Centre in Mumbai, besides Area Offices in India/ GCC countries. In addition, it has a competency development centre at Kancheepuram, and undertakes workmen training at L&T's Construction Skills Training Institute, Ahmedabad.

Over the years, the business has been fuelling its topline with the help of a robust order book.

The business is the first Indian entity to receive an order for delivery of a complete transit system abroad; it secured a design-&-build project for a Mass Transit System in Mauritius, an opportunity to deliver from track to train. The business has won the prestigious contract for construction of the New South Parallel Runway, apron and associated works at Kempegowda International Airport, Bengaluru on EPC basis.

The Railway Strategic Business has been awarded a large EPC Civil, Structure and Track project in the Eastern Dedicated Freight Corridor, involving construction of 222 RKM of a single-track corridor from Khurja to Pilkhni in Uttar Pradesh.

In the area of Mass Transit Systems, L&T's Railway SGB continues to grow in the domain of 'Ballastless Tracks' and 'Traction System for Metros'. It has won projects for ballastless tracks for the Ahmedabad Metro and for power system installation and SCADA work in Mumbai Metro Line 3.

An Integrated Light Rail Transit System, Mauritius



The business has been successful in expanding its customer base during the year by securing various orders for construction of highways, including 8L of Dwarka Expressway (8.76 Km, Package IV), Haryana from NHAI, 6L of Mumbai-Vadodara Expressway (23.7 km), Maharashtra, Amaravati Capital City Development project.

During the year, the Kanaktora- Jharsuguda Road Project - a 66.9 km, 2-lane highway in Odisha - was completed.

Business environment:

Sectoral Performance:

a) Roads:

- Construction of highways hit 27 km/day in 2017-18, clocking a 20% growth over the 22.5 km/day in the previous fiscal year.
- The Financial Year 2017-18 yielded projects worth over ₹ 1,220 billion. In the last 5 years, the average length of road projects awarded by NHAI was 2,860 km compared to 7,400 km in FY 17-18. This is a record accomplishment by National Highways Authority of India since its inception in 1995.
- The year 2017-18 saw a significant number of smaller competitors emerging in the market, consequently intensifying the competition.
- There has been a change in the modus operandi of awarding projects, i.e from EPC mode to hybrid annuity mode, where the Government brings in 40% of the project cost during construction period and the rest is to

be arranged for by the contractor and recovered through annuities.

b) Railways:

- Track renewal at record high of 4,405 km for the year 2017-18. The renewal of tracks has been the highest ever, which exceeded the target of 4,389 km (revised to 4,400 km) for the year 2017-18.
- New track-laying at a record scale of 3,100 km/yr in 2017-18 against average of 2,045 km/yr in 2009-14
- Railway electrification of 4,100 km surpassing their earlier annual target of 4,000 km in 2017-18.

Sectoral Change:

a) Roads:

- NHAI has taken a decision to have a mix of BOT/EPC/HAM projects in the ratio of 10:30:60 which will impact our addressable market.

b) Railways:

- Change in Metro Policy. Public-Private Partnership (PPP) component is mandatory for availing central assistance for new metro projects.
- Projects being implemented on EPC basis - a paradigm shift from conventional BOQ methods.
- High Speed Rail Projects on fast-track tendering to commence in FY 2018-19.

Policy Initiatives:

a) Roads:

- The National Highway network is to be expanded from 96,000 km to 200,000 km over the next 5 years.

A completed section of Western Dedicated Freight Corridor - Civil & Trackwork



Railway Signaling & Telecommunication



- Expressways are finally seeing good traction in Northern and Western India.
- The second blueprint road development programme has been launched this year vide the Bharatmala Pariyojana.

b) Railways:

- Mission Raftaar focusing on enhancing network speed on the Golden Quadrilateral – ₹ 18,000 crore sanctioned in budget 2018 for 2 corridors.
- Three New Dedicated Freight Corridors to be implemented in next 2-3 years.
- Electrification of the remaining 25,000 RKM by 2021.
- New projects to be implemented through State-Centre JV.

Safety Awards:

During the year, the business has won 14 international safety awards: 1 Distinction, 8 Merit and 5 Pass from the British Safety Council, 2 prestigious safety awards from National Safety Council (NSC), India and also 1 gold award from the American Society of Safety Engineers.

WDFC CTP 1 - 2 Railway project has won the prestigious 'Golden Trophy Award' Sarvashreshtha Suraksha Puraskar in Construction Segment for the year 2017. This singular distinction is the highest honour instituted by the National Safety Council of India. The Railway's business has won the Gold Trophy twice in the last 3 years.

Despite all these accolades, challenges continue to remain in creating a high level of safety awareness across linear projects spanning hundreds of kilometres.

Significant Initiatives

On the execution front, the mega Civil & Track Projects in the Dedicated Freight Corridor continue to speed up with the usage of the new track construction machine and the availability of continuous work front. Recently, high-speed trial runs for a major section of Tracks were successfully conducted in the Ateli-Phulera section of the Western Dedicated Freight Corridor.

Also, the expanse in WDFC Electrification project (3145 track km), necessitate faster execution techniques. This involves cylindrical foundation for the mast implantation through heavy specialized augering machines, mast-grabber-cum- multi-axis manipulator and overhead wiring through state-of-the-art automatic wiring train.

L&T's Railway business is at the forefront in implementing innovative digital initiatives which are specific to linear projects. Prominent among them are 'Central Control System on Track Vehicles Movement' which not only provides real-time tracking of machines, but also track laying / completion status, collision warning alerts and approaching LC gates alerts to both driver and LC gate operator.

The business offers a platform for development and engagement of employees across various levels such as:

- LEAP (Leadership Excellence Accelerator Program)
- EYS (Engineer Your Success) – Developing Planning Engineers
- FULCRUM - Competency Development Programme across all levels.
- GURUKUL – Mentoring by senior leaders.

7.4 km Elevated Corridor at Bhatnagar Kolkata



Garden Reach Flyover at Kolkata



- NEEV – Strengthening the base of the organization pyramid

A total of 780 participants were covered through the above programmes in FY 17-18.

The business aggressively took up the digitalization journey by connecting people, machines and materials in various ways, at site and offices, to create more efficiency and transparency in the processes to gain tangible and intangible benefits. Key digital initiatives implemented in 2017-18 include:

- Project progress monitoring through Procube
- Plant and machinery utilization monitoring through Asset Insight.
- Geospatial solutions have been deployed using drones, Lidar and other GIS technologies to survey, stockpile measurement, obstruction monitoring on Geo map.
- Grader automation – a niche solution deployed, involving installing IoT devices on graders to make them semi-autonomous, increasing grading efficiency.
- Mobile app based solution to digitize several safety processes to make them paperless.
- Quality Chat Bot QT, which serves as ready reckoner for highway engineering.

Digital solutions, in general, are helping the organization to manage operations more efficiently. More solutions will be in place in 2018-19 to extract benefits from investment in technologies.

Outlook

RREC business

As the road sector is opening up, the Government aims to spend close to ₹ 7 lakh crore over the next five years to develop 83,677 km of roads including Bharat Mala Pariyojana worth ₹ 5.4 lakh crore.

The Government aims to build 45 km of roads per day in financial year 2019, an increase from the daily average of almost 27 km achieved last year.

The Ministry has also set targets of awarding orders of 20,000 km of National Highways and constructing a total of 16,420 km in 2018-19 – up from last year's award of orders for 17,055 km highways and 9,829 km constructed.

Railway Business

Indian Railways are planning the highest outlay of ₹ 1.46 lakh crore for FY 18-19 – an increase over last year's outlay of ₹ 1.31 lakh crore.

The high-speed rail project is the next big-ticket opportunity after the dedicated freight corridor projects. While the pipeline of projects from Western and Eastern Dedicated Freight Corridor is concluding, the business is positively looking at the start of the bidding process for the 508 km Mumbai-Ahmedabad High Speed Rail Corridor (MAHSR). With the enhanced value of the overall project at ₹ 1,08,000 crore, L&T's accessible value stands at ₹ 59,000 crore, comprising packages for viaducts, undersea tunnel(s), stations, maintenance depots, track, electrification and signalling. L&T's Railway business will focus on track, electrification and signalling & telecommunications.

Delhi - Agra Highway



Al Batinah Expressway (Package 4), Oman



Apart from the high-speed project, conventional projects of the Indian Railways continue to get a big thrust, backed by strong Institutional funders like LIC. These include 25,000 km of electrification to be completed in 4 years under the banner of 'Mission Electrification'. Also, the capacity augmentation projects of track doubling will involve construction of 17,000 km of additional tracks. The business intends to participate in a major portion of these projects through EPC tendering.

Besides mainline railways, the opportunities in the Mass Transit Segment continue to be driven by Tier 2 Cities and 'Extension lines' in large metros. Leveraging its overseas experience, the business is advocating the LRT solution on an EPC turnkey basis for cities like Vijayawada, Indore, Kozhikode and Thiruvananthapuram.

Internationally, the outlook on the Middle East construction industry is improving rapidly with the uptick in oil prices since mid-2017.

Growth in the region is expected, assuming a moderation of geopolitical tensions and a modest rise in oil prices. GCC economies are anticipated to lead stronger growth in the region, supported by easing fiscal adjustment. Tendering of mainline railway projects in Middle East is likely to resume. Having been part of a major urban transit system in Riyadh – which has progressed significantly – the business is gearing up to address these upcoming opportunities as well. Further infrastructure investment (such as the UAE Expo 2020) and reforms to promote non-oil sector activity are expected to offer opportunities.

The business also has focus on the neighbouring geographies, with projects having secured funding either

from the Indian government or from other bi-lateral/ multilateral agencies such as JICA.

The business is exploring opportunities in main line railway funded by an Indian Line of Credit and multilateral agencies in select countries of South Asia (Sri Lanka and Bangladesh) and the African continent.

The business is also exploring opportunities in new geographies such as Eastern Africa and CIS. It has already started bidding for tenders for projects funded by Indian LOC and AfDB in Mozambique and Zambia, and has received prequalification for ADB- funded EPC projects in Azerbaijan.

Heavy Civil Infrastructure

Overview:

L&T's Heavy Civil Infrastructure business undertakes Design, Engineering and Construction of projects in the crucial economic segments of Metros, Nuclear, Special Bridges, Hydel, Ports, Tunnels and Defence. The business has strong presence in India, Middle East, Bhutan and Bangladesh. The goal of the business is to become a one-stop total infrastructure solutions provider to both its domestic and international customers. The in-house design strength encompassing latest technologies such as BIM (Building Information Modelling) and its unique Construction Methodology Cell give the business a clear edge over its competitors and helps it serve customers from concept to commissioning.

Kannur International Airport Runway



Six-lane Access Controlled Expressway from Unnao to Lucknow



Business Environment

Infrastructure development is a key component in empowering a nation's economic rise by improving the efficiency of production, transportation, and communication. The availability and quality of infrastructure in a region positively influences domestic firms' investment decisions and enhances the region's economic attractiveness to foreign investors.

The business turned in a very good performance in the current year despite challenging market conditions. The year was marked by receipt of multiple big orders, with a major order from MMRDA for the construction of the Mumbai Trans Harbour Link (MTHL).

Heavy Civil Infra has always focussed on its customers' needs with the aim of optimizing their value chain and providing excellent services, to increase their productivity and competitiveness. The business focuses on adaptability to adjust to market shifts and to leverage the advantages offered by digital technology in order to further refine organizational processes and technical prowess and move further ahead of its competitors.

Metros

L&T's Heavy Civil Infrastructure business offers extensive end-to-end engineering and construction services for elevated and underground metros. L&T is one of the pioneers of Metro construction in India, with the first venture being the Delhi Metro project. Since then, the business has emerged as the prominent builder of metro systems in the country, having constructed 143 km of viaducts, 43 km of twin tunnels and 65 stations. In the current year, the prestigious Hyderabad, Kochi and

Lucknow Metro systems built by L&T were inaugurated and dedicated to the country by honourable Prime Minister Mr. Narendra Modi (Hyderabad & Kochi) and Chief Minister Mr. Adityanath Yogi of Uttar Pradesh (Lucknow). At present, L&T is executing as many as 12 projects across 9 cities in 4 countries, including the Riyadh and Doha Metros.

Areas of Expertise :-

- Elevated viaduct construction using segmental, U-trough, I-girder methods and balanced cantilever construction
- Underground tunnel construction using NATM (New Austrian Tunnelling Method), cut-and-cover and TBM (Tunnel Boring Machine) methods
- Underground station construction using top-down and bottom-up approaches
- Elevated metro station with expertise in spine beam concept (lean).

Defence

The Indian Defence sector is a strategically important sector with very specific needs. The Ministry of Defence has identified an urgent need to upgrade the country's defence infrastructure in order to maintain the readiness of country's defence forces and to prepare it for future challenges.

L&T's Heavy Civil Infra is well equipped and prepared to offer its comprehensive range of services and expertise to meet these very specific needs. L&T Construction offers single-point EPC solutions from concept to commissioning in the form of infrastructure facilities for Defence bases,

Hyderabad Metro Rail - One of the many metro projects being executed by L&T



underground facilities, surveillance, etc. In the current year, the business won a mega order from the Indian Navy.

Nuclear Power

L&T has always been a pioneer in the Indian Nuclear industry with current market share of over 51%. Its nuclear power expertise extends to both Pressurized Heavy water (PHWR) and Light Water Reactor (LWR) technologies. Currently, the business is executing civil works for the Kudankulam Nuclear power project, which is the first LWR reactor in India and also one of the largest.

L&T has made history by successfully completing the single largest concrete pour of 7,232 cubic metre at the Kalpakkam site of the Ministry of Department of Atomic Energy (DAE) Projects for nuclear structures in India. The business also successfully achieved a single concrete pour of chilled concrete of 6155 cubic metre at Kudankulam.

Areas of expertise:-

- EPC solutions in civil, mechanical, electrical & instrumentation in Nuclear Power Plants
- Design capacity for end-to-end civil works including seismic qualification, procurement and construction services.

Special Bridges

L&T has built some of the finest and most challenging bridges in India across difficult terrain, incorporating design and construction technologies which stand at the cutting edge of the construction world. Achievements include building the longest operational extradosed bridge in India across river Narmada at Bharuch, Gujarat. The business is executing the longest extradosed bridge in the world at Patna (Bihar) in a Joint Venture with Daewoo. Currently

there are five ongoing projects across India and one international project in Bangladesh.

In the current year the business won a mega order to build the Mumbai Trans Harbour Link (MTHL) from MMRDA.

Hydel & Tunnels

Hydel: The domestic Hydel projects scene in the current year remained stuck at various levels owing to pending clearances, inter-state disputes and local protests. The once-promising North East region is also lagging due to lack of sufficient support. The ambitious river-linking project, which keeps getting delayed due to inter-state disputes, is expected to gather steam. Telangana is another region, which features promising opportunities for the construction of barrages. The Medigadda Barrage Project site set a record with the highest pour of 7,139 cubic metres of concrete in a single day, which is perhaps the highest for its segment in the history of Indian Construction.

Tunnels: New opportunities are expected for road tunnel projects in Maharashtra and the Northern Himalayan states of Jammu & Kashmir, Uttarakhand and Himachal Pradesh. In addition, the Government of India is planning to construct more storage caverns for strategic oil reserves. The HSR (High Speed Rail) project due to be built between Mumbai and Ahmedabad also presents robust opportunities in the near future.

Areas of expertise :-

- Diversion weirs, barrages, concrete / earthen / rockfill dams, including RCC (Roller-Compacted Concrete) dams
- Underground tunnels of various geometry and diameter (both concrete lined and steel lined)

620 m long cable-stayed bridge across the river Mandovi in Panaji, Goa



- Open and underground de-silting chambers
- Large underground power houses and surface power houses
- Pressure shafts, drop shafts and surge shafts / surge chambers
- Hydro-mechanical components such as gates, penstocks, etc., including erection of electro-mechanical equipment
- Specialised underground structures

Ports & Harbours

L&T's Ports business unit has built marine infrastructure that has given a great fillip to marine and waterway transportation. L&T has significantly contributed to the development of ports by designing and executing 7,000 m berthing structures including liquid jetties, container terminals, multipurpose berths and ferry terminals. The Company is proud to have built 14000 m breakwaters and handled armour rock of size 20T, Accropod – Max size 6.3 cum, the deepest breakwater (~18m) which is a state-of-the-art construction project which adopted the innovative concept of partial replacement of rock core with dredged sand. It has also executed other maritime structures like shipyards, caissons, long span approach trestles, and intake structures, which are unique in nature. We are looking towards the 'Sagar Mala Project' initiative which focuses on the upgradation and development of new ports as a promising prospect for future. Opportunities are expected for marine infrastructure projects involving dry-docks, marine intake structures and defence naval base projects as well.

The year marked the receipt of prestigious projects, such as two packages from MMRDA for construction of MTHL (Mumbai Trans Harbour Link), construction of a six-lane extra-dosed bridge across the river Hooghly, besides the existing Iswar Gupta Setu at Kalyani (West Bengal) and construction of a new dry dock at Cochin Shipyard.

During the year, major projects commissioned were: Kochi Metro, Lucknow Metro, Hyderabad Metro, Chennai Metro

EDRC

Key capabilities being developed are seamless integration of project stakeholders through common digital interface, context capture of project environment through photogrammetry and LIDAR techniques, augmented reality / virtual reality tools for better communication of project components and customer experience, 4D visualisation of planning and construction methodology, kinematic simulation of equipment and enabling structures.

Initiatives

Striving to achieve the goal of ZERO HARM, the business has launched the Corporate EHS Strategic Plan 2017-18 with key EHS deliverables that have been implemented across all its operations. As part of the EHS Strategy, the following significant initiatives were taken up during 2017-18:

- The business had engaged a professional agency to review and revamp cranes and lifting management safety standards, and conducted training sessions for all stakeholders to facilitate implementation in all projects.
- Key EHS training initiatives include IOSH Managing Safely certification courses for Project Heads, NEBOSH

One of the station buildings under construction for Doha Metro, Qatar



Medigadda Barrage Project



certification courses for Project EHS In-charges, 2-day Supervisor EHS Training for all site Supervisors (including JV & Subcontractor) and online EHS certification courses for technical employees.

- Total 853,700 man-hours of training on EHS were conducted.
- 23 EHS Awards were won by the business at different levels and categories from national and internationally renowned organizations including RoSPA, NSC India, BSC, and CII

The business aims for excellence in quality, to increase the satisfaction of customers and other stakeholders through effective cost-reduction and process improvements.

The business was successfully re-certified for the latest Quality Management System ISO 9001: 2015, with focus on risk-based thinking. Advanced concrete mix designs (M75 Self-compacting) are developed and being used for increased durability and for placing concrete in congested locations. The business established a concrete mix design using Ground Granular Blast Furnace Slag (GGBS), which is the latest development in the industry. Welding and heat treatment techniques were successfully developed for high-strength quenched and tempered steel for specialized projects.

Training is a necessary parameter for growth. The business has prioritized the training of its staff on the latest QMS. Training are provided in a focused manner for FLS and other trainees on concrete techniques.

The business continues its focus on digital initiatives including extensive use of BIM across the whole life cycle of projects. Other initiatives include vehicle tracking, project monitoring using mobile applications, P&M tracking, worker tracking, biometrics, tool tracking, material tracking, drones, geospatial surveys, etc.

Outlook

The Government sanctioned ₹ 5.97 lakh crore (USD 94 billion) as the budgetary allocation for Infrastructure in FY 2018-19, which is approximately 21% more than an estimated expenditure of ₹ 4.94 lakh crore in 2017-18. This increase reconfirms the Government's view that infrastructure development is the key to economic development. The Finance Minister has estimated that investment in excess of ₹ 50 lakh crore in infrastructure is needed to augment the economy and make it competitive with the other emerging economies. A majority of this allocation has been earmarked to build metros, bridges, hydro power projects and tunnels, which form the core expertise of the Heavy Civil Infrastructure business. With major projects coming up, including the high-speed rail between Mumbai and Ahmedabad, the Bharatmala and Sagarmala river-linking projects, hydel projects on the Indus and its tributaries, etc., the business is confident on achieving its revenue targets backed by a strong order book and promising prospects.

On the international front, the Middle East construction market is expected to pick up pace again this year, offering some promising prospects.

Break Water construction at Kudankulam Nuclear Project



Canopy erected for a station building at Riyadh Metro



Power Transmission & Distribution

Overview:

L&T's Power Transmission and Distribution business vertical is a leading EPC player in the field of power transmission and distribution and solar energy. It offers integrated solutions and end-to-end services ranging from design, manufacture, supply, installation and commissioning of transmission lines, substations, underground cable networks, distribution networks, power quality improvement projects, infrastructure electrification, solar PV plants, battery energy storage system and mini / micro grid projects. Besides being a dominant player in the Indian market, the business enjoys a significant share and a strong reputation in the Middle East, Africa and ASEAN markets.

L&T's substation business focuses on providing turnkey solutions for extra high voltage air insulated / gas insulated substations for utilities and power plants, EHV cable & communication backbone networks and complete electrical & instrumentation solutions for various infrastructure projects such as airports, metros etc.

L&T's Power Distribution business provides a gamut of EPC services related to urban / rural electrification, including last-mile connectivity, augmenting, reforming and strengthening of high voltage and low voltage distribution networks, distribution automation solutions and power quality improvement works.

L&T's Transmission Line business offers turnkey EPC solutions in overhead lines for power evacuation and transmission, bolstered by its state-of-the-art tower manufacturing units at Puducherry, Pithampur and Kancheepuram which have supplied over 15 lakh tonnes of tower components. The Testing and Research Station at Kancheepuram accredited by NABL is one of the largest in Asia and is also amongst the most renowned testing centres in the world. (NABL: National Accreditation Board for Testing and Calibration Laboratories).

L&T's Solar business provides single-point EPC turnkey solution for solar PV-related projects along with energy storage solutions. Its experience ranges from flat to highly undulated as well as to landfill topologies with specialized technologies including designing and executing contour-following solar PV power plants. The solar business has in-house capabilities of different module mounting structure types such as fixed tilt, seasonal tilt and HSAT to choose from for most optimal solutions. As grid stability and power conditioning requirements gain significance in the wake of large-scale renewable integration, standalone and PV integrated storage solutions are being offered.

The international units of the business in the Middle East, Africa and ASEAN regions offer complete solutions in the field of power transmission and distribution, including substations, power transmission lines, extra high voltage cabling, solar plants and Electrical, Instrumentation and Control (EI&C) works

100 MVAR STATCOM at 400 kV NP Kunta Substation, Andhra Pradesh



500 kV Tha Li-Khon Kaen 4 Transmission Line, Thailand



for infrastructure projects such as airports, oil & gas industries, etc.

The Middle East Business Unit caters to the UAE, Saudi Arabia, Qatar, Oman, Kuwait and Bahrain. The Africa unit is currently focused on the Northern and Eastern parts, and has established a presence in Algeria, Kenya, Ethiopia, Malawi, Botswana, Morocco and Egypt. The business is executing projects in the ASEAN countries of Malaysia and Thailand while seriously pursuing other opportunities in the region.

Business Environment

Thanks to a slew of Government schemes including 'Saubhagya', the distribution sector in India remained vibrant in 2017–18. Having achieved electrification of all the villages, now the focus is on electrifying all the households. Also, the urban distribution revamp programs continue aiming at multiple objectives such as improving reliability of power, making the network disaster-resilient and improving the aesthetics of cities of tourism and heritage importance. The business maintained its leadership position as a large EPC player in this segment, with key orders from the states of Uttar Pradesh, West Bengal, Jharkhand, Tamil Nadu, Karnataka and Andhra Pradesh.

The business is privileged to partner the Central and State Governments in illuminating thousands of households in economically backward areas and electrify hundreds of villages. In a large number of towns, it has significantly improved the quality of power and reduced AT&C (Aggregate Technical & Commercial) losses through distribution reformation projects.

With renewable power characterized by intermittency being added increasingly to the grid, advanced solutions to ensure voltage stability have been necessitated. L&T commissioned India's first STATCOM project of $\pm 100\text{MVAR}$ capacity at NP Kunta substation in Andhra Pradesh. A major order was received from Power Grid Corporation of India Limited (PGCIL) for implementation of STATCOM in three locations in South India. Substation-related opportunities in 400kV & 765kV GIS / AIS segments were steady as Central and select State utilities concentrated on power system strengthening schemes to meet their demands. Though there were positive signs on the policy front, the general lack of investments in conventional power generation and industry segments continues. Gas and air-insulated substation orders were received from PGCIL and State utilities including two major 400kV GIS substation orders from South Indian transmission utilities. Several key substation projects were commissioned including 765kV gas insulated substations at Hyderabad, Nizamabad, Varanasi and Aligarh.

Though the centrally driven transmission schemes were less than the prevailing levels, the intrastate system strengthening projects by States such as Jharkhand, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu and Uttarakhand continued to provide ample opportunities for transmission line construction. On the back of proven execution skills to complete projects within schedule, a repeat order from a reputed private developer was entrusted to the business. The Testing Station continues to attract orders from its customers worldwide – USA, KSA, China, Indonesia and Malaysia – to test some of the highest and tallest transmission towers in the world.

500kV HVDC Transmission Line at Kenya



The Transmission Line business has commissioned about 20 transmission corridors of 2800 km length in FY17-18. The 400kV Raipur–Jagdalpur project is the longest twin line in a single package with a length of 328 km. Key projects such as 765kV Lalitpur–Agra Transmission Line (328 km) and the 400kV Madhugiri–Gooty TL were commissioned for Power Grid. The 220kV Kishenganga–Amragarh TL has been successfully completed in Jammu & Kashmir, overcoming the tough challenges posed by the weather, terrain and local conditions. Other major projects commissioned include 400kV Banda–Allahabad TL in Uttar Pradesh and 400kV Salem–Rasipalayam TL in Tamil Nadu.

With the country achieving a milestone 1 lakh GWhr of renewable energy generation in FY 2017–18, L&T's Solar Business has seen remarkable growth. The business secured a cumulative 650 MWp+ capacity of grid- connected solar PV plants across India, including the prestigious order for 325 MWp in Rewa, Madhya Pradesh, which is also the single largest EPC contract in India to date; 140 MWp in Bhadla, Rajasthan and 187 MWp in Tamil Nadu. The business also won the prestigious Bihar State Rural Electrification project, the first-of-its-kind distributed generation project with a cumulative capacity of 12 MW solar and 105 MWh of energy storage, which aims to electrify 236 remote villages.

In the Middle East, though the macro economic scenario was mixed in 2017-18 as well, witnessing capex cuts and intensifying competition, the business could garner opportunities arising out of Expo 2020 related development in the UAE and stable T&D investment plans by KSA, Qatar and Oman. In the UAE, the business secured orders for constructing a number of 132kV gas insulated substations

from Dubai Electricity & Water Authority and reputed private developers. Despite spend cuts induced by the drop in oil prices experienced earlier, causing a sense of anxiety in the business climate, L&T secured its longest transmission line in KSA (from Qassim to Madina – 421 km). Despite the imposition of trade embargo, the business secured a major order from a private developer in Qatar. L&T commissioned 33 substations in the Middle East in FY 2017-18. Having qualified for the highest voltage levels in its lines of business, new private customers have also been added.

In Africa, the business has made an entry into the Moroccan and Egyptian markets. The foothold gained in Algeria, Malawi and Kenya has grown stronger on the back of fresh orders.

With the completion of the substation projects on schedule in Malaysia, the business has demonstrated its capabilities and has won recognition in the ASEAN market. Major 500kV substation and transmission line orders have been secured in Thailand.

Significant Initiatives:

With a major thrust on digitalization as a key enabler, the business rolled out several initiatives, including 3D/4D BIM, deployment of drones and mobility devices for project monitoring, connecting plant and machinery for asset monitoring, using geospatial technologies for surveys, etc. Workmen-related processes are being linked through unique identification. Several operational excellence initiatives in the areas of on-time delivery, profitability enhancement, effectiveness, checks of process implementation, working capital management and risk management are being pursued.

220 kV Gas Insulated Substation at Mehairja, Qatar



756 kV Gas Insulated Substation at Varanasi



Initiatives undertaken to enhance safety in operations include e-learning modules, improvised safety cards for reporting unsafe acts/conditions, virtual reality-based training, upgrading Safe Operating Procedures (SOPs) to reflect changing work methods and mechanization, adoption of the Sagging Bridge (Stringing Working Platform) technique and the use of motorized winch machines in place of tractors, in final sag activities and enhanced training on behaviour-based safety, safety audit and training the trainers. An innovative programme has been developed to groom fresh diploma engineers to take up roles as EHS professionals.

Training programmes have been developed in collaboration with prestigious institutions to enhance operational excellence.

Many initiatives earned awards and recognition for the business during the year. These include:

- ISGF Innovation Award, Solar and Storage Project of the Year award from Solar Quarter for Bihar Microgrid project
- Prashasti Patr (Commendation Certificate) from the Bihar Government for meeting electrification targets
- MEED 'Power Project of the Year' award for the Oman project
- EIA Compliance Award for Lambir substation project from Sarawak Energy Berhad
- ASSE GCC HSE Excellence awards for several projects in Middle East

- RoSPA, British Safety Council and National Safety Council awards for safety performance for multiple projects
- Special appreciation was received from the Federation of Indian Chambers of Commerce and Industry (FICCI) for RAPDRP Ghaziabad Project for best practices in Safety

Outlook:

On the power distribution front, several projects remain significant: the centrally-driven scheme for last-mile connectivity, viz. Sahaj Bijli Har Ghar Yojana (Saubhagya), and various distribution reforms by State DISCOMs for reduction of AT&C losses, power factor improvement, network strengthening in disaster prone areas etc. Urban power infrastructure is expected to get a makeover, with underground cable networks, advanced metering facilities etc. considering the thrust on development of smart cities and heritage cities.

The increasing cost of land acquisition related delays have led power grid / State utilities to increasingly opt for GIS substations due to the small footprint they occupy. As the power transmission / transformation capacities to cater to the growing demand of urban centres increase, new opportunities will arise for EHV (Extra High Voltage) cabling projects in large cities keeping in view of the right-of-way, aesthetics and Operation & Maintenance aspects. The much-needed impetus is expected to be provided by power quality improvement projects such as STATCOM, new clientele from TBCB (Tariff Based Competitive Bidding) players, state utilities strengthening their networks with funding from multilateral funding agencies, and infrastructure projects like metros and airports etc. The financial health of state utilities, the political situation in

Microgrid Project for Rural Electrification in Bihar



Restructured Accelerated Power Development & Reforms Programme, Varanasi



several states and the availability of funding will remain key determinants.

Apart from the domestic market, the business is foreseeing the pipeline of opportunities from SAARC countries like Bangladesh, Nepal etc., which are funded by international funding agencies such as JICA, ADB, IsDB, etc.

System strengthening in state utilities will provide a major impetus to transmission line prospects. Several interstate and intrastate transmission lines are expected to go through the Tariff Based Competitive Bidding route. In certain states, capacity enhancement using the already-existing corridor may provide opportunities as it eliminates the need for fresh acquisition of right-of-way, thereby reducing costs and saving time. The next phase of green energy corridors is on the anvil. Substantial activity with many prospects is evident in the SAARC countries viz. Bangladesh and Nepal, as they are coming up with several high-value prospects.

The solar power market is poised to remain upbeat, with yearly solar capacity additions pursuing an upward trajectory. The Private Power Purchase Agreement (PPA) market in select states will pick up based on encouraging open access policies and growing solar power viability. Clarity emerging on GST and duties will help the sector immensely. Advanced Battery Energy Storage Solutions will see a rise due to grid stability requirements and for electrifying rural households.

With upcoming state solar policies focusing on rooftop projects with net metering schemes, the prospects for the

rooftop segment looks positive. To harness solar power for rural India, the Government of India has formulated Kisan Urja Suraksha evam Utthaan Mahabhiyan (KUSUM) scheme, which aims at solarizing the agriculture sector with ubiquitous use of solar power for tube wells and lift irrigation projects. Emergent areas like floatovoltaics hold promise.

In the Middle East, the business is cautiously optimistic in its outlook. The stable recovery of the oil price is expected to boost investments in the T&D sector. Infrastructure development will continue to be driven by mega events like Dubai EXPO 2020, FIFA 2022 and grand plans such as Saudi Vision 2030, Qatar National Vision 2030. Further GCC grid formation, upgradation to higher voltage levels, integration of renewable energy sources to the existing power grid and interconnections of transmission networks are expected to fuel growth in power distribution throughout the Middle East. The revival of the transmission & distribution scene in Abu Dhabi is a positive sign. In KSA, SEC (Saudi Electricity Company) continues to invest in power infrastructure projects. In addition, investment in the renewable sector by a leading investor and plans for developing a transnational city augur well for the KSA market. Power system capacity expansion to cater to infrastructure growth is proceeding as per plans in Qatar and Oman. Riding on a strong execution track record in Kuwait, the business is in an advantageous position to exploit opportunities from key customers in Kuwait.

Input costs are bound to increase with the introduction of VAT and removal of subsidies on fuel, power and water. However, these will have a similar impact on all the players.

275 kV Air Insulated Substation at Lambir, Malaysia



Prioritization of spending / budgetary allocation, friction between Qatar and other Gulf countries, the slowdown in Oman, and related delays in project finalization are potential risks.

The business is concentrating on key African economies that have a clear road map to build transmission and distribution networks to meet increasing demand. Grid strengthening, regional interconnection and rural electrification opportunities are being pursued in select countries. Renewable generation is another area that holds potential. Having established a creditable track record and subcontractor/ vendor ecosystem, the business is expected to significantly scale up under the right conditions.

The rising power demand in ASEAN region paves the way for significant investments in grid interconnections, grid development and strengthening. In addition, an interconnected ASEAN power grid is beneficial in many ways such as generation – demand balancing and renewable integration. With increasing share in Thailand and Malaysia, the business expects to exploit potential in Myanmar and other countries in the region.

The overall outlook for the PT&D sector remains promising on both the domestic and the international fronts. The business looks forward to consolidating its position in established markets and gain significantly in new growth areas, ably supported by its initiatives on cost leadership and delivery excellence.

Water & Effluent Treatment

Overview:

1.1 billion people worldwide lack access to water and 2.4 billion people are challenged by inadequate sanitation. Many of the water systems that keep ecosystems thriving and feed the growing human population have become stressed. Rivers, lakes and aquifers are drying up or becoming too polluted to use. More than half the world's wetlands have disappeared. Climate change is altering patterns of weather and water around the world, causing shortages and droughts in some areas and floods in others. At the current consumption rate, it is pegged that two-thirds of the world's population may face water shortages by 2025.

To cater to these various needs, L&T Construction's Water & Effluent Treatment business segment has enhanced its process knowhow and detailed engineering capabilities across all streams of Water and Wastewater business in India, Sri Lanka, the Middle East and Africa. Its formidable in-house engineering capabilities, coupled with impeccable project management skills, has put this segment much ahead of the competition.

114 MLD Water Treatment Plant at Ranchi, Jharkhand



Business Environment

The human population has successfully harnessed many of the world's natural waterways – building dams, water wells, vast irrigation systems and other structures that have allowed civilizations to grow and thrive.

Piped water systems have been set up by the Government in most cities. But a large percent of semi-urban areas are not covered by these, and rely on ground water. Piped sewerage systems feeding into large treatment plants exist only in bigger cities and metros. Most cities have septic tanks or local waste management. Hence there are opportunities in this area for providing water infrastructure facilities.

The mega Government policies to drive water infrastructure in India that include AMRUT (Atal Mission for Rejuvenation and Urban Transformation), Namami Gange, Pradhan Mantri Krishi Sinchayee Yojana and Delhi Mumbai Industrial Corridor Development. Stringent implementation of pollution norms is in place to encourage setting up of common effluent treatment plants. In addition, large investments have been proposed by multi-lateral funding agencies for water supply and sewer projects to improve the quality of urban life.

Desalination, water management, mega lift irrigation, mega treatment plants and smart cities have started fructifying in a large scale.

All these leave L&T's Water & Effluent Treatment business with huge untapped potential.

So far, the business has created water infrastructure to cater to the requirements of 30 million people. It has

laid more than 3.5 lakh km of pipelines, designed and constructed more than 5300 Million Litres per Day (MLD) of water and wastewater treatment plants and brought more than 2 lakh hectares of land under irrigation.

The Water & Effluent Treatment Business has commissioned over 25 projects in FY 2017-18, including the following key projects:

- a) Gadag Water Supply Scheme, Karnataka
- b) Bisalpur Jaipur Water Supply Project, Rajasthan
- c) Nagaur TM 01,02,03 Water Supply Packages, Rajasthan
- d) Water Supply to Adilabad and Khammam Districts, Telangana
- e) Rampur Sewerage Scheme, Uttar Pradesh
- f) Sewerage Network and WW Treatment at Gayespur, West Bengal
- g) Dahej Water Supply Intake 50 MGD, Gujarat
- h) Sauni Link 4 Package 3, Gujarat
- i) CETP at Narol, Gujarat
- j) Infrastructure Development at NRDA, Raipur
- k) D2A - Unaccounted for Water Project at Bengaluru

This year, the business has augmented its client-base by adding 6 new clients, securing 3 mega contracts over ₹ 1000 crore in value and won orders in various business

375 MLD Sewage Treatment Plant at Jebel Ali, UAE



Medak & Sangareddy Water Supply Project, Telangana



domains like water management, drinking water supply, municipal waste water collection & treatment, integrated urban infrastructure, common effluent treatment plants and lift irrigation schemes. These include:

- a) Providing 24x7 water supply to Pune from Pune Municipal Corporation
- b) Laying of sewer lines in an extended area of Bengaluru City from Bangalore Water Supply and Sewerage Board
- c) Kundaliya Lift Irrigation Scheme from Water Resources Department, Government of Madhya Pradesh
- d) Surya Water Supply Scheme from Mumbai Metropolitan Region Development Authority
- e) Sauni Yojana Link 2 Package 6, Gujarat
- f) Mallana Sagar Reservoir Reach 2, Government of Andhra Pradesh
- g) Development of Integrated Infrastructure at Amaravati from Capital Region Development Authority, Andhra Pradesh
- h) Seoni Water Supply Scheme from Madhya Pradesh Jal Nigam Limited
- i) Cuttack Water Supply Scheme for supplying potable water to Cuttack District
- j) India's First Brownfield Smart Infrastructure Project at Udaipur, Rajasthan from Udaipur Smart City Limited

Keeping in mind oil price volatility and other uncertainties, the business has cautiously evaluated projects on the international front this year. The business is all set to win major orders in the years ahead.

Significant Initiatives

The year witnessed significant initiatives being taken to ensure that the Water and Effluent Treatment business of L&T continues to be ahead of the competition, both in terms of market share and profitability. These initiatives include:

- Diversification into different lines of businesses
- Setting up spiral mills close to project sites for rolling HR coils into pipes
- The RACE initiative, realizing considerable savings
- Launching the Project Managers Development Program (PMDP) to get the next generation of Project Managers ready
- A dedicated O&M team to remotely monitor all the sites through a Remote Monitoring system (RMS). This enables getting expert guidance, troubleshooting support, etc.
- Introducing 'O&M-Cognizance', a daily E-learning programme that keeps the O&M team updated with current O&M practices

Awards & Recognitions

- Guinness World Record for the 'Largest Sustainability Lesson' conducted in a college as part of World Water Day Celebrations 2018

227 MLD Water Treatment Plant at Garden Reach, Kolkata, West Bengal



Floating Barge Intake at Sahibganj, Jharkhand



- Best of India Records for the 'World's Largest Water Conservation Campaign in schools on a single day'
- 'Most Admired Company of the Year – Water Sector' award from World Federation of Marketing
- 'People Initiative of the Year' awarded by ET Now for PMDP
- 5 awards from Water Digest including 'Best Urban Water Solutions Provider' and 'Best Rural Water Solutions Provider'.

The business has been driving digitalization over the past two years to improve efficiency and productivity. Initiatives implemented include:

- Digital Site Walk Through: A combination of hardware (SmartGlass) and software solutions used to observe the project progress, safety, quality, workmens' welfare and administration from any remote location.
- HR Dashboard: Provides a more advanced way to assess metrics and Key Performance Indicators, allowing organizations to present information in a more interactive and user- focused manner.
- Customer Relationship Management (CRM): A tool which enables effective management of the business, from the early stage of prospects to award of contract – and can be extended till O&M. The CRM platform supports the tendering process. Once the prospect is converted to NIT (Notice Inviting Tender), the Contracts team will use the module to work with various departments and for preparation of the bid. The tender opening will also be captured in the system for further data analysis.

Outlook

The Government has already set in motion an integrated Ganga conservation plan – 'Namami Gange' – which envisages investments for sewage infrastructure across several urban habitations along the river. The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been formulated with the vision of extending the coverage of irrigation 'Har Khet ko pani' and improving water use efficiency 'More crop per drop' in a focused manner with end-to-end solutions on source creation, distribution, management, field application and extension activities. The Delhi-Mumbai Industrial Corridor (DMIC) is India's most ambitious infrastructure programme, aiming to develop new industrial cities as 'Smart Cities' and converging next-generation technologies across infrastructure sectors. The programme envisages development of infrastructure linkages like power plants, assured water supply, high capacity transportation and logistics facilities.

Hence, the projects pipeline related to drinking water, waste water and irrigation are expected to remain strong in India due to growing demand and Government thrust. Sector-specific focus is expected to shift towards rural drinking water, ETPs/STPs and irrigation projects. Major outlay based on the current status and priorities: Water projects expected in Gujarat, Karnataka, Uttar Pradesh, Bihar, Tamil Nadu, Rajasthan; Irrigation projects are expected in Tamil Nadu, Telangana & STPs expected in Uttar Pradesh and Bihar.

There is a push towards the PPP mode (HAM – Hybrid Annuity Mode) for STPs (Sewage Treatment Plant) causing big Infra developers to enter the water sector. There is the probability of this getting extended to WTPs (Water Treatment Plant) / ETPs (Effluent Treatment Plant).

Sewage Treatment Plant at Al Shamal, Qatar



Sauni Yojana Lift Irrigation Project, Gujarat



At present, the competitive landscape is such that L&T along with few selected players are only competing pan-India, while the smaller players are focusing on their home ground. Competitors tend to form JVs with regionally strong players and technology licensors for PQ and project execution.

In the international market, opportunities have been identified for water treatment, sewage treatment and desalination plants in Middle East. The business has already made its mark in Tanzania and Sri Lanka and more orders are expected from these geographies. Tireless efforts are in place to expand into other parts of Africa and Bangladesh.

Smart World & Communication Business

Overview:

L&T entered the Smart World & Communication business two years ago, specifically to address the need for a safe, smart and digital India. It has executed several projects under these segments, many in an advanced stage of implementation. The business is positioned well for accelerated growth for the year 2019.

The business has three segments – the first for Safe Cities; the second, Smart Infrastructure; the third, Telecom and Communication Infrastructure.

The Government of India continues its investments to leverage smart and digital technologies for cities and rural parts of India, focusing on a safe, smart and connected India.

In this domain, L&T is at the forefront, collaborating with the Government in leveraging technologies to meet those goals. L&T is perfectly positioned to build India's next-gen safe, smart and digital infrastructure. As a Master System Integrator, L&T has proven expertise in focused strategy, robust processes and comprehensive end-to-end solutions to cater to India's smart and digital requirements.

With its unique positioning and technology-driven portfolio, the business has been able to attract talent from across industries, comprising a diverse pool of resources spanning technology, software, hardware and domain specialists from relevant industry verticals.

Smart Cities

L&T has established itself as the leader in the smart city domain. Starting with the Jaipur Smart City Project – India's first 'smart city' – the business is currently executing five major 'smart city' projects that, inter alia, include Nagpur, Pune, Vizag, Raipur, and is positioned well in a few others.

L&T is executing India's First Integrated Smart City project for Nagpur City in Maharashtra, including the creation of a 'smart' strip of approximately 6 km with state-of-the-art systems powered by smart ICT interventions like smart transport, solid waste management, smart traffic, smart lighting, smart parking and environmental monitoring systems.

For the city of Pune, in partnership with Google, the segment successfully launched wi-fi services. Other smart elements under implementation are emergency call boxes and public address systems, environmental sensors, variable messaging displays, network connectivity, video analytics

L&T offers a bouquet of Smart City solutions



integration and state-of-the-art Smart City Operation Centre (SCOC).

In the city of Visakhapatnam, apart from the above-mentioned smart elements, L&T's project includes implementation of other smart elements such as solid waste management system, a first-of-its-kind smart pole, smart lighting and Enterprise Resource Planning. In February 2018, the Hon. Chief Minister of Andhra Pradesh inaugurated the Command Control Centre of the Vizag Smart City Project.

The business also commissioned wi-fi and a data centre for Chennai city.

In FY 2017-18, the segment secured the following orders:

- a. Raipur Smart City Limited for Implementation of intelligent traffic management system, city surveillance system and integrated command control centre in Raipur city.
- b. The first and highly prestigious order for implementation of smart meters in about 17 districts in Uttar Pradesh (for six DISCOMS) and Haryana (two DISCOMS). This is India's largest smart meter roll-out – implementation of 5 million smart meters across these two States. This is the first large-scale project involving deployment of all the applications on the Cloud, including head end system and meter data management system.
- c. Tamil Nadu Data Centre Project for Tamil Nadu State Govt. and Bhubaneswar Data Centre Project for National Informatics Centre, marking L&T's foray into the business of stand-alone data centre projects.

Communication & Telecom Infra

L&T provides end-to-end solutions for a range of requirements covering fibre- optic backbone, microwave and satellite communication, network and telecom infrastructure, wi-fi systems, early warning dissemination systems, emergency response systems, metro communication, etc.

Playing a key role, L&T supported Bharat Broadband Nigam Limited (BBNL) in the Bharat Net programme by deploying the Gigabyte Passive Optical Network (GPON) technology across eleven States in India, and also Network Operating Centres (NOCs) in Bengaluru and New Delhi. This has received much appreciation from the Department of Telecom, Ministry of Communication.

L&T also successfully created 1,900 wi-fi hot spots and 10,500 access points across 10 states in Phase 1 covering both urban and rural areas, as well as another 1,900 wi-fi hot spots and 1900 access points across 10 states in Phase 2 in rural areas.

L&T also commissioned a dedicated network for the Indian Air Force, connecting a number of Air Force stations pan-India.

As part of another Digital India initiative, L&T commissioned wi-fi access to around 300 colleges in a University in the State of Bihar on behalf of BELTRON.

L&T has commissioned the first phase of the Cyclone Early Warning Dissemination System (EWDS) – the first of its kind in India – for the State of Odisha. For Andhra Pradesh, the EWDS is at an advanced stage of completion.

L&T is executing the comprehensive metro communications package for the Lucknow Metro and a TETRA communications package for the Delhi Metro.

Command & Control Centre, Mumbai



In FY 2017-18, it won orders for similar packages for the Nagpur Metro in Maharashtra and the MEGA Metro for the city of Ahmedabad, Gujarat.

In alignment with the Government's state-wide area network initiative to provide digital connectivity between the State/UT Headquarters and the Block level via District / sub-Divisional Headquarters, L&T has won an order from the State of Jharkhand to cover 24 Districts across the State.

L&T has won a contract from Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPL) to create a 'Smart Connected Grid, Smart Transmission Network and Asset Management System' across the State of Rajasthan, covering about 624 power utility sub-stations.

Security Solutions Business

Video-based surveillance has emerged as a fundamental tool to support law enforcement agencies to accelerate the pace of detecting and preventing crime and improving emergency response systems for people in distress.

The core strength of the business lies in offering a holistic spectrum of sustainable and scalable security system solutions for pan-city and pan-state surveillance, homeland security systems, intelligent traffic management systems, critical infrastructure across ports, airports, metros, IT parks and public buildings, etc.

Starting in a small way with the Sabarmati Jail Surveillance Project and the development of surveillance and intelligent traffic management systems (in Ahmedabad, Gandhinagar and Vadodara) for the Government of Gujarat, L&T has commissioned the largest surveillance project of its kind for Mumbai.

On 5th September 2017, the Chief Minister of Maharashtra declared India's largest city surveillance project 'go-live'. This is the 'Mumbai City Surveillance Project', comprising ~5,000 cameras at over 1500 junctions in city. As part of this project, L&T has delivered state-of-the-art command control centres for the city, which is being utilized by the City's Administration and Police, not only for surveillance activities but also for overseeing natural emergencies and the strife-like situations that the city goes through from time to time.

The business is currently executing the largest city surveillance (over 10,000 cameras) and traffic management network for the cities of Hyderabad and Cyberabad.

In Rajasthan, three city Command Control Centres at Bharatpur, Jodhpur and Bikaner and the Dial 100 Emergency Response System were also successfully commissioned in FY 2017-18.

Awards

The business has received various awards, particularly for Smart City initiatives and Surveillance Projects. Awards received during the year include:

Award Category	Project
Smart Urban Traffic Management Initiative	Hyderabad Intelligent Traffic Management System
Best Smart Cities Initiative	Nagpur Smart Cities
Smart Surveillance Initiative	Mumbai City Surveillance
Best Innovation Initiative	Nagpur Smart City
Best Project in Building Smart Cities	Pune Smart City
Tourist Attraction City	Jaipur Smart City

Intelligent Parking Management System



Award Category	Project
Adaptation & Resilience	Odisha EWDS
Smart Solution of the Year	Nagpur Smart Strip

Outlook

FY 2018-19 looks promising for the business, given the boost the Government has given to safe and smart cities and other digital initiatives.

The Union budget for FY 2018-19 has allocated over ₹ 25000 crore – an increase of 22% over last year's allocation – towards various initiatives in the areas of smart, digital, etc. This augurs very well for the interest pursued by the business.

Several Tier-II cities are expected to roll out surveillance projects. Additionally, the transportation sector is also moving towards surveillance and traffic management systems. A few of the RFPs are in an advanced stage of preparation, such as railway surveillance and highway traffic management system.

Under the Central Government's Smart City Mission for developing 109 smart cities across India, the cities have already been shortlisted and several are at advanced stages of RFPs and have received Central Govt. funding. These cities will be coming up with RFPs shortly, and the balance cities are likely to follow in FY 2018-19. Equipped with diversified smart offerings, L&T is well-placed to address these opportunities.

In addition to the above, special focus is laid on the modernization of defence and homeland security. In the defence sector, perimeter surveillance systems to the Navy and Air Force are also shaping up.

The Bharat Net programme is one the world's largest network infrastructure projects. It aims to digitally connect 250,000 villages (gram panchayats) across the country and unite India digitally. The second phase of the Bharat Net program has been floated and aims to deploy network infrastructure to the 140,000 gram panchayats on a fast-track basis.

The objective of the Bharat Net programme is to facilitate the delivery of e-governance, e-health, e-education, e-banking, Internet and other services to the rural India, thereby enhancing the quality of rural life.

Along with rural digital initiatives, the Government is also focussing on increasing the number of wi-fi hotspots across the country. BSNL is planning to ensure that there are half a million more hotspots by the end of December 2018. The aim is to digitally touch India's 1.25 billion population.

One of several initiatives of the Government in the energy sector is the drive for replacement of old analog meters with new, tamper-proof, digital smart meters for domestic consumers.

The metro initiative is gaining further impetus, with the addition of metros for cities of Mumbai, Bengaluru, Hyderabad, Nagpur, Ahmedabad, Chennai, Jaipur, and Kochi in the next few years. In addition, there are proposals for Mass Rapid Transport Systems for Pune, Chandigarh, Ahmedabad, Kanpur, Ludhiana, Bhopal, Indore and Faridabad.

Both technically and financially, the Government has been supporting the set-up and upgrade of State Wide Area Networks (SWAN). The business expects opportunities in State Wide Surveillance.

Information Kiosk at Jaipur - a Smart City solution

