

INFRASTRUCTURE BUSINESS



Al Wakrah Bypass Road Project, Qatar

Sector Performance in FY 2019-2020

The Infrastructure sector is a key driver for the Indian economy, and contributes to India's overall development. The sector, accordingly, receives focused attention and resource allocation from both Central and State Governments.

FY 2019-20 was a challenging year both for the Indian economy, which performed below its true potential, as well as the construction sector, which recorded a six-year low growth of 1.3%.

Cement production saw a marginal decrease of 0.8% in FY 2019-20 as compared to 13.3% increase in FY 2018-19. India's crude steel production was down by 1.5 percent and finished steel production was flat at 109.2 MT in FY 2019-20 against 110.9 MT in FY 2018-19.

Despite the challenges, the Government's thrust areas continued to provide a business opportunity basket for the Company, which was in the pole position to capitalize on the business prospects that came to fruition during the year. The continuing weakness in the Realty sector was countered with a Government focused boost to the affordable mass housing and health segments. With the Government's focus on improving air-connectivity, opportunities in the airport segment continue to arise at periodic intervals.

The construction of highways slowed to 28 km a day during FY 2019-20, from 29.7 km a day achieved in FY 2018-19. The Ministry of Road Transport & Highways is hopeful of increasing it to 32 km a day in FY 2020-21.

Competition in this sector has increased with a higher frequency of smaller-sized bids attracting interest from smaller players. This sector is also beset with challenging payment terms in Government tenders coupled with slow progress in land acquisition.

With a discernable thrust on renewable energy, the award of some contracts in this area has been gaining momentum, which has offset the tapering of prospects on centrally sponsored intensive electrification projects under the 'Saubhagya' initiatives. As on March 31, 2020, over 26 million households have been provided with electricity connections under the Scheme.

As the implementation of Mass Rapid Transit System (MRTS) at various metros progressed well, the Government's focus has turned to Tier II cities, and opportunities are being sighted there.

The Government's emphasis on augmenting local water resources launched under the Jal Jeevan Mission is also giving rise to good prospects.

Under the National Infrastructure Pipeline (NIP), roads, urban and housing, railways, power (renewable and



Hyderabad International Airport, Telangana

conventional) and irrigation comprise ~80% of the total plan. This investment and initiative from the Government will create a good opportunity for the infrastructure sector in the coming years.

Public sector spending on the Infrastructure sector, as a whole, continues to witness focused attention through a combination of Central, State Government and PSU capex. The combined Budgetary Capex spends (including PSU Capex) amount to over ₹ 16 lakh crore for FY 2020-21, which translates to over 7% of expected nominal GDP. The COVID-19 crisis is likely to adversely affect revenue collections and GDP growth in FY 2020-21, which in turn could lead to contraction of spends on Infrastructure. The Central and State Governments are attempting to mitigate the impact of lower tax collections through significantly higher market borrowings than originally budgeted for the year FY 2020-21, and the increase could be in the region of ₹ 9 lakh crore. Multi-lateral funding of projects, which has increased in recent years, is providing additional resources for building infrastructure within the country.

On the international front, amid geo-political upheavals, the Middle East countries have been investing in non-oil capex as well, which has offered some business opportunities to the Company, especially in Saudi Arabia and the UAE. Geographical diversification has been yielding

results in the last few years, and the segment saw some big-value successes in countries other than the Middle East region.

The Infrastructure business, which faces normal execution challenges in terms of 'Right of Way' and delayed client clearances, encountered some unprecedented issues in FY 2019-20. Change in some State Governments, led to reassessment of awarded contracts, while some environmental-related work stoppages adversely affected work progress in some projects. The impact of these challenges was accentuated with the onset of the pandemic in the last fortnight of the financial year, which slowed down the economy, with the lockdown being implemented by various Governments. The pandemic has affected execution in the last quarter of the year, which otherwise is the busiest quarter for the segment in terms of progress and collections. This has had an impact on both revenues and profits, since the sites had to be shut temporarily.

With the changing environment, the project sites are also required to adapt to a new set of norms for continuation of work, which will hamper progress for some time. The impact of the pandemic is expected to continue into the next financial year, and may taper off as normalcy gradually returns.



Motera Cricket Stadium, Gujarat



Ford Global Technology & Business Centre

BUILDINGS AND FACTORIES

Overview:

L&T's Buildings & Factories (B&F) business is the leader in Engineering, Procurement and Construction (EPC) of airports, hospitals, stadiums, retail spaces, educational institutions, IT parks, office buildings, datacentres, residential buildings, high-rise structures, mass housing complexes, cement plants, industrial warehouses, and other factory structures in India and overseas. The business is well-known for its capabilities in constructing engineering marvels and landmark structures.

The business comprises six business units (BUs) – Airports, Health, Public Spaces, IT & Office Space (ITOS), Residential Buildings and Factories.

Airports: B&F offers design-and-build solutions for passenger terminal buildings and allied service buildings, and cargo terminal buildings, with integrated airport system solutions like baggage-handling systems, passenger-flow monitoring system, passenger boarding bridges, visual docking guidance systems and other facilities.

Health: This business unit handles hospitals, medical and nursing colleges. Healthcare

infrastructure is delivered with end-to-end healthcare facilities, including medical equipment, right from concept to commissioning.

Public Spaces: Design and execution of special structures like tall statues, metro stations, convention centres, secretariat buildings, hotels, malls, integrated development and educational institutions are handled by this business unit.

IT & Office Spaces: This business unit focuses on providing turnkey solutions for IT and office spaces. Leveraging the strong mechanical, electrical and plumbing (MEP) competencies of B&F, it also offers concept-to-commissioning services for building Data Centres.

Residential Buildings: This business unit is a prime EPC solutions provider of elite, affordable and mass housing projects.

Factories: This business unit is a one-stop solution for the EPC requirements of factories like cement plants, automobile plants, glass manufacturing and food processing plants.

In line with L&T's Perspective Plan 2026, the business is venturing into a new segment – B&F Fast – to explore and create value from advanced construction technologies such as Prefabricated



Academic Block for West Bengal Medical College



Asian Paints Factory, Mysuru

Prefinished Volumetric Construction, Offsite Manufacturing, Structural Steel Construction and 3D printing.

A state-of-the-art design facility, competency cells, advanced formwork systems, highly mechanized project execution, digitalized project control and a talented pool of employees helps sustain the leadership position of the business, retain key customers and secure major orders. An efficient supply chain and extraordinary project management expertise, acquired over decades, adds to the competitive edge.

Business Environment

The Indian economy started the year FY20 on a high note with higher GDP growth projections of up to 8% year on year. Government of India's intention to drive more investments into developing infrastructure and thereby improving the growth, was evident in the Union Budget 2020. The tax sops for sovereign wealth funds investing in infrastructure sector, proposal of an Investment Clearance Cell, viability gap funding for projects in healthcare and logistics were some of the initiatives proposed. The allocation of funds towards the National Infrastructure Pipeline, announced earlier by the Finance Minister, has also offered promise to the Infrastructure industry, specifically

the health care segment, in which B&F has a proven expertise of handling design, turnkey execution including the supply and commissioning of medical equipment.

The data localization policy has also paved the way for more Datacenters in India, a segment in which B&F has concept to commissioning capabilities.

The real estate industry was the focal point of the Indian economy in FY 2019-20, but not for the ideal reasons. The Government of India had announced substantial relief packages to support the real estate industry by improving liquidity and enabling developers to come out of stuck realty projects. However, sizeable orders emerged from the affordable and mass housing industry and major developers from elite housing business were making a move to capture the market in this segment.

Assembly elections and the political instability that followed had created problems viz. delayed tender results and lack of clarity in governmental policies and decisions in this fiscal.

Additionally, the spread of the COVID-19 pandemic towards the end of the financial year and the consequential lockdown has posed severe concerns for the economy. Construction activities across the country have been impacted due to the lockdown.



Godrej The Trees, Mumbai



Government Medical College Hospital, Madhepura

Major Orders secured

- CIDCO Housing Project at Navi Mumbai
- One of the largest greenfield airports in India at Navi Mumbai
- Mandarin Oriental Hotel, Muscat in Oman

Key projects completed

Key projects commissioned during the year include:

- Government Hospital & Medical College, Madhepura, Bihar
- Ford Global Technology & Business Centre, Chennai
- ITC Royal Bengal, Kolkata
- Police Bhawan – Signature Building, Lucknow
- Prestige Song of the South, Bengaluru
- Asian Paints Factory, Visakhapatnam

The business has also achieved important milestones in the execution of major landmark projects, as given below:

- The pitch-laying process was completed at the Al Rayyan - FIFA Stadium, Qatar in under 12 hours
- South Asia's largest skybridge weighing a massive 2000 MT was erected in 8 hours at ITC Colombo by the in-house team

- The largest cricket stadium in the world at Motera, Gujarat was substantially completed and was the venue for the meeting between the Prime Minister of India and the President of the US
- AIIMS Gorakhpur's OPD block was completed and handed over

Awards

The business has received numerous accolades from renowned international and national agencies for its superior standards in EHS and quality.

- Bengaluru International Airport Project bagged three coveted awards from the Confederation of Indian Industries – Southern Region
- Multiple International agencies – such as Project Management Associates (PMA), American Concrete Institute (ACI) and Engineering News Record – have showered praises on the construction of the iconic Statue of Unity project in Gujarat
- The Prestige Lakeside Habitat secured the ACCE(I) Billimoria Award for 'Excellence in Construction of High-rise Buildings'
- WIPRO Kodathi was conferred the ICI (BC) Birla Super Endowment Award for the Outstanding Concrete Structure of Karnataka 2019 in the Building Category



ICC Towers, Mumbai



IKEA Navi Mumbai

- Police Bhawan, Lucknow was conferred an award by ICI Ultratech – Lucknow Centre, for the Outstanding Concrete Structure of 2019 in the Institutional Building Category

Significant Initiatives

The business has been the frontrunner in developing digital applications customized to serve its project sites in streamlining various activities and statutory processes. Apart from the consistent success in employing advanced Building Information Modelling (BIM) in construction, the business was able to leverage the latest technologies like Geospatial Information System, Image Recognition, Artificial Intelligence and Robotic Process Automation through various applications developed in-house.

Geospatial technology using LiDAR (Light Detection and Ranging) was utilized to map existing structures and create 3D models. The Workforce Induction and Screening Application (WISA) is extensively used to digitize the workmen induction process and build a database of over 2 lakh workmen including their skill details and images captured using face recognition technology. Robotic Process automation helps in replacing human effort in mundane activities like indent creation and other accounting functions.

The Digital Stores initiative has digitized the processes of indent generation, approval, material issue and indent creation in an ERP system. The data generated through this application has helped in better inventory management.

Using 3D-printing technology, the team successfully printed a 2.8 m-high residential building at Kancheepuram, the first full-scale 3D-printed building in India. The mix design developed by the team enabled the use of crusher sand in 3D printing of concrete for the first time in the world. Further research is in progress.

Environment, Health and Safety

The business has rolled out its EHS Professional Development Programme (EHSPDP) and comprehensive Risk Management training for front-line engineers to ensure better EHS practices.

In an effort to develop a positive safety culture based on the principles of BBS (Behaviour Based Safety), SIM (Safety Improvements made by Me) has been introduced. To date, more than 4000 interventions (SIM cards) were made at all levels of employees at the project sites.

As a testimony of superior EHS standards, the business was certified for ISO 45001:2018 Occupational Health & Safety on June 13, 2019 by M/s DNVGL.



ITC One - Colombo, Sri Lanka



ITC Royal Bengal, Kolkata

Significant statistics for the year include:

- 93% of projects achieved Zero Accidents status
- 65 projects achieved more than 3 million safe man-hours
- 20 projects achieved more than 10 million safe man-hours

The business was conferred several prestigious awards during the year, including:

- British Safety Council's Sword of Honour, for the fourth consecutive year, with ten of its projects securing the award
- The Royal Society for the Prevention of Accidents (UK)' Gold Awards for Occupational Health & Safety for eleven projects
- 18 National Safety Council awards in various categories

The business has also taken up several initiatives to safeguard employees and workmen within the country and abroad at the onset of the pandemic. The various project sites across India are housing workmen in labour camps equipped with all essential facilities, medical care and competent supervision. COVID-19 Emergency Response Teams (ERT) constituted at the cluster-level pan-India are tasked with reaching out to staff, especially those at project sites, to check on their well-being.

The business has also banned the use of single use plastic in all forms across all offices, sites and establishments.

Human Resources

With people as the prime assets, the business ensures that it nurtures talent through new initiatives and value-adding training programmes. The business has introduced a Testing & Commissioning Management Development Programme to develop a specialist group of individuals to deliver Testing & Commissioning of Airports, Data Centres and Smart Buildings. To further develop a specialist group of 'Finishes professionals', a customized programme covering Masonry & Plaster, Dry Finishes, Wet Finishes, Interiors and Façades was launched in December 2019.

Risks and Concerns

The housing and real estate business is increasingly witnessing the political risks of Government decisions being reversed and projects halted due to changes in regime in the States. A robust political risk index is conceived and being developed to effectively identify and mitigate the same at the bidding stage.

In the case of a few projects, specifically Government projects, hand-over of encumbrance-free sites on time, remains a key issue that halts the project's momentum.

In jobs executed on a design-and-build contract basis, frequent changes in design by the client and



Prestige Song of South, Bengaluru



TANCEM Cement Plant, Tamil Nadu

client-appointed consultants are a huge concern. Though in-house Engineering, Design & Research Centre (EDRC) is proactive and is improving continuously by documenting and implementing the learning from previous experiences in new jobs, unexpected changes suggested by clients hinder timely completion of jobs. Such changes are thoroughly documented and communicated to clients by the Contracts Administration team to pursue claims.

The strategy of the business to develop a specialized vertical – B&F Fast – to modularize, standardize and focus on ‘prefab plus assembly’ building solutions for different types of buildings is a step towards mitigating the growing risk of the non-availability of skilled manpower in the industry. The solution will also cater to the increasing need of customers for quicker construction.

Presently, the world economy is facing a downturn triggered by the COVID-19 pandemic, which has spread to almost all the countries across the globe. The Infrastructure industry is among one of the badly affected industries due to the contagion-led lockdown and eventual new norms of working. It has also impacted the supply chain and the availability of the workforce.

The business is working on identifying different scenarios and preparing contingency plans for each scenario. All necessary measures are being taken to ensure the collection of payments due and to have a hard look at fixed costs and optimize overheads during the lockdown period.

Outlook

Currently the economy is opening up with restrictions on construction activities completely lifted.

The lockdown has led to a reduction in consumption demand in the country, leaving government spending in social sectors as the key driver of economic growth. The opportunities for the business in the upcoming year will be majorly from Healthcare industry, as increased government spending is expected in this segment. Also, there is a negative sentiment about China and many countries currently are looking to move out of China which was their manufacturing base. This is expected to trigger opportunities for the factories segment in B&F as most companies are likely to set up their manufacturing establishments in India. However, the commercial and residential real estate business in the country will witness a prolonged impact of the pandemic. The investments into the development of Airport construction may slow down and are expected to rebound only during the latter part of FY 21.

The major challenge for the construction industry will be supply chain disruptions including limited availability of labourers as the migrant workers constituted a very large share of the workforce. The business has already initiated the implementation of long-term solutions to face such challenges like reducing the dependency on human resources by leveraging advanced construction technology.



A section of the 13km Phase 1 of Mauritius Metro

Also, the business is considering implementation of techniques like Zero Based Budgeting for cutting down unnecessary expenses and optimizing resource utilization.

On the international front, B&F will employ a cautious approach in the Middle East and also while exploring opportunities to enter new geographies like Bangladesh and Africa.

The business is confident of its ability to tide over the challenges arising from subdued demand and executional challenges through its customer-centric approach, construction expertise and technology leadership in the industry.

■ TRANSPORTATION INFRASTRUCTURE

Overview:

L&T's Transportation Infrastructure business (TI) is one of the oldest, largest and most reputed EPC contractors in India in the Road, Railway and Airport sectors and has two Strategic Business Groups (SBGs), namely, Roads, Runways & Elevated Corridors (RREC) and Railways Business Group (RBG).

The RREC's major business unit, the Roads & Runways BU (R&R), provides EPC Design & Build Construction services for all types of roads (asphalt and concrete) including all associated structures, cross drainage, toll booths, wayside amenities, etc., to NHAI, MoRTH, State Governments and certain private clients. In the Airport sector, the R&R BU undertakes EPC construction of complete airside infrastructure, namely, runways, taxiways, aprons, airfield ground lighting, fuel hydrant systems, etc., both greenfield and brownfield. The R&R BU is also a pioneer in providing complete civil infrastructure for greenfield city infrastructure projects, e.g. Smart Cities. The Elevated Corridor Segment (EC) is engaged in EPC construction of all types of urban flyover projects for City Traffic Decongestion, and the Dedicated Freight Corridor Corporation of India (DFCC) - civil works projects in both the Eastern and Western Dedicated Freight Corridors.

The Railways SBG (RBG) consists of the Mainline Business Unit (MLBU) and the Metro Business Unit (MTBU). The MLBU provides EPC construction services for all Mainline Railway Projects, Western & Eastern Dedicated Freight Corridors including Track Laying, Overhead Electrification, Dedicated Railway Linking for Port & Mining facilities, etc.



Area Development Works, Bidkin, Maharashtra



Runway for Bengaluru International Airport

The MTBU executes EPC projects for all Signalling & Telecommunication Systems Works, Mass Rapid System Projects for metro projects in India, Riyadh Metro, Dhaka Metro and end-to-end Integrated Transit System complete with Civil and Systems Works (Mauritius Light Rail Transit – LRT).

On the international front, the business recently completed several large and complex road projects in the UAE, Oman and Qatar. The RBG is currently executing major projects in Mauritius and Bangladesh.

The business leverages its vast experience in project management, engineering design and construction management to achieve international standards of safety, quality and operational efficiency. It has engineering design centres in Mumbai, Faridabad and Chennai. In addition, it has a Competency Development Centre at Kancheepuram for the RBG and a Workmen Training Centre at Ahmedabad for the RREC. In FY 2019-20, the transportation infrastructure business has executed approximately 1 million sq. mtr. of airside construction, 1347 lane km of roads, 389 km of track linking and 981 km of Railway Electrification (OHE).

Business Environment

a) Roads, Runways & Elevated Corridors

Over the last 5 years, the budgetary support for road construction has seen a steady increase. However, the award of contracts has shrunk significantly in FY 2019-20 owing to land- acquisition issues. The delay in the financial closure of Hybrid Annuity Model (HAM) projects has impacted the Government's ambition to infuse private investment into the sector. Any shift towards a higher proportion of EPC projects will impact NHA's awarding capability due to higher funding requirement for civil works related to EPC projects. Due to difficult contractual terms, the working capital requirement for road projects is becoming very high. The delays in settling contractual issues like extension of time, arbitration award, etc., are compounding problems. In FY 2019-20, approximately 5,100 km of road were awarded and 9,855 km of road were constructed. Construction of highways at 28 km/day in 2019-20, has been steady from FY 2017-18 onwards, with an increased focus on delivery of projects. The market continues to have many small EPC contractors, consequently intensifying the competition.

In the year 2019-20, a few major airports have been initiated, such as the Delhi International Airport and Navi Mumbai International Airport, providing opportunities for the business.



Rewa-Katni-Jabalpur Road

City Infrastructure Development has seen a lull in orders in FY 2019-20, with no significant awards. The Delhi–Mumbai industrial corridor is at an advanced stage, with multiple projects substantially completed in Dholera and Bidkin industrial township.

The Government announced a National Infrastructure Pipeline with a total outlay of ₹ 100+ lakh crore for FY20-FY25. Out of this, 19% of the capital expenditure is earmarked for Roads, which is expected to give a considerable boost to the sector.

b) Railways:

The Indian Railways (IR) has significantly improved its EPC tendering model. The new EPC tender document (Single Stage 2 packet) has been finalized, with industry suggestions suitably incorporated. However, the IR needs successful and faster implementation of EPC tendering. No major project was awarded in FY 2019-20.

High Speed Rail, the tendering for which was expected to gather momentum, has been deferred, with the major bids being extended multiple times. Steady projects in metro rails in various States are expected to help increase business. The Public-Private Partnership (PPP) component has been made mandatory for availing Central assistance for new metro projects.

Major Orders

- Navi Mumbai International Airport - design, engineering, procurement and construction of Passenger Terminal Building, runway, taxiways and aprons, landside roads, utility infrastructure and drainage
- Delhi International Airport Limited – Fuel Hydrant System
- Three Systems packages on EPC basis for the Eastern Dedicated Freight Corridor
- EPC Overhead Electrification job from CORE
- Track works for two packages of Mumbai Metro Line 3

Projects Completed

The business has completed the following projects:

- Rewa–Katni–Jabalpur–Lakhnadon Road Project – 4 Packages, 288 km, 4-lane, Madhya Pradesh
- Bijapur–Humnabad Road Project, 220 km, 2-lane, Karnataka
- Raipur–Bilaspur Road Project, 42 km, 4-lane, Chhattisgarh
- Hospet–Chitradurga Road Project, 108 km, 4-lane, Karnataka
- North–South Parallel Runway commissioned for Bangalore International Airport, Phases 1 & 2



RTA 1028 Road Network, Dubai

- Kanakura–Madar section (OHE – 294 TKM) and the Alwar–Bandikui section (OHE – 68 TKM)
- Khaliapali–Loisinga (11.15 TKM) track section of the Sambalpur–Tilagarh Doubling Project
- GMRCL – Meg Track Project – Priority Stretch (13 TKM)
- Hyderabad Metro OHE and Track Package (25 TKM)
- Track-linking for the Rewari–Iqbalgarh section of CTP 1&2 (1400 TKM)
- Commercial Trial runs are in progress in the Rewari–Madar section
- Mauritius Light Rail Transit system (Phase I, 25 TKM)
- Roads and Transport Authority (RTA) 1028 (Extension of Tripoli Street)
- RTA 1048 Improvement of Expo 2020 Roads Network contract No R 1048/1 & 5

During the year some other notable achievements were:

- DFCC – (Civil track package) CTP3R project had the highest single-day production of 1.16 L cu.m/Day Earthwork in filling and record of executing 20.30 lakhs cu.m in May 2019
- Mumbai–Nagpur Expressway Project, Mumbai–Vadodara Road Project - 80% design completed in 6 months' time

under the Design Acceleration Initiative of the RREC business

- Aurangabad–Karodi Road project milestone II achieved 6 months ahead of time

Significant Initiatives

The major fixed cost for the RREC business includes hiring charges for asset operation & maintenance, fuel, etc. Special initiatives of P&M as a profit centre with a focus on productivity-driven decision-making have resulted in cost-reduction on all these fronts.

The business continues to leverage the benefits of the extensive use of Linear Project Management tools, such as TILOS, to effectively visualize and plan mega linear projects across domains. Driven by a dedicated 'Track Planning Cell', this strategic initiative facilitates centralized planning of not only civil and track projects but also mega OHE (Overhead Electrification) projects.

An **Internal Project Management Consultant (IPMC)** team was formed to conduct a quality audit of ongoing projects. The team will ensure that construction complies with design specifications, specified materials are used during construction, codal specifications meet with the requirements, as well as review the status of non-conformance reports and aid closure.



E&AM System Works, Dhaka Metro



Bata Nagar Flyover, Kolkata, West Bengal

Engineering Project Monitoring & Control Cell was formed under the project controls team and tasked with development of a design and drawing tracker to monitor the delivery with respect to agreed time lines, optimization of quantities with respect to initial design, coordination and monitoring of the actual quantity reported by the design department progressively and development of a model for indices for quantities of projects of a similar nature to support ongoing projects and the tendering department.

The thrust on mechanization in the railway business for faster execution has been a remarkable success, involving simultaneous stringing of Contact and Catenary, which reduces operational costs and execution time. Having been well-established in DFCC, such mechanization is also being used in other EPC projects, such as the Konkan Railway in the Western Ghats – a project requiring OHE installations amidst highly restrictive ‘block sections’ involving significant material handling and extraordinary erection methodologies.

Digitalisation

Connected assets and geospatial solutions are two high-impact solutions for the business. Digital data now backs the majority of equipment mobilization and hiring decisions, as well as fuel distribution. On the geospatial front, drone-based photogrammetry or LiDAR-based surveys are conducted wherever possible for every new project.

Work has commenced on an Artificial Intelligence (AI) based Contracts Administration Platform to introduce smarter ways to manage contracts.

Environment, Health and Safety

Transportation Infrastructure projects are typically spread across hundreds of kilometres, with a multitude of discrete safety risks that are both location and task specific. RtR (Reverse the Risk) and PREP are digital applications which have been developed to identify the risk level. Continuous monitoring of the risk level using digital applications and implementation of effective control measures helps mitigate risk.

Well-planned implementation of traffic diversions as per IRC SP55 to prevent work zone incidents is undertaken. To monitor live road activities and prevent traffic accidents, the business has introduced the ‘Verify and Ensure Controlling Traffic’ (VECT) initiative.

Across all the projects, digitally enabled training modules – such as virtual reality safety modules and augmented reality EHS Golden Rule modules – have been developed to increase the EHS awareness in the workforce. A ‘Zero Fatal Award’ has been introduced for projects having zero fatality for the entire duration of the project cycle.

A structured Environment Management System (EMS) has been implemented. Every project has a specific



Ghoshpukur-Salsalabari Road, West Bengal



Overhead Electrification for Delhi Metro Phase 3

Environment Plan which conforms to ISO 14001 2015, individual contractual needs and the business' Integrated Management System (IMS) manual. Micro-level preparation takes place at each project to define a set of processes, followed by Impact Aspect Assessment. The defined control measures are implemented during job execution, and that facilitates the reduction of the negative environmental impact and the mitigation of all potential environmental aspects. Detailed Environment Impact Assessments (EIA) are conducted in the pre-execution construction planning stage. Various control measures are identified and implemented. Along with dedicated methodology / SOP and engineering control, many new initiatives are taken.

During FY 2019-20, the business won 19 international awards (five Gold Awards, two Silver Awards from the Royal Society for the Prevention of Accidents, a Sword of Honour and a BSC OHS Audit Five Star Rating from the British Safety Council, one distinction, 4 merit and 5 pass certificate from British Safety Council). Other than international, the business has received seven prestigious safety awards by the National Safety Council, a prestigious award by the Institution of Engineers India and two awards by India HSE Summit.

Human Resources

The focus of the business has been on developing a culture of recognition, innovation and process improvement. The business conceptualized the DELTA Awards - Digital

Breakthrough, **E**nergy Optimization, **L**arge scale reuse of Scrap/ Waste, **T**ime reduction (Reduction in Cycle Time), **A**dvances (Innovation). To strengthen its safety culture using positive motivation, the **LIFE** (Loss & Injury Free Environment) Award was conceptualized.

Risks and Concerns

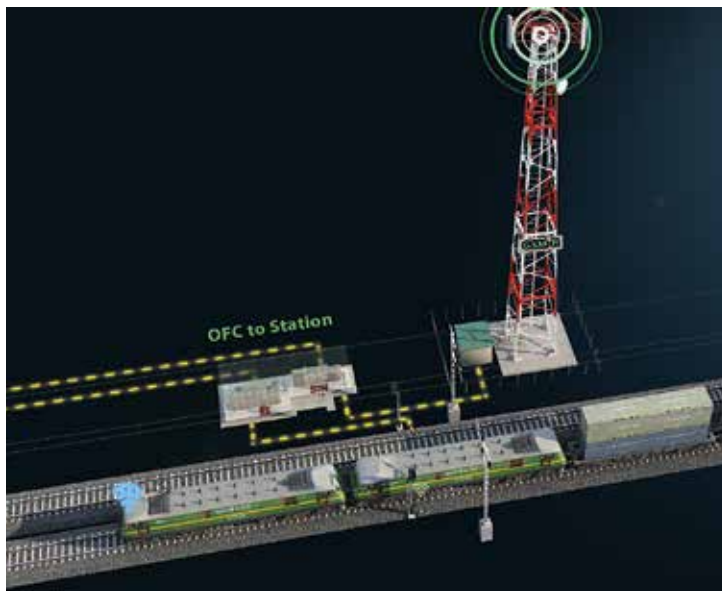
Land acquisition is a critical factor. Very often, there are delays in handing over encumbrance-free land and Right of Way, impacting progress of work and idling of resources. Commercial terms in the business are getting tougher, resulting in working capital pressures. The sector is also exposed to delays in various approvals, leading to a domino effect. Extreme environmental events (such as unprecedented rainfall), National Green Tribunal bans and construction bans due to pollution pose an adverse risk to the business.

Outlook

a) RREC business

Over the next 5 years, the Government has planned to expand the National Highway network by ~60,000 km, with about 20,000 km in major economic corridors, strategic areas and major tourist destinations.

The Department of Civil Aviation envisages 100 new airports will be built in the country over the next 10 to



Signaling & Telecommunication for WDFC



Trial run at Western Dedicated Freight Corridor

15 years. It is also working on the cargo policy, which will provide a boost to the nation's logistics capacity. The Government has envisaged an investment of more than ₹ 1.43 lakh crore for airports under the National Infrastructure plan over a period of 5 years. The Government's focus on developing a strong express highway network, along with changes in contractual terms, is expected.

b) Railway business

The Indian Railways is planning its highest outlay of ₹ 1.61 lakh crore for FY 2020-21, an increase of over ~3% on last year's outlay of ₹ 1.58 lakh crore.

The conventional projects of the Indian Railways continue to get a big thrust, backed by strong institutional funding like LIC, IRFC, etc. The Indian Railways is planning to tackle Mainline Capacity constraints through a New Line of ~5,000 km, Capacity Augmentation (Doubling & Tripling) of ~12,000 km and Gauge Conversion of ~2,500 km in the next five years. About 10,000 km of electrification is also expected to be awarded under the banner of 'Mission Electrification' over the next four years.

There is a major thrust on electrification of the entire railway network by 2024. New projects including port connectivity dedicated rail links, etc., are planned to be implemented through SPVs owned by State-Centre JVs.

Tendering for three New Dedicated Freight Corridors is to be initiated in the next 2-3 years.

India is well on its way to creating a world-class MRT system as an integral part of community infrastructure development across all metros and major cities, including Tier 1 and Tier 2 cities in the country. System works in MRTS provide good business opportunities; nevertheless such opportunities are increasingly becoming multiple smaller packages, especially in Tier 2 cities, and hence may not be attractive enough for the business to participate in.

The Indian Railways has floated tenders for a Detailed Project Report (DPR) on each new Dedicated Freight Corridor. The Government has not yet secured funding for these projects. Certain packages are being contemplated on the PPP mode. Packages worth ~ ₹ 68,000 crore are expected to be finalized in the next five years.

On the international front, the focus is on the neighbouring geographies and in geographies where the business already exists. The funding needs to be through secured sources, such as the Indian Government or from any bi-lateral / multilateral agencies like JICA.

c) International

Since all the major infra projects related to EXPO 2020 in Dubai and FIFA 2022 in Qatar are already awarded and are



Cable Stayed Bridge across Durgam Cheruvu Lake, Telangana

at an advanced stage and oil prices have dropped, no more major prospects are visible in the near horizon in the Middle East. Africa posted very few opportunities during 2019-20 and stiff competition persisted from Chinese contractors. The key hubs for investment in 2020 are expected to be Morocco, Egypt, Ghana, Cote D'Ivoire, Namibia, Botswana, Rwanda, Ethiopia and Kenya.

In general, with the disruptions due to the COVID-19 lockdown, funding for new projects is likely to get affected. The lockdown may trigger shortage of raw material and workmen, disruption in the supply chain, a significant increase in costs related to operating at site, coupled with reduced productivity due to controlled working environment, need for hygiene infrastructure and various safety measures requirements. There may be a decline in project awarding by various other authorities owing to rising debts, limited capital and reduced private investment.

■ HEAVY CIVIL INFRASTRUCTURE

Overview:

L&T's Heavy Civil Infrastructure business is a market leader in Engineering, Procurement, and Construction (EPC) projects in core civil infrastructure segments that are crucial to the economy, viz. Metros, Nuclear, Special Bridges,

Hydel and Tunnels, Ports and Harbours and Defence.

As an industry leader in augmenting capabilities for urban mass rail transit systems, the business is involved in the construction of metro rail systems in almost all the major Indian cities. It provides extensive end-to-end engineering and construction services for both elevated and underground metro systems. During the year, the construction of the Hyderabad Metro was completed.

In the Nuclear segment, the business provides EPC solutions in civil, mechanical, electrical and instrumentation, including seismic qualification and modular construction technology. Its expertise extends to both pressurized heavy water reactor (PHWR) and light water reactor (LWR) technologies.

The Special Bridges segment has extensive experience in executing a wide range of bridges, such as cable-stayed, precast, pre-stressed concrete, steel and concrete composite construction using ingenious cutting-edge construction techniques, viz. incremental launching, segmental construction, balance cantilever construction and span-by-span construction.

The Hydel and Tunnel segment offers EPC solutions for complete Hydroelectric Power Projects,



Singoli Bhatwari Hydro Power Project, Uttarakhand



Multi-modal terminal at Sahibganj, Jharkhand

large-diameter Transport / Water Tunnels and complex Irrigation projects. The business also provides expertise for road and railway tunnelling projects, which cater to nation-building.

The Ports & Harbours vertical has extensive experience in greenfield ports, shipyard structures and seawater intake systems in all coastal states of India. It provides EPC solutions for breakwaters, berths, jetties and wharfs, dry docks and shore protection structures. It has unique expertise in providing design and construction solutions for state-of-the-art Shiplift structures.

Backed by the expertise and experience gained from managing mega projects, L&T has established a position of pre-eminence in shoring up the country's defences. L&T offers single-point EPC solutions in the form of infrastructure facilities for defence bases, underground facilities and surveillance.

The business has a strong presence in India, the Middle East, Bhutan, and Bangladesh. The ability to provide 'tailor-made' design-&-build and EPC solutions to suit the specific requirements of customers for complex infrastructure projects has made the business a market leader in India. Dedicated design and technical centres, competency cells, specialized training centres, digital project management, and a talented pool of employees

help the business sustain a leading role, attract key clients, penetrate new geographies and secure major orders.

L&T Geostructure is a unique entity which focuses on foundation and ground improvement related projects. It has a strong and professional foundation specialist team with the knowledge of design, equipment and methods to execute and supervise sophisticated foundation works. It has expertise in deep piling and diaphragm walls, multi-cellular intake wells for river-linking, marine terminals with berths and jetties and deep cut-off walls.

Business Environment

Infrastructure is a major sector that propels the overall development of the Indian economy. The Government maintains India's upward growth trajectory and continues to target gradual and sustained growth. Infrastructure was one of the country's budget priorities this year.

With major metropolitan areas on the metro map, both the Central and the State Governments have now turned their attention towards Tier-II cities such as Kanpur, Agra, Surat, Patna, Meerut, Ahmedabad, Nagpur, etc. due to their increasing population density. The business has been awarded two packages of the 82-km Delhi-Ghaziabad-Meerut Regional Rapid Transit System (RRTS) line in Uttar Pradesh.



Kakrapar Atomic Power Plant, Gujarat

The Ministry of Defence has identified an urgent need to upgrade the country's defence infrastructure, and major projects are currently in the planning stage.

Bridge construction in India is witnessing significant interest from international funding agencies like JICA, the World Bank, ADB, etc.

India's ports and trade-related infrastructure accelerate growth in the manufacturing industry and assist the 'Make in India' initiative. India has 12 major ports and approximately 200 non-major ports administered by Central and State Governments respectively. With a view to promoting the expansion of port infrastructure and facilitating trade and commerce, the Ministry of Shipping's proposal to replace the Major Port Trusts Act, 1963 by the Major Port Authorities Bill, 2020, was approved. The Major Port Authorities Bill, 2020 will empower the major ports to perform with greater efficiency on account of full autonomy in decision-making and by modernizing the institutional framework of the major ports. The business has secured the Dabhol Breakwater Project (offshore structures) located at Ratnagiri.

FY 2019-20 saw a steady increase in projects tendered out by the Government in the Hydel, Tunnel and Irrigation segments, as the Government introduced a few structural

policy changes to promote the Hydropower sector based recommendations of the Standing Committee on Energy (2019).

India's total nuclear power generation capacity is 6,780 MWe, which comprises 2 percent of the country's overall power generation. The Energy policy of the country calls for 25 percent of electricity to be generated from nuclear power by 2050. The business is expecting the Government to move forward with a proposal for 10 pressurized heavy-water reactor (PHWR) fleet. Major tenders in the Nuclear industry were delayed and were pushed to FY 2020-21 due to lack of clarity about The Civil Liability for Nuclear Damage Act, 2010 amongst civil contractors.

However, the momentum of project awards suffered due to delays in bid evaluations, board approvals, etc., towards the end of the FY, and was further aggravated due to the impact of COVID-19 in March 2020. These delays have affected the much-anticipated order inflow for the business.

Major Achievements

Orders Won

- Rishikesh – Karnaprayag Rail Link Project (Package# 2), Uttarakhand



Mumbai Coastal Road Package 1

- Dabhol Breakwater Project (offshore structures) located near Ratnagiri, Maharashtra
- Delhi-Meerut Regional Rapid Transit System (RRTS) – two packages, Delhi and Uttar Pradesh
- Strategic Defence Facility project

Projects Completed

- Medigadda Barrage, Kaleshwaram Irrigation Project, Telangana
- Singoli Bhatwari HEP, Uttarakhand
- Hyderabad Metro Rail Project (HMRP) Raidurgam Stretch, Telangana
- Doha Metro Gold Line, Qatar
- Durgam Cheruvu cable-stayed bridge, Telangana
- Kakrapar Atomic Power Plant (KAPP MPCW), Gujarat

Other Key Achievements

- The business won a slew of awards during the financial year from august bodies, including the Indian Chapter of ACI Excellence in Concrete Construction Awards in the 'Infrastructure' category for the Kakrapar Atomic Power Project 3 & 4, and the Indian Concrete Institute for

'Outstanding Concrete Structure of Telangana-2019' for the Medigadda Barrage Project.

- A 16 m-high wall was cast in a single pour at the Kudankulam Nuclear Power Plant Project, setting a benchmark in the industry.
- The first-of-its-kind superstructure erection was undertaken using heavy cranes across the congested Delhi-Mumbai live railway line in a block period of 4 hours at DFCC 15C project.
- The first span for Mumbai Trans Harbour Link (MTHL Package 1) was erected in January 2020.

Significant Initiatives

With high potential business opportunities anticipated in tunnelling projects, an in-house Tunnelling Excellence Academy (TEA), the first-of-its-kind in India, was built at Kancheepuram, Chennai, India. It has been set up with international expertise to build strong technical capability in the design and execution of complex tunnelling projects conforming to world-class standards, with high quality and safety compliance. The academy has in-house subject-matter experts who are capable of training the staff on various technical aspects to upskill them in alignment with the needs of the business. The objective of this institute is to create a pool of certified tunnelling professionals for the business in order to meet international industry standards in safety, quality and productivity.



One of the underground tunnels for Mumbai Metro



Riyadh Metro Line 3, Kingdom of Saudi Arabia

Digitalisation

Digitalisation has become an integral part of business processes. It has opened up new-age capabilities to measure, analyse and improve business performance. The business digitally monitors all productivity factors – Men, Material and Machinery – in real-time. For effective project delivery, the business is committed to digitalisation and innovation through the use of digital platforms such as VR for workmen training in EHS (Environment Health and Safety), BIM (building information modelling), Drones and 3D laser scanners.

Environment, Health and Safety

Committed to the mission of 'Zero Harm', the business clocked 330 million safe man-hours in the year, and 76 thousand man-hours were invested in EHS awareness and training. Key EHS training initiatives were implemented, including P&M operations, tunnelling, incident investigation, marine construction, scaffolding, sustainable skills, auditing, EHS leadership, behaviour-based safety and certifications in NEBOSH IGC and IOSH Managing safety. The business has successfully fulfilled the corporate EHS strategic plan 2019-20 with key EHS deliverables that have been implemented across all its operations.

Digital applications have been launched to regulate safe working conditions, such as inspections, work permits, P&M inspections before use, and monthly reporting status.

Various projects across the business have received safety awards:

1. Six projects received International Safety Awards and one project received a Gold medal (for the 9th consecutive time) from The Royal Society for the Prevention of Accidents (RoSPA) – UK, for the year 2019.
2. International Safety Awards were conferred for various projects from the British Safety Council – UK for the year 2019.
3. Various projects received awards and appreciation certificates from the National Safety Council – India (NSCI) under the Construction Award Scheme 2019.

Human Resources

The prime focus is on talent development and talent engagement. Policies and programmes for employee growth and development, employee appreciation and employee satisfaction are put in place to pave the way for future leaders. Programmes – such as those conducted at the Trainees Engagement & Development Centre (TEDC), an initiative of HR's Talent Development cell – focus on the engagement and development potential of the recruits. Other training programmes deliver customized training,



The Mumbai Trans Harbour Link

partnering with subject-matter experts to enhance relevant skillsets.

In collaboration with IIM-Trichy and Great Lakes Institute of Management, long-term capability-development programmes have been initiated in order to develop future leaders. Different methodologies, mentoring and coaching forums and L&T-specific case studies have been created to make the Competency Development model more relevant to the business context.

Risks and Concerns

Each construction project is unique and comes with its own set of challenges and opportunities. Major risks for the business are delay in obtaining Right of Way (RoW), work front, third-party liability, epidemic risks, schedules, approvals/clearances, design approvals, and change in design.

We have a strong risk management system and process in place. The risks identified in the pre-bid and post-bid stages are continuously monitored through regular reviews throughout the project cycle for mitigation/resolution.

Outlook

A National Infrastructure Pipeline (NIP) has been prepared for capital investment worth ₹ 100+ lakh crore in

infrastructure through FY25, pledging about ₹ 65 lakh crore for ports, urban development, irrigation, railways and roads and power.

Out of the total NIP, ₹ 34 lakh crore (30%) worth of projects are at the conceptualization stage, and ₹ 22 lakh crore (20%) worth of projects are under development. Several big-ticket and first-of-its-kind projects are proposed by the Government – such as High-speed Rail, Dedicated Freight Corridors, Urban Transport / MRTS projects – which are expected to provide an impetus to the business in the coming years. Strategic investments in the North East and the J&K region in Hydel projects are expected to enter the implementation phase in the next 2-3 years.

The Government has also identified an urgent need to upgrade the country's defence infrastructure. Plans for the upgrade of Naval and Air force bases as well as the creation of underground infrastructure for strategic assets by the Government are in progress.

However, the COVID-19 situation may lead to a shift in priorities and a slowdown in decision-making by customers for the award of projects. Elevated investments in infrastructure will be the key to ensuring that India recovers from the COVID-19 crisis at the earliest. The Government has already identified infrastructure as one of the 5 pillars to make India a self-reliant economy, and various stimulus



220 kV Transmission Line, Uttarakhand



5 million households electrified

packages proposed by the Government to revive the economy will be a big boost for the infrastructure sector.

■ POWER TRANSMISSION & DISTRIBUTION

Overview:

L&T's Power Transmission and Distribution (PT&D) business vertical is a leading EPC player in the field of power transmission & 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 and fibre optic backbone infrastructure, to solar PV plants including floating solar, battery energy storage systems and mini / micro grid projects. Besides being a dominant player in the Indian subcontinent, the business enjoys a significant share and a strong reputation in the Middle East, Africa and ASEAN markets.

The business comprises several business segments:

The Substation business unit provides turnkey solutions for Extra High Voltage (EHV) air insulated / gas insulated substations, Flexible AC Transmission Systems (FACTS) and substation automation and digital substation solutions for utilities and power plants, EHV cable systems and complete electrical and instrumentation solutions for various infrastructure projects, such as metros and airports.

The Power Distribution business unit provides a range 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.

The Transmission Line business offers turnkey EPC solutions for overhead lines for power evacuation and transmission, bolstered by its state-of-the-art tower manufacturing units at Pudukcherry, Pithampur and Kancheepuram, which have supplied over seventeen lakh tonnes of tower components over the years. The Testing and Research station at Kancheepuram is accredited by NABL (National Accreditation Board for Testing and Calibration Laboratories), and is one of the largest in Asia, apart from being amongst the most renowned testing



250 MWp Solar PV Plant, Madhya Pradesh

centres in the world. The clientele of this testing facility includes utilities from 30 different countries.

The Optic Fibre Cabling (OFC) segment provides turnkey solutions for deploying a gigabit-scale optical fibre backbone for both government agencies and private telecommunication companies by establishing a state-of-the-art network infrastructure, typically involving a vast geographic spread. The business also provides operation & maintenance support to ensure the health of the Optic Fibre Cable by maintaining Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR) figures as per the agreed Service Level Agreements (SLAs).

The Renewables business provides single-point EPC turnkey solutions for solar Photo Voltaic (PV) related projects, including energy storage solutions and microgrids. Its experience ranges from flat to highly undulating 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 to produce different module-mounting structure types – such as Fixed Tilt, Seasonal Tilt and HSAT – offering the customer a range of 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, ranging from rooftop systems to floating solar systems.

The International units of the business in the Middle East, Africa and the ASEAN region offer complete solutions in the field of power transmission and distribution up to 500 kV. These include substations, power transmission lines, EHV cabling, distribution networks, solar plants and Electrical, Instrumentation and Controls (EI&C) works for infrastructure projects such as airports, oil & gas industries, etc.

The Middle East business unit that caters to the UAE, Saudi Arabia, Qatar, Oman, Kuwait and Bahrain, has garnered a coveted place in the GCC region. With a presence spanning over 25 years and numerous milestones, it enjoys an enviable track record in the region.

The once-fledgling Africa business unit has established itself as a force to reckon with, in 10 countries across the North, East and South of the continent. With a sizeable market share in the addressable segment, and projects from all the business lines within the PT&D spectrum, the business unit is now poised to make inroads into the western parts of Africa.



400 kV Grid Station at Misfah, Oman



400/220/66 kV Substation at Wangtoo, Himachal Pradesh

In the ASEAN region, a proven track record of successful project execution in Malaysia and Thailand has helped the business foray into Myanmar and the Philippines.

Larsen & Toubro Saudi Arabia LLC (LTSA) is a wholly owned subsidiary providing engineering, construction and contracting services in the sphere of Transmission & Distribution in the Kingdom of Saudi Arabia.

Business Environment

On the power distribution front in India, the achievement of electrical connectivity to all villages and the near closure of centrally sponsored schemes such as Saubhagya and R-APDRP redirected the focus to strengthening of urban distribution networks and intensification of electrification in select States. As the State DISCOMS depended mainly on multilateral funding, finalization delays were witnessed. However, the business was able to maintain its market share and garner significant orders from Karnataka, Tamil Nadu and Uttar Pradesh.

In the transmission system space, investments were driven by the packages finalized based on tariff-based competitive bidding and through the State utilities that could secure multilateral funding. With the continuing general lack of investment in the conventional power generation and industry segments, centrally-driven transmission schemes

were not aplenty. States such as West Bengal and Tamil Nadu finalized packages for strengthening their intra-state transmission line networks and associated substations.

The neighbouring countries of Nepal and Bangladesh too offered potential across the T&D spectrum, viz. substations, transmission lines and distribution.

Despite the fact that the solar industry faced a lower capacity addition in FY 2019-20 as compared to the previous year, in the face of political changes in some States and the dependence on China for modules, the solar business portfolio surpassed a cumulative capacity of 2.3 GW. Measures such as the removal of the ceiling on tariff, acceptance of corporate guarantees in lieu of bank guarantees, etc., boosted the confidence of the developers. Central PSU tenders with a domestic content requirement gave a fillip to prospects.

In the Middle East, though the macro-economic scenario was mixed in FY 2019-20, the business garnered a major portion of the opportunities that arose. The continued trend of non-oil based economic diversification has opened up infrastructure project development in these countries.

In Africa, certain countries in need of facilitation in terms of funding and expertise to build transmission lines and substations at EHV levels resorted to the MOU route with reliable partners.



400/220/132/33 kV Substation, Mawana, Botswana

With the on-schedule completion of projects in Malaysia and Thailand and the strengthening of its presence in the Philippines and Myanmar, the business has demonstrated its capabilities and has won recognition in the ASEAN market.

Major Achievements

Orders Won

- Modernizing the power distribution network in Bengaluru Metropolitan Area Zone, Gurugram Smart City and Chennai. The package for Chennai also includes fully automated, unmanned 33 kV Gas Insulated Substations at select locations
- Underground cabling packages and supply and installation of Medium Voltage capacitor banks with related accessories in Uttar Pradesh
- Construction of 765 kV and 400 kV Transmission lines for integration and evacuation of power from wind energy in Kutch, using high capacity Transmission systems
- Design, supply and construction of a 400 kV Substation at Ottapidaram, Tamil Nadu and the associated 400 kV Double Circuit Ottapidaram – Udangudi – Kamudhi Transmission Line on a total turnkey basis
- Establishing a 220 kV Gas Insulated Substation including laying of associated 220 kV and 66 kV cable networks in Karnataka
- Substation and Transmission Line packages associated with Meerut and Simbhavali Project under tariff-based competitive bidding
- Power Transmission Infrastructure for 800 MW Rupsha power plant, Bangladesh; 220 kV Substations in Nepal and a distribution package for establishing an underground cable network in Kathmandu
- Developing a 230 MW Grid Connected Solar Photovoltaic plant, which is one of the largest such orders under the CPSU Scheme Phase II (Tranche II)
- Another 150 MW Solar Photovoltaic Plant in Tamil Nadu and Uttar Pradesh including a large floater solar power project at a reservoir of Auraiya Gas Power Plant
- Providing off-grid DC solar photovoltaic water pumping systems with standalone lighting systems for farmers, with provisions for mobile charging and transfer of automated meter reading and water discharge reading data in Maharashtra
- Orders across the Middle East for establishing 380 kV and 230 kV Transmission Line corridors in the Kingdom of Saudi Arabia, upgrading substations and related power facilities in Kuwait and UAE, constructing 400 kV Overhead Lines in Qatar and setting up a 400 kV Grid Station in Oman



132/133 kV Grid Station at Ghala Heights, Oman

- Engineering, Procurement and Construction of the 400 kV Overhead Transmission Line between the towns of Chimwara and Alto Molocue in Zambezia Province in Mozambique, Africa. In Ethiopia and Uganda, orders have been received for establishing distribution networks involving medium / low voltage distribution lines and last-mile consumer connections
- 500 kV Substation order in the Philippines

Projects completed and commissioned

- Three STATCOM projects in Hyderabad, Udumalpet and Trichy
- Commissioned one of the highest-altitude 400 kV GIS at Wangtoo, Himachal Pradesh, at an altitude of 1727 m above MSL, overcoming cold weather conditions
- More than 1900 CKM-long transmission corridors were completed in 2019-20
- Communication backbone networks involving aerial / underground optic fibre cable links of more than 11000 km have been established
- The first biggest utility-scale solar-cum-MWh-scale energy storage project in India was substantially completed. Also, the first MW scale floating solar project in India (4 MWp) was rendered ready for commissioning

- Across the Middle East, 26 substations were commissioned, including major 400 kV substations in Qatar and Oman. More than 200 km of overhead transmission lines and 325 km of underground cable networks capable of high capacity energy transfer were built
- Building upon the successful commissioning of EHV substation projects in Africa, the business has now completed a 220 kV Transmission Line in Egypt and a 500 kV HVDC Transmission Line in Kenya
- In Malaysia, a 500 kV Transmission Line from Yong to Peng to Segamat has been successfully commissioned on schedule

Awards and Recognitions

The business won laurels for its technological and execution prowess.

- For its innovativeness amongst the emerging technologies, the Energy Management System for BESS used in hybrid and microgrid systems won several awards, including World Innovation Congress 2020 Awards, ET Now Solar Leadership Award 2020 and the ISGF Innovation Award 2020
- The smart portable mobile solution L&T Mobisol won the World Innovation Congress 2020 and ET Now Solar Leadership Awards 2020



Floating Solar Project, Tirupati, Andhra Pradesh

- The Bihar rural electrification project was adjudged as the best use of solar for societal benefits, and the Andaman Energy Storage project was hailed as the energy storage project of the year by ET NOW
- The automatic module dry cleaning system won the award for the best smart technology of the year from India Smart Grid Foundation (ISGF)
- The 132 kV Ghala Heights Substation earned L&T Oman the Dossier Award for the Best Contractor for Infrastructure Projects
- The power transmission & distribution projects in KSA and UAE bagged five Middle East Economic Digest (MEED) awards in different categories
- The Union Territory of Puducherry conferred the Swachhata hi Sewa award for a water management related CSR project of the Puducherry factory

Significant Initiatives

The containerized integration facility for battery energy storage systems set up at Kancheepuram was commissioned successfully and started despatch. The ready-for-commissioning cell that was created to quicken the handing-over of completed transmission line stretches has started to have a beneficial impact on customer delight. Improved modularization initiatives such as kitting

of tower components and remote electrification items continue.

In the vast expanses of Africa, mechanized bush-clearing activities and the adoption of advanced techniques, such as the Aerial LiDAR survey, have led to timely project completion with desired productivity levels. With mechanized trenching and in-house GIS surveys with 360° cameras, increased productivity was witnessed in the domestic optic fibre cabling projects too. The TL9000 certification meant for the supply chain of telecommunications industry has been obtained.

The MoMRA (Ministry of Municipal and Rural Affairs) certification for L&T Saudi Arabia has opened up opportunities with Royal Commission tenders.

Digitalisation

Taking a step towards the next level of digitalisation, a specific Opex initiative has been launched to orchestrate the data captured by digital means and to articulate the organizational wisdom in a replicable manner. This initiative is expected to enhance the predictive abilities and make the plans robust, so as to better manage risks and achieve the desired speed and scale. The Industry 4.0 journey has gained momentum in the manufacturing facilities, resulting in a marked improvement in the overall



400/132 kV Grid Station at Qabel, Oman



500/220 kV S4 Ras Ghareb Gas Insulated Substation, Egypt

equipment efficiency (OEE). At the core of such initiatives is the centralized facilitator set-up named PRAPTI – Planning, Reviewing and Assisting Projects to Improve – that equips the site team with the requisite tools and analytics to improve productivity.

Digital initiatives such as 3D/4D BIM, deployment of drones and mobility devices for project progress monitoring, connected plant and machinery, geospatial technology-based surveying, integrated material management, quality / EHS incident reporting, etc., have yielded tangible benefits. Novel solutions have been deployed, and a fibre track application that facilitates patrol management for Operation & Maintenance of cross-country cables laid is just one such example.

Also, to measure the depth profile of trenches in real time accurately, a sophisticated digital method has been used.

Environment, Health and Safety

EHS practices implemented by the business are aligned with a corporate EHS policy that is strictly followed, along with clear policies laid out at the business level. The EHS policy is supported by standard operating procedures (SOPs) at the business-unit level, and the aim of 'Zero Harm' is cascaded down to the project level through various digital and technical initiatives.

The start-and-stop OTP (One Time Password) based process with a 3-level approval mechanism for shut-down works is an example of an improvised fail-safe EHS practice meant for the geographically distributed electrification work involving workmen of different skill levels. Virtual reality-based training modules, gamified mobile training modules, etc., are utilized to inculcate a safety culture. A nimble communication platform named Prakasha Vani was launched for dial-out conferencing with large teams of field staff. WISA (Workmen Induction & Skills Application) Card implementation is used for workmen screening and allocation of tasks according to skill levels and proficiency.

In the Middle East, the Occupational Health and Safety System was migrated from OHSAS 18001:2007 to ISO 45001:2018.

The business bagged 21 British Safety Council (BSC) Awards, 8 awards from NSCI under various categories and 15 RoSPA Awards. Also, ASSE awards and appreciation certificates from several domestic and overseas customers such as PGCIL, Aramco, SEC and OETC have been received.

Human Resources

The business has been constantly engaged in developing employees for greater roles and responsibilities, ensuring that there is a talent pipeline of managers prepared to take up challenging roles.



500 kV Bang Saphan-2 to Surat Thani Transmission Line

A blend of robust processes like the Performance Management System, the Individual Development Plans, Job rotation Plan, cross-learning and cross-training opportunities help to develop young managers. They are assigned new situations and challenges which expand their skill sets and encourage them to think on their feet. Many of the new projects sites in Africa have been staffed by young managers and engineers transferred from India in accordance with the employee development plan.

A wide array of digital platforms has been implemented to connect and engage with employees as well as encourage them to undertake new learning opportunities. A year-long Employee Engagement Calendar has been launched, with specific focus on a range of activities built around the core values of the organisation. The initiatives to recruit and induct young engineers of diverse nationalities continue.

Risks and Concerns

Towards the end of the financial year, the outbreak of the COVID-19 pandemic and the resultant lockdown caused uncertainties in timely delivery of a few supply items planned. Adequate contractual safeguards have been put in place and extensive scenario planning exercises have been carried out.

Recovery is expected to be prolonged and necessitates a multi-pronged approach towards prudent financial

management, workmen management, etc., as it provides an opportunity for new methods of working and revised cost estimates.

The business has implemented a bespoke digital platform for Enterprise Risk Management that supports the pre-bid and execution risk reviews with robust stage gates.

Outlook

The proposed amendment to the Electricity Act envisages stricter enforcement of obligations that are to be fulfilled by State utilities, thereby improving their financial health. It may also open up new models of participation in the distribution sector.

The Union Budget 2020-21 hinted on a centrally sponsored scheme, focussed on smart metering, feeder segregation and AT&C loss reduction. Early formulation and implementation, along with project packaging and models of participation, are crucial.

Though the investment levels delineated in the National Infrastructure Pipeline are not markedly higher than historical trends, the report contains a KPI-based framework with specific targets on AT&C loss reduction, etc., by 2023.

In urban areas and cyclone-prone zones, HT and LT overhead lines are being replaced with underground



765 kV Gas Insulated Substation, Varanasi, Uttar Pradesh



132/33 kV Underground Cable at Ghala Heights, Oman

cables. New 11 kV feeders are created for load bifurcation. Such projects improve the overall reliability of the power distribution network and, in particular, help in avoiding unscheduled power cuts during rains and gusty winds.

The transmission lines and substations related to the second phase of Green Energy Corridors for evacuation of renewable energy are expected to get finalized. These are under various stages of bidding through the Tariff-based Competitive Bidding mode. In addition, intra-state system strengthening-related opportunities are expected to come up in select States. Also, certain mass transit projects which involve receiving substations and power supply networks are envisaged in key cities.

Grid integration of intermittent renewable energy and the emerging prospects of distributed generation require investments in power quality devices such as STATCOM, thyristor-controlled reactor (TCR) and SVC to ensure voltage stability, reactive power compensation and reduction of harmonics.

System Strengthening and Generation Linked Schemes, especially those funded by Indian Lines of Credit and multilateral aids, offer potential in Bangladesh and Nepal.

Despite the slow pace of solar EPC tenders from private developers being incommensurate with ambitious targets, there are ample opportunities, especially from PSUs.

Preference for Hybrid renewable projects and floating solar projects are also on the rise. There is a perceivable shift towards solar-cum-storage projects. The expanding support to the International Solar Alliance is a positive factor in attracting investments into the renewable energy sector in India.

The Indian market for Optical Fibre Cable has been projected to grow at a CAGR of 17 percent through 2023. Growth in the market is majorly expected to be backed by the rising investments in OFC network infrastructure by the Indian Government to increase internet penetration across the country, in line with the Government's initiatives such as Smart Cities Vision and Digital India. Also, the success of 5G technology will ultimately depend on the strength of Optical Fibre Cable connectivity.

In the Middle East, the business is cautiously optimistic in its outlook as oil prices are hovering in the lower ranges; commodity prices are volatile, and the geopolitical stalemates continue. The investment in infrastructure will depend on the fiscal surplus and financial buffers available with the countries. However, the diversification of the economy to non-oil sectors will continue to provide opportunities in terms of upgradation to higher voltage levels, integration of renewable energy sources to the existing power grid and interconnections of transmission networks.



12 Million cu.m storage reservoir for Vizag Steel Plant, Andhra Pradesh

The business continues to concentrate on key African economies that have a clear road map to build transmission and distribution networks to meet increasing demand. Ambitious plans – such as the Kenya Vision 2030, Growth and Transformation Plan II of Ethiopia and the National Development Plan of Botswana – point to significant opportunities to scale up faster. Grid strengthening, regional interconnection and rural electrification opportunities are being pursued in select countries. Renewable generation is another area that holds potential. Consolidating the breakthroughs achieved in countries forayed into, exploring renewable energy opportunities and the opening-up of select West African countries will hold the key to success in the coming year.

The rising power demand in ASEAN countries continues to pave the way for significant investments in grid interconnections, grid development and strengthening. The entry into the Philippines, Myanmar and Cambodia is expected to provide a fillip in the region. Plans are afoot for an expanded presence in Malaysia and Thailand.

Given the visibility of prospects in traditional strongholds and the thriving expansion in renewables and new geographies, the growth momentum of the PT&D business is intact, backed by a strong order book and ably supported by cost leadership, technology leverage, delivery excellence and employee engagement initiatives.

WATER & EFFLUENT TREATMENT

Overview:

The Water & Effluent Treatment business undertakes the construction of water infrastructure for the efficient usage, conservation and treatment of water. The business has proven to be a lead player in the domestic market and has also had successes in international markets. The business comprises the following verticals:

- **Water supply & distribution business**, which caters to the supply of potable water.
- **Wastewater business**, which provides infrastructure by building sewer networks and sewage treatment plants to collect and treat municipal wastewater for safe disposal of the treated effluent.
- **Large Water business**, which irrigates lakhs of hectares of land in order to enhance the livelihood of millions, pumps and lifts water from rivers to delivery chambers and distributes it using automated outlet management systems. The business also constructs combined effluent treatment plants for industries and desalination plants.



375 MLD Sewage Treatment Plant, Jebel Ali, UAE

- **Smart Water Infrastructure business**, which develops utility infrastructure in the cities as well as the shortlisted brownfield cities under the Smart City Mission.
- **The International arm**, which focuses on building water infrastructure, viz. sewage treatment plants, water treatment plants and water transmission and distribution projects. The business has a presence in the UAE, Qatar, Oman, Tanzania and Sri Lanka.

Business Environment

Aiming to provide piped water supply to all households, the Government has announced the Jal Jeevan Mission. The scheme places emphasis on augmenting local water sources and recharging existing sources, and will promote water harvesting and de-salination. The 'Har Ghar Jal' scheme to provide a functional tap connection to all households by 2024 is part of the Jal Jeevan Mission.

The business accounts for an average of more than 35% share of the domestic market. Over the years, it has emerged as a strong contender in the water segment, meeting the requirements of the public at large. Each business unit is independent, and faces stiff competition in the market including international competition from Chinese and European players.

FY 2019-20 has been volatile, with the General Elections and the change in Governments of key states. This has resulted in some delays in new prospects fructifying, and the execution of projects being stalled or reviewed by a few states. The COVID-19 pandemic also continues to have a profound impact on the Indian construction industry.

Major Achievements

The business continued its momentum in securing repeat orders from existing customers as well as attracting new customers. These orders were secured across the various business portfolios.

Major Orders Secured

In India

- Parwati Mega Lift Irrigation Schemes Phase III & IV, Madhya Pradesh
- 100 MLD Sea Water Reverse Osmosis Desalination (SWRO) Plant in Dahej district
- 477 MLD Water Treatment Plant at Chandrawal
- Area Based Development for Rajkot, Gujarat
- Gunjawani Lift Irrigation Scheme



137 MLD Water Treatment Plant, Nashik, Maharashtra



Secondary clarifiers under construction for 318 MLD Waste Water Treatment Plant, Coronation Pillar, New Delhi

- Bhubaneswar Sewerage Scheme
- Rural Water Supply Scheme to Keonjhar District in Odisha
- 30 MLD Combined Effluent Treatment Plant (CETP) at Ahmedabad, Gujarat
- Water Supply Schemes to 4 blocks in Medinipur, West Bengal
- Water Management projects in Hubballi-Dharwad, Belagavi and Kalaburgi districts of Karnataka

International

- Al Dhakhliya Water Transmission System, Phase-II project in the Sultanate of Oman
- Kundasale Haragama Water Supply Project, Sri Lanka
- Supply of Recycled Water along Abu Dhabi Al Ain Road – Package B, UAE

Awards

During the year, the business won a slew of prestigious awards:

- 7 awards from Zee Business as part of the National CSR Leadership Congress including ‘Best Water

Company’ and ‘Best Rural Drinking Water Solutions Provider’

- ‘Overall Infrastructure Development’ award from Dun & Bradstreet
- Water Optimization Awards ‘Technology Excellence in Design & Engineering’ and ‘Best Water Management in Ash Handling’ from Mission Energy Foundation
- The prestigious Golden Peacock Award for HR Excellence for 2019

The business is proud of commissioning its largest 375 MLD Sewage Treatment Plant in Jebel Ali, UAE and successfully undertaking its operation and maintenance.

The desalination project bagged by the L&T-Tecton JV this year uses the Split Partial Method for the Reverse Osmosis (RO) process, the first of its kind to be implemented in India. This is an in-house design innovation and will reap benefits during the progress of the project.

Significant Initiatives

The business keeps continuously honing its operations and process knowhow capabilities by implementing strategic initiatives for the effective working of its project sites.



Pump house for Chhaigaonmakhan Lift Irrigation Scheme, Madhya Pradesh



Lift Canal System for Upper Indravati Irrigation Project, Odisha

With significant focus on digitalisation, the business has developed many web and mobile applications such as:

- Project monitoring tool **ePragati**, from which data is captured for visualization of project progress using 3D GIS platform for pipeline and civil structures
- The customized pipe fabrication (P-Fab) application to track the status of pipes – from manufacturing to installation
- The Material Schedule Tracker (MST) to ensure timely supply of items by effective monitoring and tracking
- The WISA application for elaborate and faster on-boarding, monitoring and screening of the workforce
- Using artificial intelligence in contracts for classifying, extracting and assessing the risk in the tender's clauses

The continuous emphasis on strengthening the in-house design team has resulted in shortening the design duration by leveraging technological solutions, such as:

- Use of LiDAR surveys to capture accurate, speedy and voluminous data
- Automated design-to-drawing preparation of ESRs using in-house developed tools

- Extensive utilization of BIM for project monitoring and progress review
- Creation of value engineering centres and process improvement techniques to aid in innovation and design optimization

Apart from digitalisation, the business has also developed strong process teams and tie-ups with educational institutions like IIT Madras, Anna University and BITS, Goa for research in the field of wastewater and sludge management.

Environment, Health and Safety

The business:

- Achieved 112 million safe man-hours and clocked 5.9 lakh man-hours for training the workmen and staff
- Developed training videos for MS pipe manufacturing process (conventional and spiral), pipe-handling methodology, safe erection of transmission towers, micro tunnelling safety and pipe-bursting methodology
- Developed Project Risk Index Map for real-time hazards and risk-monitoring of sites
- Developed a comprehensive Safety Mobile application, ViewEHS, capturing safe execution cards (SEC), observation and audit reviews



Moradabad Sewerage Treatment Plant, Uttar Pradesh



Pump house for Nandawadagi Lift Irrigation Scheme, Karnataka

- Planted more than 14 lakh tree saplings, with 7 lakh+ saplings in a single day on World Environment Day 2019, and donated 4300 units of blood
- Received several awards from RoSPA (Royal Society of Prevention of Accidents), British Safety Council, Confederation of Indian Industry and National Safety Council

Human Resources

Continuous learning, improvement and excellence are the focus of the business, which has 5700+ staff across India and abroad. Various programmes are conducted to appreciate employees, such as RAVE (Recognition Awards for Value Engineering Excellence) which aims to recognize individuals and teams in L&T's Engineering, Design & Research Centre (EDRC) for their outstanding contribution to fulfilling business objectives; and PRAISE, which recognized 124 staff members for the innovations or improvements implemented by them at work.

To engage employees beyond work, various events were organized to commemorate World Water Day, World Environment Day as well as various national and regional festivals. The business also organized sporting events across all projects, which helped employees de-stress and develop a sense of togetherness and camaraderie.

Succession planning is the key to ensuring the seamless continuity of a business. A leadership programme, ASCEND, was initiated to build leadership capabilities in women managers. EMEX (Engineering Management Excellence Programme) was organized to build the project engineering management capabilities of the EDRC's managers.

Risks and Concerns

Operational risks include delays in land acquisition, ROW/ROU issues and volatile steel prices. With the majority of the business' clients being state government authorities, there isn't much risk related to projects getting shelved or concerns pertaining to creditworthiness. However, the year evidenced the cashflow rationalisation in the case of change in state governments.

The assessment of risks associated with the projects is carried out frequently to track and review the project cost, cash flows, margins as well as physical progress, and thus determine the overall health of the portfolio. Also, state-wise exposure is dynamically monitored to track any early signals of cashflow constraints.

The business proactively ensures that it has a healthy mixture of projects funded by various credit-worthy clients and bodies like the Central Government, State Governments, Municipal Corporations, Urban Local Bodies,



Command & Control Centre, Prayagraj

Multilateral Funding Agencies, etc. Wherever feasible, the payment terms with supplier and vendor partners are aligned to customer terms to avoid cash gaps.

Foreign currency exposure in the case of international projects, is minimised by ensuring a natural hedge at the bid stage. Further, hedging policies are also in place for exposures, if any.

Outlook

The business is anticipating an increase of multilateral funded projects in the next year from the domestic market. The Jal Jeevan Mission is envisioned to provide piped water supply to every rural household under the 'Har Ghar Jal Yojana' scheme by 2024, which will bring greater coherence to policy objectives and the decision-making process.

However, the business foresees challenges in terms of payment slowdown, mobilization of the workforce and loss of the productive months of the year due to the ongoing pandemic.

A revision of the National Water Policy 2012 with key changes in the water governance structure and regulatory framework is anticipated in FY 2020-21, with more emphasis on water management and river interlinking. This is expected to give impetus to the business.

The Union budget proposed an allocation of ₹ 11,500 crore during the year 2020-21 towards the Jal Jeevan Mission. The Jal Shakti Ministry has been formed by merging the Ministry of Drinking Water and Sanitation (MDWS) and the Ministry of Water Resources and Ganga Rejuvenation (MoWR).

SMART WORLD & COMMUNICATION

Overview:

L&T's Smart World & Communication (SWC) vertical was created in 2016 to address the emerging need for a safe, smart and digital India. As a Master Systems Integrator, SWC operates and retains market leadership in the following segments:

- Smart Cities & Smart Infrastructure: Smart Cities, e-gov, Smart Energy, Smart Education, etc.
- Safe Cities: Public Safety, Critical Infra Security, Intelligent Traffic Management, etc.
- Communication & Telecom Infrastructure: Wired & Wireless i.e. IP/MPLS backbones, Dense Wavelength Division Multiplexing, Global System for Mobile Wi-Fi, Satellite, Microwave, Emergency Communications like APCO, Tetra, Early Warning Dissemination, 5G, etc.



Data Center, Hyderabad



Tourist Information Kiosk, Jaipur

The business has gained experience across 26+ cities and 44 agencies in the country. It has built a technology and project management team with over 800 personnel, to cater to the needs of both projects and Operations & Maintenance. The business is currently in the process of rolling out various initiatives to transform itself as a 'thought partner' to its clients; a value-adding Master System Integrator (MSI) with futuristic solutions, strategic partnerships, as well as Integration & Analytics and domain-specific centres of excellence.

Business Environment

A growing number of cities is adopting elements of smart city infrastructure, such as intelligent traffic management and surveillance systems, smart electric grids and lighting, fibre optic cabling and transport and logistics systems. Out of the 100 Smart Cities planned in the Smart Cities Mission, an integrated command and control centre along with various Smart City solutions is operational in 47 cities, with 17 more cities being in the process of implementation.

To provide 100% population coverage for telecom and high-quality broadband services for the socio-economic empowerment of every citizen and end-to-end online delivery of government services, the Government will continue its investment in the Bharat Net Programme.

During the COVID-19 pandemic lockdown, the authorities leveraged Smart City or Safe City Command and Control Centres set up by the business, with cutting-edge technologies like AI, IoT, etc. The business has rolled out smart technology solutions to combat COVID-19 in 20 major cities across India. These technologies are helping the administration in cities such as Mumbai, Pune, Nagpur, Prayagraj, Raipur, Ahmedabad, Visakhapatnam and Hyderabad in fighting the pandemic through Command Centres or City Operations Centres.

Major Achievements

The business received several major orders, as follows:

- a. The business won a large order to establish the first-of-its-kind, state-of-the-art Unified Network Management System to Manage, Support and Operate a countrywide Armed Forces Network under the Network for Spectrum (NFS)
- b. Jhansi Smart City involving deployment of an Integrated Command and Control Centre, Intelligent Traffic Management System, City Surveillance, City Wi-Fi, technology-enabled Solid Waste Management, GIS, Citizen Portal and e-Office Applications



City Operation Centre, Nagpur

- c. SUMITRA Project, which is a pilot project for Surveillance using Multilayer Intelligent Tracking, Response and Analysis system on a turnkey basis
- d. Army IP MPLS - an order to create an IP MPLS Network Backbone for the Armed Forces
- e. Hyderabad ITMS Expansion an order for expansion of the Intelligent Traffic Management System for Rachakonda and Cyberabad

Other Achievements

The Early Warning Dissemination System (EWDS) for Odisha was effectively utilized in disaster management by the Government during Cyclone Fani enabling the Government of Odisha to save millions of lives through dissemination of warnings through text messages (26 million messages), Sirens and Radio communication.

The business successfully rolled out 1 million+ Smart Meters, with Meter Data Management System and Head End System hosted on the cloud, in the states of Uttar Pradesh and Haryana as part of the ongoing project to deploy 5 million Smart Meters.

The business commissioned the E-shiksha (Hi-Tech Lab) project for the state of Tamil Nadu, involving the largest roll-out of ICT for more than 6000 schools in Tamil Nadu.

The largest City Surveillance and Intelligent Traffic Management System for Hyderabad was declared Go-Live.

The Early Warning Dissemination System (EWDS) for Andhra Pradesh was successfully commissioned and covers 10 coastal districts.

Raipur Smart City was successfully commissioned and declared Go-Live.

Awards and Recognition

In the year under review, the business won over 10 prestigious awards, including: -

- 'Best Smart City Award' at the Dun & Bradstreet Infra Awards 2019, for Nagpur Smart City
- 'Best Safe & Secure Initiative' Award at the 5th BW Digital India Awards, for Prayagraj Smart City
- Unique Artificial Intelligence-based Solutions at the Data Science Excellence Awards, CYPHER, for Prayagraj Smart City

Significant Initiatives

The business has taken the following initiatives in the areas of tendering, technology, supply chain management and operational efficiency improvement:

- In order to solve problems utilising the huge amount of data being collected in 25+ Smart and Safe cities,



Early Warning Dissemination System, Odisha



Smart Pole, Vizag

the business has set up an Analytics & Integration CoE using Big Data, IoT and Artificial Intelligence technologies. The business has also undertaken the development of a world-class Integrated platform, which allows the creation of one Operating System to solve business problems as against point solutions. This value-based approach helps in retaining clients. Under this initiative, a pilot use case of in-house AI-based crowd management solutions was successfully deployed in Telangana State to manage 'Samakka Saralamma Jatara', Asia's largest tribal fair

- The business is continuously working with global partners, reputed academic institutions and start-up ecosystems to co-develop customised solutions, blending the partner's technology and its domain expertise. This approach will position the business as 'Value-adding MSI' and help transform it into a 'thought partner' to clients
- The business launched a multitude of digital solutions to support the business functionalities, viz.
 - **SWIFT:** 'Supply and Work Integrated Finishing on Time' to enable procurement
 - **Centralized O&M:** A GIS-based tool to track O&M activities and incident management

- **VR Training Module:** A virtual reality training module for site staff/workmen
- **QMS Tool:** QMS Manual and Risk / Opportunity / Objective Tracking

Environment, Health and Safety

- The business completed 4.93 million safe manhours during this financial year
- The business planted 35,974 saplings and donated 403 units of blood
- The business won 4 RoSPA Gold Awards from The Royal Society for the Prevention of Accidents, UK, for Lucknow Metro Rail Project, Raipur Smart City, MEGA Telecommunication Project and Prayagraj Smart City
- The business launched its second digital application, VIEW EHS, this year and received copyrights over the application
- After successful completion of transition audits by DNV-GL, the business has been recommended for ISO 45001:2018 certification

Human Resources

The team comprises multi-domain technical talent with specialists in the areas of communication, IoT, server and storage, Cloud in Smart Cities, Safe Cities and



Surveillance cameras installed at Prayagraj

Communication technology areas. The focus over the last year has been on building capabilities in cutting-edge technologies like AI, IoT, Computer Vision, Cyber Security, Blockchain technologies for Smart Cities. Project Management, and Domain Expertise, blended with technology expertise – all of which have differentiated the business, enabling it to retain its position as market leader for the last few years.

Technical certifications are a focus area, with over 150 employees obtaining certification in courses from CISCO, Microsoft, Huawei, Juniper and Cloud.

Technology-enabled learning has been extensively deployed, using eLearning and webinars as well as microlearning using the ATL Next and RapL platforms. The business recognizes high performers through its Quarterly PRAISE awards programme.

Risks and Concerns

Though the projects secured are funded through Union and State budgetary allocations, payment terms continue to pose working capital challenges. Projects with certain State authorities need close monitoring due to delay in handing over of sites, delay in certifications due to involvement of multiple agencies and the challenges faced in timely budgetary allocations.

Operational risks – such as timely mobilisation, procedural delays in ROW and sign-offs are mitigated through digital interventions at every stage of project implementation – from planning to monitoring operations – helping the management to take appropriate action to pre-empt and overcome challenges.

The business is well supported by a centralised support team in the maintenance of SLA requirements.

The business also faces unstructured competition through aggressive bidding of new entrants in certain segments. However, with its experienced team and previous experience in executing complex technological projects, L&T has an advantage in the market.

Outlook

The Infrastructure Vision 2025 includes the goal of 'Digital Services: Access for all', amongst others. The current pandemic has opened new opportunities to leverage digital services owing to the necessity of social distancing, which is going to be the new normal.

Under the Bharat Net Programme, investment in digital connectivity backbone will be more prominent.

The Government has also announced the possible launch of Smart Cities Mission 2.0 soon, covering 4000+ cities/towns.



Chhabra Coal Handling Plant, Rajasthan

Under the Smart Meter National Programme, the Government aims to replace 250 million conventional meters with Smart Meters in the next 5 years. With the Government's focus on reducing commercial losses and providing a choice of suppliers to consumers through Smart Meters, this programme is likely to be implemented at an accelerated mode with a target of completion of 3 years.

The Ministry of Home Affairs continues its focus on Safe Cities and the modernization of the Police force. It is expected to launch multiple City Surveillance projects and augment the scope of the existing Safe City projects.

With the continued need for perimeter security for all critical installations – including defence establishments, air/ army bases, armament factories, nuclear power plants, etc. – investments are expected to flow into projects designed to meet these security needs.

Another focus area in the National Infrastructure Pipeline is the creation of technology-driven learning. This focus on creating ICT infrastructure for primary and secondary schools through 'Samagra Shiksha Abhiyan' is expected to create many new opportunities in e-Education.

The Union Budget 2020-21 also announced the National Mission on Quantum Technologies & Applications with an outlay of ₹ 8,000 crore over the next 5 years to focus on a quantum computing domain and its impact on new

frontiers in computing, communications and cyber security, with widespread applications including smart cities.

The business has the unique advantage of in-house domain expertise, enabling it to provide end-to-end offerings to its customers. This enables it to play the role of a Master System Integrator for the Smart Cities of the future.

■ METALLURGICAL AND MATERIAL HANDLING

Overview:

L&T's Metallurgical and Material Handling (MMH) business offers complete EPC solutions for the metal (ferrous and non-ferrous) sectors across the globe. The business undertakes end-to-end engineering, procurement, manufacture, supply, construction, erection and commissioning, covering the complete spectrum from mineral processing to finished metal products with state of the art Process Plants.

The business also offers comprehensive product solutions such as Mineral Crushing Equipment and Plants, Surface Miners, Premium Sand Plants, Material Handling Equipment (Stackers, Reclaimers, Wagon Tippers, Ship Unloaders, Multipurpose



Finishing Mill for Rourkela Steel Plant

Cranes and other Mining Equipment), as well as Steel Plant Machinery catering to core industrial sectors, including Cement, Mining, Power, Construction, Steel, Fertilizers and Chemical Plants. The complete range of product solutions is backed by 5 decades of experience and knowledge, in-house design resources and state-of-the-art manufacturing capabilities. The manufacturing centres of its product lines are in Kansbahal, Odisha and Kancheepuram, Tamil Nadu with facilities for fabrication, machining and assembly of custom-made equipment and critical structures. The business commands a leadership position in the sectors it serves.

Business Environment

The metal sector, as a whole and specifically the base metal sector, witnessed a subdued price level globally on account of less-than-anticipated growth in demand.

The demand for Manufactured Sand witnessed a rise with the increasing restrictions / bans on river-sand mining. The replacement of river sand with quality manufactured sand continues to gain momentum, improving prospects for the business.

The successful completion of the steel industry consolidation and allocation of iron ore mines in Q4 FY20

has brought all the majors on par as vertically integrated producers. Despite the liquidity crunch during the consolidation cycle and new expansions not immediately on the anvil, the refurbishment and de-bottlenecking of newly acquired assets to synergise with their existing products will be something very much on the cards.

The business faces reduced competition in EPC contracts and technology-oriented projects due to the scarcity of players matching qualification requirements.

In the wake of the COVID-19 pandemic, the global demand has plummeted and business cycles have been disrupted, resulting in a major production cut by the industry. The industry is expected to take time to attain full capacity again.

Major Achievements

The continued focus on the Middle East and North Africa (MENA) has yielded good results in FY 2019-20, with the award of major orders from the Ma'aden-Gold Plant Project in Saudi Arabia and the Etihad Rail – Freight-handling package in UAE. Despite the limited opportunities available during the current year in India, the business has managed to stay ahead of its competitors in terms of order booking.



7C Stacker-cum-Reclaimer installed at Khargone

Marquee projects commissioned / at an advanced stage of completion in the year 2019-20 are:

- Hot Strip Mill at Rourkela Steel Plant
- Basic Oxygen Furnace plant at Bokaro Steel Plant – Commissioned
- Tandem Tippler at JSW Paradip – Commissioned (hydraulically driven largest tippler in India)
- CHP & AHP at Tanda, Khargone
- CHP Lingaraj, Chhabra (Phase 1)
- 10 Large-capacity state-of-the-art sand plants commissioned for various customers
- 3 Newly-developed Track-Mounted Mobile Roll Crushers commissioned for coal-crushing applications
- 5 Surface Miners commissioned in Coal India subsidiaries
- 1100 MT Sky bridge in Colombo, fabricated in a factory at EWL works Kancheepuram.

Significant Initiatives

The business has strategic alliances with leading global technologists to offer comprehensive EPC solutions across the various sectors of mineral beneficiation, steel processing units and mega-sized by-product plants. The technical

collaboration with Kemco of Japan was strengthened to enable the addition of many new products for the construction industry.

Digitalisation

There is an increased thrust on digitalisation of processes / activities to enhance operational efficiency through faster decision-making with ready availability of data. The large international projects are being executed through Building Information Modelling (BIM) connected philosophy where in-house 3D engineering capability is being extended to 4D for scheduling with Work Breakdown Structure (WBS). Comprehensive solutions for EPC Planning and Monitoring, as well as Communication and Document Management solutions are implemented for projects under execution. Many of the sites have digitalised the workmen induction and tracking processes, while the initiative on connected equipment began giving results in terms of increased utilization.

The business has further strengthened real-time monitoring systems for Stockyard Machines, Sand Plant and Surface Miners through IOT and linked customized dashboards for optimum utility of the system for customers.

Environment, Health and Safety

Leadership and management commitment are demonstrated at all locations and levels, by continual

improvement in the EHS processes and their implementation. Various digital tools, including Virtual Reality (VR) based training modules for 'Safe Rigging Practices', have been deployed at all project sites. Concerted efforts are made to involve and engage every employee, including workmen, in the safety cultural transformation, with a training coverage of 0.52 million manhours. Similarly, IB4U (Inspection Before Use) has been launched to track the inspection details of various materials and equipment including P&M, tools and tackle, PPE, etc.

All operations have been certified for ISO 45001: Occupational Health & Safety.

Various national and international awards and accolades have been received for projects and factories in recognition of EHS excellence from the Ministry of Labour and Employment, RoSPA, ICC and customers.

Human Resources

Focussed interventions for employee learning and growth were implemented through various virtual platforms like RAPL and webinars after mapping the needs across various levels and functions. To reinforce the latest developments in technology and automation in processes, the business has developed a pool of internal trainers. They share knowledge and enhance implementation of these initiatives at all locations for the development of our personnel and to improve productivity. To increase employee satisfaction, the business uses open communication channels like Connect HR, Townhalls, 2-way feedback and an internal newsletter - Sampark, while continuing with appreciation schemes, such as Hi5, NMR and PRAISE.

For building future leaders, a focused way of talent building across positions and levels, employees are provided with challenging opportunities across various functions, including job rotation with active handholding and mentoring by senior leaders. Leaders have been identified for senior key positions as part of the succession planning process.

Risks and Concerns

The impact of the pandemic on the global and national economy and the time the situation takes to return to normalcy will determine the confidence of industry, especially the private sector, towards fresh capital expenditure.

COVID-19 will impact business operations, with restrictions on the mobilization of the workforce to MENA and disruptions in the supply chain, which may have adverse effects on the projects under execution. However, strategies to overcome these difficulties are being put in place to minimize impact, and customers are taken into confidence.

Outlook

While sentiments looked positive for FY 2020-21, the COVID-19 pandemic has put the industry across the globe on the back foot. Global investments may be impacted in developing nations.

While the base and light metal prices continued to be subdued, the demand for these metals in the medium-to-long term looks robust enough to meet the growing needs of domestic consumption.

While oil prices are recovering after hitting new lows due to weak demand, impact on earnings of the GCC countries may slow down the capex plans of governments. Even though there is a slump in prices of base metals due to weak demand, GCC nations (e.g. KSA) with their own mines are expected to move ahead with capex plans to compensate for the loss of revenues from the oil sector.

With expected growth pick-up in the coal and cement sectors, core products like Crushing Plants, Surface Miners and Material Handling equipment are expected to grow at a good pace, especially in the second half of FY 2020-21.