



HM platform built and installed as part of ONGC's Heera Phase III Development Project

HYDROCARBON BUSINESS

Overview:

L&T Hydrocarbon Engineering Limited (LTHE), a wholly owned subsidiary of L&T, provides integrated 'design and build' turnkey solutions for the hydrocarbon industry globally. The business executes projects for oil and gas extraction and processing, petroleum refining, chemicals and petrochemicals, fertilisers, cross-country pipelines and terminals. In-house capabilities range from front-end design through detailed engineering, procurement, fabrication, project management, construction, and installation including commissioning services.

LTHE has a fully integrated capability chain across the value chain, accentuated with in-house engineering and an R&D centre, world-class modular fabrication facilities, as well as onshore and offshore construction and installation capabilities. Major facilities in India include Engineering & Project Management Centres at Mumbai,

Vadodara, and Chennai, and Fabrication Yards at Hazira (near Surat) and Kattupalli (near Chennai). The business has an overseas presence in the Middle East, i.e., in the UAE (Sharjah), Saudi Arabia (Al-Khobar), Kuwait and Oman (Muscat) as well as Algeria. International business is served through state-of-the-art Modular Fabrication facilities at Sohar in Oman and an integrated manufacturing facility at Jubail in Saudi Arabia.

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

Offshore

Lumpsum turnkey EPCIC solutions are offered to the global offshore oil & gas industry, and encompass wellhead platforms, process platforms and modules, subsea pipelines & systems, brownfield developments, offshore drilling rigs (upgrade and new builds), FPSO modules, deep-water subsea manifold & structures, living-quarters platforms, transportation & installation services, offshore windfarm projects, and decommissioning projects.

The offshore vertical has comprehensive in-house engineering capabilities offering customised 'Fit for Purpose' engineering solutions covering the complete project life cycle, from concept to commissioning, for offshore projects. As a vertically integrated EPCIC player, it also has in-house fabrication and offshore installation capability. Marine assets comprise a self-propelled heavy-lift-cum-pipe-lay vessel – LTS 3000 – held in a joint venture, and a wholly-owned pipe-lay barge – LTB 300.



One of three gas PDMs installed in Hasbah and Arabia Offshore, Saudi Arabia



Delivered and installed two oil PDMs and associated facilities in Zuluf Fields, Saudi Arabia

Projects in the Middle East are being pursued by the vertical with significant thrust to localisation for In-Country Value benefits in the UAE, in addition to the already commenced In-Kingdom Total Value Add (IKTVA) programme in Saudi Arabia. This trend can multiply opportunities in the region, going forward.

Onshore

This business vertical provides EPCC solutions for a wide range of onshore hydrocarbon projects covering upstream oil & gas processing, petroleum refining, petrochemicals, fertilisers (ammonia & urea complexes), thermal systems such as cracking furnaces, cryogenic storage tanks and LNG regasification terminals, cross-country pipelines & terminals as well as coal / pet-coke gasification, coal-to-chemicals and crude-to-chemicals projects. The business has a track record of concurrent execution of multiple mega projects successfully, with diverse technology process licensors. Design Engineering Centres for the Onshore vertical offer the complete spectrum of FEED, process, and detailed engineering.

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 (leveraged for gas & new development such as hydrogen storage) and cross-country oil & gas pipelines.

Its major capabilities include heavy-lift equipment erection 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.

Modular Fabrication Services

This vertical specialises in modular fabrication and supply of offshore structures and process modules, including free-standing static equipment for oil & gas fields, refineries, petrochemical plants and fertiliser complexes. Leveraging its modular capability, much of the on-site work for mega jobs – such as Residue upgradation facility (RUF) for HPCL Vizag Refinery and for Sonatrach South West Gas project in Algeria – are being executed at the fabrication yard.

World-class modular fabrication facilities are strategically located in India at Hazira (India's west coast) and Kattupalli (India's east coast). International projects are served through a state-of-the-art fabrication facility at Sohar (Oman). The combined annual capacity is more than 200,000 MT (depending on the product mix). An integrated manufacturing facility at Jubail in Saudi Arabia caters to the local market and works towards developing local skills and supporting the In-Kingdom Value Added programme of Saudi Arabia. The business is also equipped to supply foundations and other modules for offshore wind-farm projects and e-houses. The all-weather waterfront facilities provide easy access to clients across the globe, and have load-out jetties



LNG Tanks under construction for Adani's Dhamra LNG Terminal

suitable for the dispatch of large and heavy modules via ocean-going vessels and barges.

Advanced Value Engineering & Technology Services (AdVENT)

AdVENT vertical fosters new business lines and technologies to make LTHE future-ready. It provides all the in-house support required for new areas of green energy, modular solutions, cutting-edge hydrocarbon technologies and smart differentiated solutions in the hydrocarbon industry. Leveraging its domain knowledge and expertise in high-end engineering based on experience gained from the execution of large-scale, technologically complex EPC projects for the business coupled with collaborations with well-organised R&D centres, renowned institutions, hi-tech and core-tech start-ups, AdVENT delivers comprehensive customer-centric solutions. AdVENT will also focus on new energy areas, such as grey to blue hydrogen in existing refineries to reduce the carbon footprint.

Business Environment

The global oil & gas industry has faced periodic downturns in the past. However, the industry witnessed a double whammy – supply glut and diminished demand caused by the Covid-19 pandemic and the resultant lowering of oil prices to unprecedented levels. Even before the outbreak of the Covid-19 pandemic, the industry was reeling under very low crude oil price caused by over-supplies. During 2020-21, the oil & gas industry witnessed CAPEX cuts and deferral of tendering and awards. Further, excess capacity pursuing limited prospects, the competition intensified.

Further, with the pandemic-led lockdowns, the eventual new norms resulted in operational challenges due to supply chain disruptions and workforce migration that prolonged the project cycles.

LTHE quickly adapted to the new norms by reprioritising critical activities and leveraged digital tools effectively to manage remote operations. The business implemented safety protocols across all facilities and sites by formation of several small camps to minimise the spread of Covid-19, Work from Home for office employees, incentives for labour to stay back at sites, quality checks through video and new production / construction process / methods.

Relaxation of lockdown restrictions, curtailment of production by OPEC and its allies from the second quarter of the financial year resulted in the gradual recovery of oil demand leading to a more favorable crude oil price between USD 55 and USD 65 per barrel, which stabilised the capital investment climate for ongoing projects – albeit at a slower pace. With the rebound in oil price and increased focus by Governments to develop gas assets, E&P activity is expected to slowly gain momentum.

Despite the above challenges, LTHE maintained a healthy order backlog and remained focussed on executing ongoing projects resulting in better financial performance as compared with its global peers.

Major Achievements

Major orders won during the year

- EPCIC contract for new Living Quarters (LQ) and revamp at 'NQ Complex' (NLRNC-RT2) involving a new living quarters platform



n-Paraffin & Derivative Complex for Farabi Petrochemical Company at Yanbu, KSA

- EPCC contract from HPCL Rajasthan Refinery Limited (HRRL) for setting up a Petrochemical Fluidised Catalytic Cracking (PFCC)
- Biggest EPCC contract awarded in the country in the refinery & petrochemical sector from HRRL for setting up a Dual Feed Cracker Unit (DFCU), EPCC-07 Package (capacity: 890 KTPA) for Rajasthan Refinery Project at Barmer, Rajasthan
- Contracts for CMIE (Civil, Mechanical, Instrumentation, Electrical) works for Raba and Hanya Phase 2 Field Development Project as well as Mabrouk North East Field Development Project for Petroleum Development Oman
- Fabrication Contract for supply of offshore jackets from an international customer to be executed from LTHE's modular fabrication facility
- CMIE works at ethane facility upgrade at Juaymah NGLF plant for Saudi Aramco

Projects Completed

- Linear Alkyl Benzene, Normal Paraffin and Speciality Oils Unit are commissioned and under normal operation at Yanbu, Saudi Arabia for Farabi Petrochemicals Company. Performance guarantee test runs are completed.
- Achieved full production (40K BOPD) at Haliba field for Al Dhafra Petroleum. 72 hours plant performance guarantee test run demonstrated.
- INDMAX Fluid Catalytic Cracking Unit (FCCU) Project for IOCL's Bongaigaon Refinery in Assam successfully

commissioned and handed over to the customer and accolades were received from IOCL Chairman on the implementation.

- Adani LNG – Dhamra – Critical milestone of 'roof air raising' of 2 tanks was successfully achieved.
- Completed offshore installation of all the 3 gas Production Deck Modules (PDM) completed in Arbiya and Hasbah fields off KSA and 2 oil PDMs in Zuluf field.
- Construction is completed for Cairn–Vedanta Mangala field upgradation at Barmer and final stages of commissioning are in progress.
- IOCL's Paradip Hyderabad Pipeline Project substantially completed.

Awards and Accolades

- The Company was ranked second among the top 30 EPC Contractors by the Oil & Gas Middle East magazine for securing many huge contracts from Saudi Aramco as part of its 'long-term agreement'.
- The Company was presented the 'EPC-Company of the Year' award by Federation of Indian Petroleum Industry (FIPI).

Significant Initiatives

LTHE has taken a three-pronged approach to better handle the situation brought about by the onslaught of the Covid-19 pandemic together with many business challenges, such as oil price volatility, reduced investment cycle, energy transition, etc. Christened the **PIO**



118-km crude transit line from North Kuwait to CMM for KOC

(Protect-Innovate-Opportunise) programmes – there are three pillars to sustain long-term growth initiatives and identified as ‘SHIELD’, ‘DREAMS’ and ‘DHOW’.

Programme ‘SHIELD’ is aimed at protecting the existing business, prioritising its products and services currently on offer and identifying products and services that can be quickly developed and scaled to satisfy the transforming market. It aims to attract new customers and geographies with innovative ideas and deep focus on stepping-up the business development activities, and develop localisation plans in the countries which are core to LTHE’s growth agenda by offering smart solutions.

Programme ‘DREAMS’ focuses on efficiency and speed in operations. The most significant action under DREAMS is the initiative called SESA (Simplify, Eliminate, Standardise and Automate) which drives digital solutions, productivity enhancement measures at fabrication yards and construction sites and knowledge management and capability development.

As a part of Digital Transformation, LTHE continues to focus on the areas of Smart Collaboration & Augmented Reality, Industrial Internet of Things, Enterprise-wide Project Lifecycle Management programme (EPSILON) and Predictive Analytics to enhance efficiency in operations.

LTHE has embraced the culture of productivity and quality enhancement at yards as well as construction sites. These include automated welding, extensive use of jigs & fixtures as well as assembly line concept, full kitting, and serial production technique for fabricating multiple jackets

concurrently, which helped in the fabrication of a jacket in a record time of just 98 days at the Sohar Fabrication Facility. As part of improving safety and productivity, LTHE is maximising work on the ground rather than at a height for the fabrication of modules. To address construction challenges for onshore projects that are at remote locations or at congested plants, LTHE is maximising the modularisation at yards.

Programme ‘DHOW’ focuses on transforming the organisation to attract clients to support their efforts in the upcoming energy transition in areas such as green hydrogen, decarbonisation, biofuels and the circular economy. Digitally-enabled O&M is also identified as an adjacency to its existing business capability to be one of the future growth engines.

LTHE is also actively engaging with various R&D Centres and start-up companies to develop emerging technologies and create differentiated solutions.

Environment, Health and Safety

LTHE had taken preventive control measures to overcome the effect of Covid-19 and safely delivered more than 32 million man-hours at a stretch across various projects in domestic and international markets, including the modular fabrication yards.

For effective implementation of the HSE management system uniformly across the business verticals and strengthening the safety culture, LTHE consolidated all its operations under a single ISO Certification for ISO 14001 and 45001.



Onshore process and pipe rack modules being dispatched from MFF Kattupalli

The digital platform is used to facilitate online incident reporting and investigation, pilot electronic permit to work at four locations and remote HSE assurance audit.

To strengthen compliance to the HSE system and raise awareness, LTHE conducted management walkthroughs, both virtual and physical, to emphasise monitoring performance at fabrication yards and project sites, HSE audit reporting, mock drills, safety meetings, continuous training in HSE practices and webinars.

LTHE bagged eight domestic and three international awards in recognition of best performance under the category of Health, Safety and Environment, e.g.:

- NSCI (National Safety Council of India) 'Shreshtha Suraksha Award – Silver' for HPCL FCHCU Project
- CII-SR EHS Excellence Awards-2020 with 4-Star Rating under Infrastructure Construction Category
- ICC (Indian Chambers of Commerce) Platinum Award in Oil & Gas sector under Large Enterprises
- Frost & Sullivan's Safety Excellence Award 2020 – MFF Hazira
- ASSP (American Society of Safety Professional) HSE Excellence Award for the KOC TL- 05 and Aramco Hasbah Projects

In recognition of achieving critical project HSE milestones and best HSE performance metrics, LTHE also received 17 recognitions from various customers such as Farabi for achieving 31 million safe man-hours in the Paraffin project

at Saudi, HURL for achieving 19 million safe man-hours at Sindri and 17 million safe man-hours at Barauni.

Human Resources

L&T Hydrocarbon Engineering focuses on acquiring and grooming a unique and diverse set of talent, with the right attitude.

To inculcate a culture of driving continuous career opportunities of internal talent, LTHE has initiated a career planning architecture for the sustainable growth of its employees, with more emphasis on the top talent. Specific programmes for Resident Construction Managers (RCM) and Young Fabrication Professionals (YFP) are designed to develop construction and yard professionals. As a commitment to create a highly engaged workforce, LTHE actively communicates through multiple forums such as Town Hall sessions and Fireside chats. LTHE always tries to inculcate a culture of appreciation through various reward and recognition interventions. The 'I-TOO' recognition framework, annual ICONS, Long Service Awards, Talent Champions, Counselling & Well-being support, and a bouquet of custom-designed calendared interventions are cascaded across the organisation to the most remote sites with the aim of enhancing employee motivation. LTHE is committed to improve the gender balance across all functions and levels.

As the Covid-19 pandemic brought uncertainties and extra stress in both personal and professional lives of employees, LTHE engaged with employees at various levels by frequent interventions from senior leadership and CEO and across leadership strata to ensure engagement. LTHE ensured



Convection modules built at MFF Hazira for HMEL Cracker Furnaces Project

medical assistance on 24x7 basis by arranging doctors and ambulances for about 25000 staff and workmen. Also, LTHE made arrangements in co-ordination with Government departments and embassies to evacuate employees stranded in foreign countries.

Risks and Concerns

Cost-competition is becoming challenging and is further accentuated by increasing the in-country value for localisation in some of the regions where the business has a presence. LTHE is focussing on meeting the localisation requirements in an optimal way.

Typical risks in the EPC business are stiff contract conditions, tight schedules, counter-party risks, currency and commodity exposures, vendor defaults, delay in material delivery, QHSE, productivity, etc. The risks are mitigated through specific actions, such as strong contracts and claims management process, assigning strong project management teams at the pre-bid stage, operational excellence initiatives, strategic partnerships, non-negotiable QHSE compliance, taking derivative covers to hedge foreign currency and commodity fluctuations.

Covid-19 had an unprecedented impact on business operations. LTHE mitigated the risk with well-prepared plans deployed across locations, work and safety protocols, knowledge sharing and monitored continuously in a structured manner by the crisis-management team.

The risk management policy and guidelines have facilitated the creation of a consistent set of standard tools and

templates incorporating global best practices and procedures.

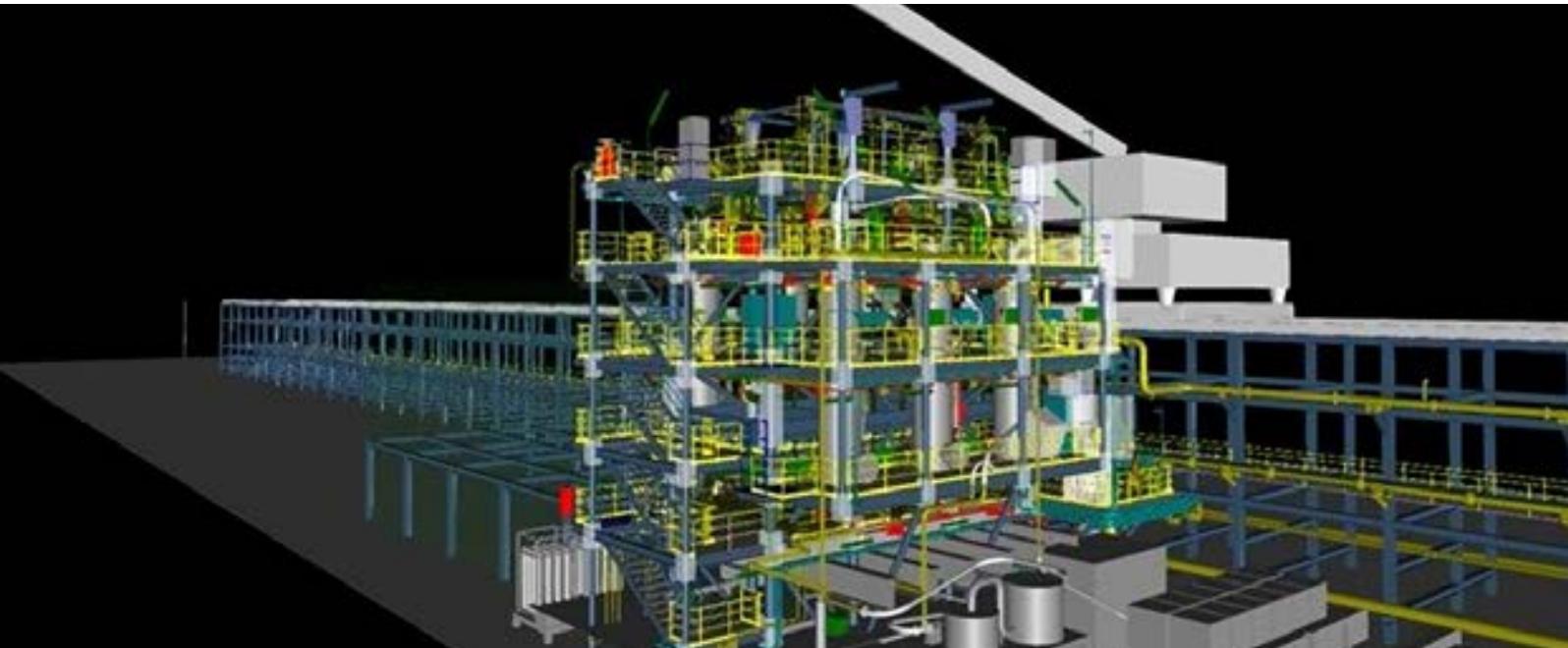
Outlook

In India, the Central Government, is planning to spend around ₹ 7,50,000 crore to build oil and gas infrastructure over the next five years. For the FY 2021-22, the Union Budget has proposed a capital outlay of ₹ 1,04,870 crore for oil and gas companies. ONGC's capex guidance for FY 2021-22 would once again normalise to the historical average of ₹ 32,000 crore for the offshore segment.

The present share of natural gas in the energy mix of the country is 6%. The Government's aim is to increase it to 15% by 2030 which will bring in significant investment in developing gas infrastructure, LNG regasification terminals, pipelines (~ 14,700 km) and city gas distribution.

Refining capacity is likely to increase from 250 MMTPA to 400 MMTPA by 2030. IOCL Panipat (from 15 to 25 MMTPA), IOCL, Gujarat (from 13.7 to 18 MMTPA) and NRL (from 3 to 9 MMTPA) are planning to expand their capacity. A 9 MMTPA grassroots refinery is also planned by CPCL and IOCL at Nagapattinam.

Petrochemical demand is growing at a CAGR of about 7.5% (~1.2 MMTPA) and this will drive investments in refinery-petrochemical integration and Oil to Chemical (O2C) / Crude-to-Chemicals (C2C) projects. India is also planning to convert 100 MT coal into gas by 2030 which will lead to projects for coal to fertilisers / coal to methanol.



3-D rendering of ExxonMobil Serpentina H2S Management Project

In the Middle East, investments in Saudi Arabia are reviving and capital projects with investments in the range of USD 17 billion for offshore and onshore projects in Zuluf and Safaniya fields are expected to be tendered in the upcoming period.

While in the UAE, ADNOC remains committed to its 2030 Smart Growth Strategy of increasing its oil production from 4 mbpd to 5 mbpd, though simultaneously focussing on hydrogen and renewables. Business opportunities are expected from Qatar, which is investing in increasing its leadership as the largest gas producer in the world, and is also restoring its diplomatic ties with Saudi Arabia and UAE.

Other markets in South East Asia, such as Vietnam, are expected to continue developing gas-based projects. LTHE is looking for new geographies in the Far East, such as Mongolia. In Algeria, Sonatrach plans to invest USD 40 billion over next five years. LTHE is currently executing a mega project for Sonatrach and will focus on upcoming opportunities.

The US market has opportunities for the Modular Fabrication Yard for modules for LNG, carbon capture & storage, petrochemicals and offshore windfarm segments.

The Covid-19 pandemic has fast forwarded the clean energy transition across the world. Hence the capital allocation is likely to be diverted from fossil fuels to push new developments in renewable energy. However, it is also likely to increase spend on de-bottlenecking facilities, brownfield upgrades, enhanced oil recovery and similar projects to enable oil & gas companies to maintain production levels in otherwise depleting extraction wells.

E&P operators are diversifying into renewables. Rapid electrification of automobiles as well as the use of hydrogen as a fuel is gathering pace and traction. While coal may be the least preferred followed by oil, natural gas will continue as the transition fuel during this shift to renewables.

LTHE will continue to expand its bid pipeline and explore new clients and new markets for its existing business and is building capabilities to address opportunities arising out of new businesses. Operations & Maintenance (O&M) and New Energy Transition have been identified as the future growth engines. LTHE is positioning itself to offer integrated Power-to-X solutions across the hydrogen value chain from technology, production, storage, and distribution of derivatives such as ammonia and methanol.