

HYDROCARBON BUSINESS

Overview:

L&T's Hydrocarbon business provides integrated 'design to build' turnkey solutions for the global oil & gas industry and fertiliser sector. The Company executes projects for oil and gas extraction and processing, petroleum refining, chemicals and petrochemicals, cross-country pipelines and terminals. In-house capabilities range from front-end design through detail engineering, procurement, fabrication, project management, construction and installation up to commissioning services. L&T's Hydrocarbon business is housed primarily in a wholly owned-subsiary, L&T Hydrocarbon Engineering Limited (LTHE).

The business has a fully integrated capability chain, including in-house engineering and R&D centres, world-class modular fabrication facilities as well as onshore construction and offshore installation capabilities. Major facilities in India include Engineering & Project Management Centres at Mumbai, Vadodara and Chennai, as well as Fabrication Yards at Hazira (near Surat) and Kattupalli (near Chennai). The Company's overseas presence is primarily in the Middle East, i.e. in the UAE (Sharjah), Saudi Arabia (Al-Khobar), Kuwait and Oman (Muscat). The business also has a major Modular Fabrication and Heavy Engineering Facility at Sohar in Oman.



40,000 MTPA Melamine Plant for Gujarat State Fertilizers & Chemicals, Vadodara, India

The business caters to clients across the hydrocarbon value-chain through the following business verticals:

Offshore

Lumpsum turnkey EPCIC solutions are offered to the global offshore oil & gas industry encompassing wellhead platforms, process platforms and modules, subsea pipelines, brownfield developments, offshore drilling rigs (upgrade and new-builds), floating production storage and off-loading (FPSO) modules, deep-water subsea systems, offshore windfarm projects and decommissioning projects.

The business has comprehensive engineering capabilities covering the complete project life cycle from feasibility studies, concept, FEED, 3-D model based detailed engineering, special studies to commissioning for offshore projects. The offshore capability is supplemented by a self-propelled heavy-lift-cum- pipe-lay vessel – LTS 3000 – held in a joint venture with Sapura Energy Bhd and a recently-acquired pipe-lay barge – LTB 300 – which will be an enabler in augmenting the Company's offshore installation capabilities.

Onshore

The business vertical provides EPCC solutions for a wide range of onshore hydrocarbon projects covering upstream oil & gas processing, refining, petrochemicals, fertilisers (ammonia & urea complexes), cryogenic storage



A fully-integrated gas platform - the heaviest in Saudi Aramco's history - installed by float-over method at Hasbah Field in Saudi Arabia

tanks and LNG regasification terminals and cross-country pipelines. The business has a track record of successful simultaneous execution of multiple mega projects having diverse technologies from process licensors like UOP, Axens, Haldor Topsøe, Lummus Technology, Scientific Design, Black & Veatch, Ortloff, Air Products, ExxonMobil, Merichem, Foster Wheeler, Casale, BOC Parsons, Invista and Davy Process Technologies.

The Company's Design Engineering Centres – L&T Chiyoda for onshore engineering and L&T GULF for pipeline engineering – enable it to offer its clients the complete spectrum of FEED, process and detailed engineering. In-Kingdom EPC prospects in Saudi Arabia are addressed through the Company's subsidiary, LT Arabia, registered as an IKEPC Company.

Construction Services

This business vertical renders turnkey construction services for refineries, petrochemicals, chemical plants, fertilisers, gas gathering stations, crude oil & gas terminals and underground cavern storage systems for LPG and cross-country oil & gas pipelines.

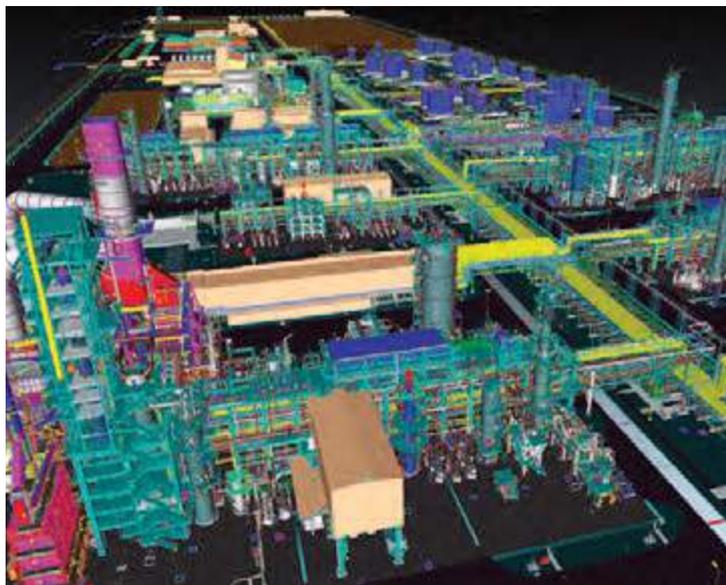
Its major capabilities include heavy lift competency, application of advanced welding technologies, high levels of automation, management of manpower and material in large volumes at construction sites and Quality / HSE

systems conforming to international practices. The business has also invested in strategic construction equipment, a range of pipeline-spread equipment, automatic welding machines and other plant and machinery for electro-mechanical construction works. The business has executed projects for major private sector customers as well as major oil PSUs.

The Company's country-specific entities render construction support to international onshore projects – Larsen & Toubro Electromech LLC in Oman, Larsen & Toubro ATCO Saudia LLC in Saudi Arabia, Larsen & Toubro Kuwait Construction General Contracting WLL in Kuwait.

Modular Fabrication Services

Comprehensive modular solutions are offered, with a unique combination of Modular Fabrication Facilities backed by rich and extensive experience in Project Engineering, Procurement and Installation / Construction, Testing and Commissioning (EPIC/EPCC) in both Offshore and Onshore domains, in primarily the oil & gas sector. This includes fabrication and supply of modules and static equipment for offshore oil & gas fields, refineries, petrochemical plants and fertiliser complexes. World-class modular fabrication facilities are strategically located at Hazira (India's west coast), Kattupalli (India's east coast) and Sohar (Oman) with a combined annual capacity in excess of 2,00,000 MT (depending on the product mix). These



3-D model of Normal Paraffin & Derivative Complex under execution for Farabi Petrochemicals at Yanbu, Saudi Arabia



One of the 4 decks of SFNY-4D project installed in Safania Field for Saudi Aramco

facilities offer year-round delivery capability with robust QHSE performance and are equipped with state-of-the-art infrastructure and machinery for operational and logistical flexibility, project management and cost competitiveness. The business is also equipped to supply foundations and other modules for offshore wind farm projects and modular e-houses.

These all-weather waterfront facilities have easy access to clients across the globe and have load-out jetties suitable for the dispatch of large and heavy modules via ocean going vessels and barges.

Advanced Value Engineering & Technology Services (AdVENT):

The Company's erstwhile Engineering Services vertical has been restructured into a specialized vertical. Known as 'AdVENT', it offers customer-centric solutions for the Hydrocarbon industry and emerging industries while addressing the specific needs of the changing energy sector.

Leveraging its expertise in high-end engineering and execution of large-scale technologically complex EPC projects, AdVENT delivers comprehensive solutions encompassing Design & Engineering, Project Management, Strategic Project delivery, Modularisation, Asset Management and Turnaround Services.

AdVENT is involved in implementation of indigenous 2G (Second Generation) Ethanol Technology through upcoming plants based on agro-waste under the National Biofuel Policy.

Business Environment

FY 2018-19 witnessed fluctuating commodity as well as currency markets. Oil prices exhibited significant volatility with Brent crude price soaring to USD 86 per barrel in early October 2018 and subsequently nosediving to a low of USD 51 in December 2018. However, the business environment in the Middle East for oil & gas projects is quite buoyant, with large-scale projects under various stages of development. There are now visible signs of higher capital expenditure in both Onshore and Offshore businesses.

Saudi Arabia has reported a rise in oil and gas reserves up to 268.5 billion barrels. Abu Dhabi has passed an AED 132 Bn budget for the next 5 years, with increased focus on gas production, unconventional and new developments. Also, ADNOC is allowing more international companies to independently mine for oil & gas. However, localisation content and value norms in the GCC countries are becoming intense, with significant weightage given while awarding projects.

Indian refineries are in a healthier financial position due to higher refining margins and a lower subsidy burden.



LTB 300, a pipelay-cum-work barge undertaking offshore installation

Significant investments are planned by PSUs in the debottlenecking of existing assets, expansion of existing refineries and integrating refineries with petrochemical complexes.

The Government has its focus on the LNG Infrastructure. Consequently, it has slashed the import duty from 5% to 2.5%. Also, enhanced oil and gas recoveries are subsidized by the Government for royalties. The Indian market is becoming increasingly attractive to international competitors, with India's ambitious plan to enhance its refining capacity by 2030.

Consolidation continues in the industry as service providers seek to create value through integrated offerings to clients. Intensity in competition is increasing by the day, with the prevalence of predatory pricing among service providers.

Major Achievements

Offshore

Projects Completed

During the year, the offshore vertical handed over three wellhead platforms ahead of schedule to ONGC for their Neelam Redevelopment Project. The balance process platform, along with an associated bridge, is progressing on schedule. The Company also completed Transportation & Installation (T&I) for Daman Development Project and achieved substantial completion for ONGC's Pipeline

Replacement Project – 4 (PRP4) project. It also completed the Safaniya 4 Deck project and upgraded 17 Tower Cranes for Saudi Aramco.

Orders Won

- EPCI contract in consortium with Subsea7 for three oil production deck manifolds and subsea pipelines in the Zuluf and Berri Fields of Saudi Aramco.
- Contract in consortium with Baker Hughes and McDermott International for ONGC's largest deepwater oil & gas project, the development of block DWN-98/2 in the Krishna Godavari basin.
- EPCI contract from ONGC for development of Cluster 8 marginal field involving three wellhead platforms, 1 bridge-connected wellhead-cum-riser platform, a ~59 km pipeline, 3 clamp-on structures and modification of two platforms.

Onshore

Projects Completed

- Gathering Centre, GC-30, in North Kuwait for Kuwait Oil Company
- SNDC-2 and KDC-2 projects for PDO, Oman



Saih Nihaydah Gas Compression Project (SNDC2) for Petroleum Development Oman (PDO)

- Off-gas treatment (urea plant) was successfully commissioned for GSFC
- Mechanical completion of a melamine plant for GSFC
- Mechanical completion for IOCL Haldia's Coke Drum System Package (CDSP)

Orders Won

- Two fertiliser plants of 2,200 TPD ammonia and 3,850 TPD urea at Barauni (Bihar) and Sindri (Jharkhand) on EPCC basis in consortium with TechnipFMC from Hindustan Urvarak and Rasayan Limited (HURL) - a major breakthrough in the fertiliser segment, offering complete ammonia plants.
- Seven cracker furnaces of 1200 KTPA Dual Feed Cracker Unit (DFCU) on EPC basis from HPCL-Mittal Energy.
- EPCC order from IOCL for 357 KTPA Mono Ethylene Glycol (MEG) Plant and a 180 KTPA Ethylene Recovery Unit (ERU) under LSTK-1 Package.
- EPC contract from KOC for installation of New Strategic Gas Export Pipelines, 48" diameter, spanning 145 km from North Kuwait to Mina Al Ahmadi Refinery.

- First breakthrough project in Algeria – EPCC contract from Sonatrach for South West Gas Fields Development Project.

Construction Services

Projects Completed

Successful commissioning of ROGC, PCG DTA, PX-04, MEG, LDPE and ECSP plants for Reliance Industries Limited, Jamnagar.

Orders Won

- Pipeline and associated works in the south-eastern region of India from IOCL
- Upgradation of facilities of Mangala Terminal at Barmer for Vedanta
- Additional scope in existing contracts

Modular Fabrication

Projects Completed

- Launching of Hasbah II Tie-in Platform (TP-II) - the heaviest Gas Platform in Saudi Aramco's history.
- Supply of fabricated and modularised CCR, NHT, MHC Heaters to JNK Korea for Dangote Oil Refining Company Limited, Nigeria.



Construction of the world's largest ethylene cracker (1.4 MMTPA) for Reliance Industries, Jamnagar, India

Orders Won

The business secured a breakthrough order from an international customer for process and pipe-rack modules.

AdVENT

Orders Won

- EPCM contract for an ethanol production unit from the off-gas of IOCL's Panipat refinery
- Various projects from BASF Corporation, BHEL, Cairn Oil & Gas, IOCL, Coromandel Fertilizers, Gujarat Chemical Port Terminal Company Limited, ONGC, SKI Carbon Black, Gujarat Alkalies and Chemicals Limited and others

Significant Initiatives

The business has a vision: to 'Revolutionize the Hydrocarbon Industry' and a mission of 'Execution Par Excellence'.

The Company lays continued emphasis on sharper bidding to enhance its market share and execute projects within time and cost to protect bid margins. The business continued its journey with its Operational Excellence initiative, which aims to achieve refined cost structures, align operations for timely project deliveries and optimize fund deployment. This initiative has yielded results for the

Company, reflecting in enhanced cost-competitiveness in its bids and further improvement in its bottom-line for projects under execution. The business has now embarked on an initiative for cost-reduction through Design Value Improvement.

Its capability-building initiative has led to significant progress in terms of building portfolio and project leadership as well as functional group development. This initiative aims to build globally benchmarked project leadership teams to execute large international projects and develop and institutionalize an international project capability development engine.

Through its Perspective Plan 2026, the Company lays strategic thrust on new business segments like Offshore Wind Energy and is gearing up for emerging Waste-to-Value projects.

Digitalisation

The Company is geared towards introducing and implementing innovative practices and has adopted digital technology for global delivery.

The Company is enhancing its current practices through digital / new-age technological advances including Integrated Project Management System (IPMS). The



Laying of 36" x 67 km-long natural gas pipeline from Anjar to Mundra in Gujarat for Gujarat State Petronet Limited on EPC basis



Load-out of BSE-11A Topside for Bassein Development 3 Well Platform & Pipeline Project of ONGC from Modular Fabrication Facility at Hazira, India

business has also launched digital fabrication and construction initiatives in order to improve productivity.

Environment, Health and Safety

Much emphasis is laid upon the Environment, Health, Safety and Sustainability aspects of the Company. It remains committed to achieving HSE excellence at the workplace and beyond by continuously striving to improve, protect and develop the health, safety and environmental assets of its employees and stakeholders.

The business strongly believes that every incident is preventable and is committed, through its 'Zero Incident Credo', to providing a safe and healthy workplace. During the year, the business delivered over 112 million safe man hours at a stretch across a dozen successful projects both in domestic and international markets. All the three Modular Fabrication Facilities maintained a zero Lost Time Injury (LTI) record for the financial year.

The Company drives HSE excellence across the EPC value chain from engineering to commissioning of projects, applied to all stakeholders by reinforcing a safe working culture through various initiatives:

- HSE Assurance Audits were initiated and carried out for all the verticals to ensure the effective implementation of the HSE management system across the business.

- Theme-based campaigns were observed on World Environment Day, Fire Service Week, L&T Safety Day, Road Safety Week and National Safety Day to create awareness and engage employee and contractors on HSE aspects

- Conducting various HSE training programmes, mock drills, near-miss incident reporting

The business received recognition of the safe practices by way of following accolades:

- National Safety Council Award for the Lowest Accident Frequency Rate in September 2018
- Safety Innovation Award 2018 for implementing Innovative Safety Management Systems by the Institution of Engineers (Delhi)
- Golden Peacock Environment Management Award for 2018 for commitment towards Environment Management
- Challenger's Award – Mega Large Business in Engineering Sector at the Sustainability 4.0 awards 2018 co-hosted by Frost & Sullivan and the Energy and Resource Institute
- ASSE GCC HSE Excellence Platinum Award & Gold Award for 2018 for Management of Driving Safety



Load-out of two mega Tie-in Platforms (7000 MT each) for Hasbah Field, Saudi Aramco from L&T Hydrocarbon Engineering's Oman facility

As a responsible corporate citizen, the Company is determined to continue operating in an environmentally sustainable manner by preserving resources, mitigating negative impacts and improving efficiency. The Company received the Sustainability 4.0 Award 2018 under the Challengers Category from Frost & Sullivan and TERI.

Human Resources

The business focuses on acquiring a unique and diverse set of talented and passionate individuals. It has adopted various policies and initiatives for the sustenance of healthy employee relations, employee growth and development as well as work satisfaction.

The organisation utilises state-of-art training infrastructure and resources to develop the project management skills as well as functional and leadership competencies of its employees. It also nurtures and grooms talent.

The design and deployment of the GENIE Engagement survey and the GPTW with the subsequent business-specific and managerial level interventions undertaken and communicated through the multiple forums of 'IGNITE' like 'Town Hall', webcast, video conferencing bears testimony to the commitment to create a highly engaged work-force. The Company inculcates a culture of appreciation through various Reward & Recognition interventions. The 'I-TOO' recognition framework, initiatives like ICONS, Long Service

Awards, Talent Champions, Team Building Workshops, non-monetary recognition events, etc., are periodically undertaken to enhance the employee motivation.

Risks and Concerns

The major risks – such as impact of fluctuating oil process, onerous contract terms by client, tight schedule, counterparty risk, localization requirements, forex exposure, vendor default, delay in material delivery, QHSE, Productivity, etc. – are mitigated through specific actions like operational excellence initiatives, alliances, cost optimisation, improved customer intimacy, compliance with stringent QHSE standards, proactive hedging, strong contract and claims management and identification of key personnel and talent at the pre-bid stage.

Localisation is increasingly becoming a key differentiator. ADNOC is driving an In-Country Value (ICV) programme, while Saudi Aramco is driving an In-Kingdom Total Value Add (IKTVA) programme with the objective of growing and diversifying their economies and creating opportunities for their nationals in the private sector. The Company has executed a Memorandum of Understanding with Saudi Aramco for commitment to IKTVA with a Five Year Plan. The South East Asian region continues to protect local players under the 'Bumiputra' concept.



Mangalore Aromatic Complex for ONGC-Mangalore Petrochemicals Limited, India

Proactive Risk Management is an integral part of the overall governance process to identify, segregate, mitigate, control and monitor various risks at all levels – business, prospect and operational.

The Company's risk management policy and guidelines have enabled it to create a consistent set of standard tools and templates, incorporating global best practices and procedures. This enables the Company to build the ability to anticipate challenges and opportunities in order to achieve its strategic objectives.

Outlook

US oil production is expected to grow by around 1.2 million barrels per day in 2019, and will be balanced by production cuts by OPEC countries and their allies. Oil prices are expected to be range-bound around USD 60 to 70 per barrel during FY 2019-20.

India will be Asia's fastest-growing economy in the next four years i.e. 2019-23. Oil demand in India is growing at CAGR of about 4.5%. The gas energy mix is expected to shift from the current level of 6.5% to about 15% by 2022. India is planning to double its annual gas production to 60 BCM by 2022. The Government of India is incentivizing Enhanced Oil Recovery (EOR) projects. Also, India has an ambitious plan to enhance its refining capacity from about 248 MMTPA to about 438 MMTPA by 2030.

The Indian Government is keen on India's becoming a gas-based economy. This will provide significant opportunities for LNG import terminals and gas pipelines. India is the fourth largest LNG importer in the world. LNG imports into the country accounted for about one-fourth of total gas demand, which is estimated to double over the next five years. The Government of India aims to increase the use of biofuels / alternative fuels to cut its oil import bill by 10% by 2022 and plans to build 2-G ethanol plants using agricultural residue. The Company is well poised to undertake execution of these 2-G ethanol plants and is gearing up for other Waste-to-Value projects. This serves as a significant opportunity to the business in upcoming years.

During the year, 55 oil and gas exploration areas were awarded under the first round of Open Acreage Licensing Policy (OALP). The Government has auctioned an additional 14 blocks in the second round and 23 blocks in the third round. ONGC is also planning to invest USD 3 billion to explore ultra-deepwater fields in Cluster 3 on the east coast of India. E&P activities are also picking up in Vietnam and Myanmar.

Refinery capacity additions of about 17 MMTPA along with petrochemical integration are planned in FY 2019-20. Deregulation of fuel prices is encouraging overseas companies to invest in retail and refinery projects. India's domestic polymer demand is growing at about 8.5% per annum and India is currently the net importer of polymers.



Group Gathering Station-11 for RIL's Coal Bed Methane Field Development Project, Shahdol, Madhya Pradesh



Panoramical view of PTA Plant for JBF Industries, Mangalore

The widening demand- supply gap for petrochemicals, coupled with enhanced returns for integrating petrochemical complexes vis-à-vis standalone refinery, is driving the integrated refinery and petrochemical complex model.

In the international arena, GCC region and Algeria will see higher outlays for gas, downstream and petrochemical projects.

Saudi Aramco plans to invest over USD 140 Bn in oil, gas and petrochemical projects over the next five to six years. The UAE is planning a USD 36 Bn spend over the next five years, with a focus on gas production. Kuwait is also diversifying into the petrochemicals segment and has announced a USD 115 Bn investment plan, roughly divided equally between the upstream and downstream sectors. Qatar is planning to invest to USD 5 Bn in the offshore sector to increase its LNG Liquefaction Capacity to 100 MMTPA. These prospects will provide significant business opportunities for the Company in the region.

Algeria has plans to invest about USD 55 Bn in the next 5 years. The recent breakthrough in Algeria will open up significant opportunities for the Company to leverage its modular fabrication capabilities.

There is increasing thrust on modularization to reduce site presence. Modular Fabrication and AdVENT businesses are aggressively exploring alternative product lines as well as strategic partnerships to enhance yard utilisation and provide integrated modular solutions.

Shale gas / oil will continue to drive petrochemical and LNG liquefaction investments in the US, which will offer opportunities for high value engineering and modular fabrication services.

On the other hand, competition intensity is expected to remain high with predatory pricing, especially by competitors with large underutilised assets. Also, clients are expecting EPC contractors to share the benefit of value addition over the tenure of the project.

However, the business is confident of maintaining its credo of being cost-competitive and ensuring on-time delivery of large, critical and complex projects, worldwide. The business will accomplish this by virtue of its customer focus and responsiveness, sustenance of experienced and highly skilled human resources, world-class Quality and HSE practices, a culture of excellence, distinctiveness in corporate governance, extensive IT-enabled processes, digitalisation and state-of-the-art IT security practices.