

ENERGY PROJECTS SEGMENT



New Water Injection System - R Project for Oil & Natural Gas Corporation

The Energy Projects segment comprises:

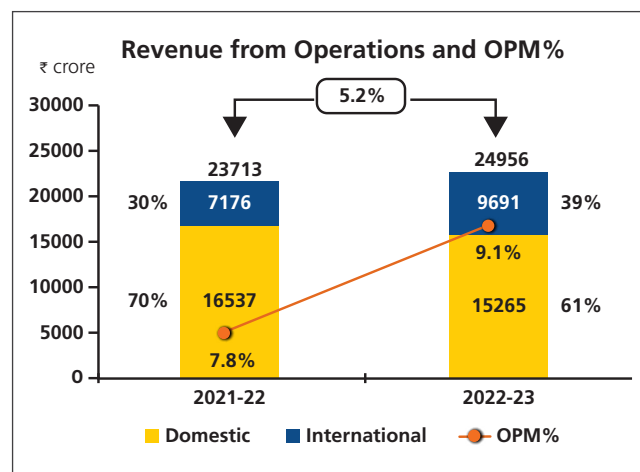
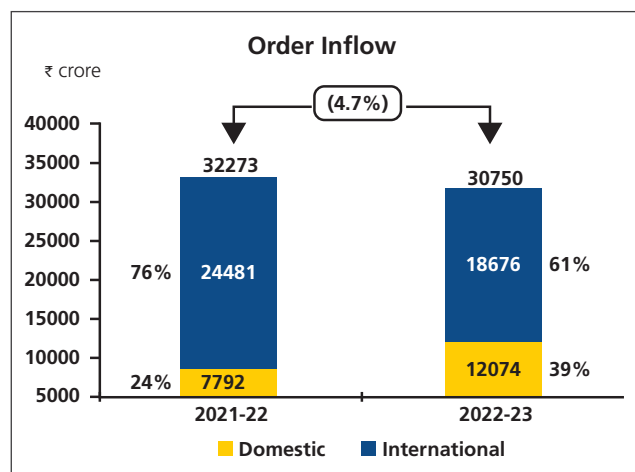
- (a) Hydrocarbon Business
- (b) Power Business
- (c) Green Energy Business

Financial performance of the segment

The Energy segment achieved order inflows of ₹ 30,750 crore in FY 2022-23, registering a decline of 4.7% over the

previous year, on subdued ordering activity in the thermal power business. The share of international orders declined to 61% from 76% in FY 2021-22, mainly due to the receipt of multiple domestic orders in the Hydrocarbon business.

The Energy segment's revenue at ₹ 24,956 crore for the year grew by 5.2% y-o-y, due to a pick-up in execution momentum, mainly in the Hydrocarbon business. The Power business registered a decline due to the tapering of the Order





Ethylene Glycol Unit and Ethylene Recovery Unit for Paradip Refinery, Odisha

Book. The share of international revenue in FY 2022-23 was higher at 39% of the total revenue of the segment as compared to 30% in the previous year, on the execution of large international projects in the Hydrocarbon business.

The segment's operating margin increased to 9.1% from 7.8%, mainly due to cost savings and a change of job mix under execution.

Funds employed by the segment as at March 31, 2023 at ₹ 4,299 crore, declined by 3.3% vis-à-vis March 31, 2022, mainly due to a decrease in contract assets in some large value projects and receipt of customer advances in the Hydrocarbon business. The Power business though was impacted due to delays in the collection of retention money from clients and build-up in contract assets due to the non-achievement of billing milestones.

Hydrocarbon Business

Overview

The Hydrocarbon business provides integrated 'design and build' turnkey solutions for the hydrocarbon industry, globally. The business executes projects for oil & gas

extraction and processing, petroleum refining, chemicals & petrochemicals, fertilisers, cross-country pipelines and terminals. Leveraging its expertise in hydrocarbon projects, verticals like asset management and offshore wind have recently been launched to tap the relevant opportunities in these emerging areas.

The business has integrated capabilities across the value chain, supported by in-house front-end design and detailed engineering, project management, procurement, modular fabrication facilities, Onshore and Offshore construction, installation and commissioning. Major fabrication facilities are located in India and the Middle East. In India, the Engineering, Procurement & Project Management Centres are located at Mumbai, Vadodara and Chennai, and Modular Fabrication facilities are at Hazira (near Surat) and Kattupalli (near Chennai). The overseas presence of the business is predominantly in the Middle East, i.e., in the UAE, KSA, Kuwait and Algeria. The Project Management Office with a training facility has been established in Al Khobar, KSA.

The business also has a state-of-the-art Modular Fabrication facility at Sohar in Oman, a piping shop at Jubail in KSA and a newly built Heavy Wall Pressure Vessel Manufacturing shop at Jubail Industrial Zone in KSA.



One of 28 Jackets being shipped to Zuluf Field, Saudi Arabia

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

Offshore

Lumpsum Turnkey EPCIC (Engineering, Procurement, Construction, Installation and Commissioning) solutions are offered to the global offshore Oil & Gas industry. The product offering encompasses wellhead platforms, process platforms, process modules, subsea pipelines and systems, brownfield developments, deep-water subsea manifolds and structures, living-quarters platforms, transportation and installation services, and decommissioning projects.

The Offshore vertical has comprehensive in-house engineering capabilities offering 'Fit for Purpose' engineering solutions, covering the complete project life cycle, from concept to commissioning. As a one-stop solution EPCIC player, it also has in-house fabrication facilities which focus on zero-punch list dispatch to the site. Marine assets comprise a self-propelled heavy-lift-cum-pipe-lay vessel – LTS 3000 – held through a joint venture, and a wholly-owned pipe-lay barge – LTB 300 – that helps expedite offshore installations, ensuring on-time completion of projects.

Onshore

This business vertical provides EPCC (Engineering, Procurement, Construction, Commissioning) solutions for a wide range of onshore hydrocarbon projects covering Oil & Gas processing, petroleum refining, petrochemicals,

fertilisers (ammonia and urea complexes), thermal systems such as cracking furnaces, cryogenic storage tanks and LNG regasification terminals, cross-country pipelines and 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, both in domestic and international markets, with diverse technology process licensors. The Design Engineering Centre for the Onshore vertical offers the complete spectrum of FEED (Front End Engineering Design), process and detailed engineering.

In FY 2022-23, the Company has acquired the Joint Venture partner's stake in L&T-Chiyoda Limited and it has been renamed 'L&T Energy Hydrocarbon Engineering Limited'. The business will continue to provide engineering and related services to the hydrocarbon industry in the domestic and international markets.

Construction Services

This business vertical renders turnkey construction services for refineries, petrochemical, fertiliser projects, gas-gathering stations, cross-country oil & gas pipelines and terminals including LNG and oil storage tanks and underground cavern LPG storage systems. Its major capabilities include heavy-lift equipment erection competency, application of advanced welding technologies with high levels of automation, management of workforce and material in large volumes at construction sites and Quality / QHSE systems conforming to international



Mabrouk Northeast Development Project, Oman

practices. The business has also invested in strategic construction equipment, viz., a range of pipeline-spread equipment, automatic welding machines and other plant and machinery for mechanical construction works.

Modular Fabrication

This vertical specialises in the modular fabrication and the supply of offshore and onshore structures and process modules, including free-standing static equipment for Oil & Gas fields, refineries, petrochemical plants and fertiliser plants. The vertical has the capability to undertake significant modularisation of onshore process plants, which is the new emerging trend.

World-class modular fabrication facilities are strategically located at Hazira (India's West coast), Kattupalli (India's East coast), Sohar (Oman) and Jubail (KSA). The combined annual capacity for fabrication is estimated at about 60 million manhours or 200,000 MT (depending on the product mix).

The Piping and Pressure Vessel Manufacturing Shops in KSA primarily cater to the local market and for developing skills to support the country's localisation programme.

The business is equipped to supply products like wind farm foundations and other modules for offshore wind-farm projects and e-houses. An all-weather waterfront facility

provides easy access to clients across the globe and has load-out jetties suitable for the dispatch of large and heavy modules via ocean-going vessels and barges.

Advanced Value Engineering & Technology Services (AdVENT)

Leveraging the expertise in high-end engineering and execution of large-scale technologically complex EPC projects over several decades and collaborating with well-organised R&D centres and renowned institutions, the AdVENT vertical delivers customer-centric solutions for various elements of the value chain of the hydrocarbon industry.

AdVENT's technical capabilities and agility enables it to offer tailor-made value engineering solutions such as product modular solutions, supporting customers in re-purposing studies of existing assets and adoption of the energy transition.

AdVENT also focuses on technology-backed chemical industries which are now ramping up investments in the chemicals sector, thereby reducing dependence on imports. These chemicals are the building blocks of high-value industrial end products.

Asset Management

The Asset Management business delivers integrated digitally enabled value-added services to the Oil & Gas industry.



Offshore substation platform

The Asset Management solutions extend the organisation's design, engineering, construction and commissioning capabilities to cover operations, maintenance, performance enhancement and health assessment of critical assets. This business vertical complements EPC project offerings for mutually beneficial engagement with clients over the entire lifecycle of assets.

Offshore Wind

The newly-formed Offshore Wind business offers EPCI (Engineering, Procurement, Construction and Installation) solutions for the Offshore Wind Energy segment, which is poised for faster growth across all the major geographies. The business leverages capabilities built over the last three decades in the Oil & Gas offshore segment and offers EPC solutions for Offshore HVAC and HVDC Substations as well as fixed and floating foundations. The business has forged a partnership with Electrical Technology Company for joint 'go to market' solutions and has also signed an MoU for collaboration with a company leading in floating technology.

Business Environment

The current ongoing geopolitical tensions are expected to slow down the journey of energy transition and also ensure that all sources of energy remain relevant for the current decade.

While the general outlook remains positive, the business environment remains a bit challenging, with elevated commodity prices, supply chain constraints for procurement

from Europe, logistic constraints in domestic markets due to increased scale and complexity of projects, limited availability of skilled labour force in the markets and finally stiffer timelines as well as stringent contractual terms and conditions. The business is witnessing competition from European, Korean and new emerging Chinese players in the GCC space.

However, the business has, over the years, developed expertise and put in place several mitigation measures including implementation of technological solutions and modular solutions wherever feasible, focusing on productivity improvement and reducing workforce dependence to effectively deal with these headwinds.

Finally, the business has once again demonstrated resilience with robust order inflows and recorded its highest ever order backlog in FY 2022-23.

Major Achievements

Orders won:

- ▣ Multiple offshore packages from a prestigious client in the Middle East for EPCI
- ▣ India's first contract for decommissioning of offshore facilities from British Gas Exploration and Production India Limited (BGEPL, part of Shell Plc Group of Companies) at the Tapti field, off India's West Coast
- ▣ An order from Oil & Natural Gas Corporation (ONGC) for balance works of Pipeline Replacement Project (PRP-VI)



Sailaway of Process & Piperack Modules from MFF Kattupalli for Gasification Plant for Linde, Singapore

and associated subsea works across India's West Coast offshore fields

- ▣ Multiple contracts from Indian Oil Corporation for setting up a Residue Hydrocracker Unit and Reactor-Regenerator System Package (P-25) Project on EPCC basis
- ▣ EPC contract for setting up a Hydrogen Generation Unit (HGU) from Matheson Tri - Gas Inc., for Numaligarh Refinery Expansion Project (NREP)
- ▣ 5-year O&M contract from Vedanta Limited, Cairn Oil & Gas division for Integrated O&M of Upstream Oil & Gas Processing Facility at Raageshwari Gas Terminal and associated Gas Well Pads and South Satellite Fields, located in Rajasthan, India
- ▣ Engineering, Procurement and Construction of a Technical Ammonium Nitrate plant and Weak Nitric Acid plant from Chambal Fertilisers and Chemicals Limited
- ▣ Contract from a prestigious client in KSA for rerouting of Midyan-Duba Gas and Condensate pipelines
- ▣ Modules for Green Hydrogen Project for an international client

Projects completed:

- ▣ Heera Re-development Phase III for ONGC
- ▣ Commissioning of New Water Injection South (NWIS-R) project, the first-of-its-kind Enhanced Oil Recovery Project in India for ONGC
- ▣ Commissioning of Ammonia and Urea plants along with production of Urea prills for Hindustan Urvarak and Rasayan (HURL) at its Sindri and Barauni complexes

- ▣ Crude / Vacuum Distillation Unit of HPCL Visakhapatnam
- ▣ Monoethylene Glycol (MEG) and Offsites & Utilities Projects for Indian Oil Corporation's, Paradip Refinery
- ▣ Completion of dispatches of the modules for Singapore Gasification Project of Linde

Significant Initiatives

As part of Lakshya 2026, the business has embarked on various strategic initiatives to boost cost-competitiveness and to achieve its targeted growth aspirations.

Strategic actions include building partnerships, developing markets for adjacencies in offerings, nurturing new businesses like asset management, offshore wind farms and modular solutions, driving localisation efforts in key geographies where a long-term presence could be established and adopting digitally-enabled operational excellence.

The business is focusing on improving productivity through collaboration and seamless digital integration across project ecosystems. Some of the key initiatives include:

- ▣ Implementation of Drishti, an AI-driven knowledge portal which leverages the collective expertise and facilitates accelerated decision-making
- ▣ Implementation of Epsilon for integration of various transaction systems and creation of Project Virtual Twins with Multi-D visualisation
- ▣ Construction-driven EPC using Advanced Work Packaging Methodology



28 Jackets being fabricated for Zuluf Field, Saudi Arabia

- ▣ Predictive Analytics for single-point visibility of various project interfaces and proactive actions towards reducing rework and eliminating waste at construction sites
- ▣ Robotic Process Automation (RPA) bots for automating mundane tasks across functions

Outlook

The ongoing geopolitical instability continues to affect global trade, economic growth and technological innovations. A slower pace of energy transition and high oil prices will continue to support investments in fossil fuels, which is evident from continued investments by Oil & Gas majors, especially in the GCC and the developing world. Oil & Gas as an energy form, will continue to remain a core for an energy-hungry economy like India.

The Government of India aims to double the net area being explored for Oil & Gas to 500,000 sq. km. by 2025. Favourable Government policies revolving around concession for early monetisation, marketing and pricing freedom as well as the shift of focus from Revenue to Production maximisation are favouring the investments in the Exploration and Production industry. ONGC has drawn up its Strategy 2040 to increase its production two-fold and has announced capital projects worth USD 7 billion over the next 3 years.

India's crude oil refining capacity is planned to be increased to 450 MMTPA from the current 250 MMTPA by 2030 and the demand for Petrochemicals is expected to grow nearly three-fold to 80 MMTPA by 2040 from the current level of

31 MMTPA. The Government of India has set a target of gasifying 100 million tonnes of coal into value-added products by 2030. An investment of ₹ 35,000 crore is planned by Indian PSUs for setting up surface coal gasification projects. India's natural gas demand is projected to reach 133 BCM in 2030 from 64 BCM in 2022. India is also considering the creation of strategic reserves of LNG to protect against potential supply shortages and numerous LNG receiving terminals are planned to be set up in the near future. The Government is also set to expand its natural gas grid to 34,500 km by adding another 17,000 km of pipelines with an investment potential of ₹ 70,000 crore over the next couple of years.

Further, the Government of India intends to maximise the production of fertilisers mainly based on indigenous feedstocks and also decrease import dependency on speciality chemicals like ammonium nitrate and nitric acid to achieve self-sufficiency. On the back of the anticipated diversification of a global supply chain, many international chemical companies are looking to set up niche chemical manufacturing units in India.

The lack of capital spending during the COVID period and the subsequent geopolitical developments are likely to accelerate the launch of new projects across the Oil & Gas value spectrum. KSA has developed its Vision 2030 document for production enhancement and is targeting 12-13 MMB / D of oil production and 2 BCFE / D of Gas Production. UAE is also planning to boost its Oil & Gas production capacity to 5 MMB / D, while Kuwait is envisaging spending on oil production, exploration and



Offshore platforms being fabricated at Sohar yard, Oman

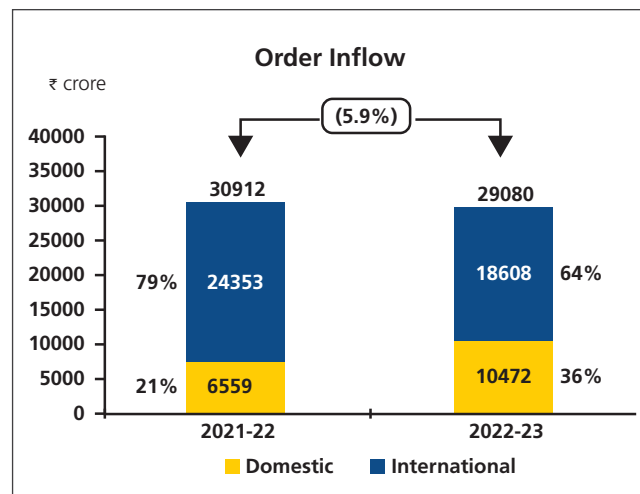
other projects by 2025. The business is also well-positioned to participate in upcoming mega offshore Oil & Gas projects in Qatar. With the recovery in Oil & Gas prices, the Middle East and North Africa (MENA) region is planning for investments of around USD 450 billion in Oil & Gas as well as petrochemicals.

There is an increased thrust on localisation in KSA, UAE and Qatar and the business has introduced significant initiatives to address localisation requirements in KSA, which is the biggest market outside India, for the hydrocarbon business presently. The business has formed a joint venture with a KSA-based company for jointly targeting onshore business opportunities in KSA.

Offshore Wind, now widely recognised as a reliable source of energy, is gaining momentum. The business is committed to playing a significant role in powering the winds of change and towards this, our newly formed Offshore Wind business has secured pre-qualification and is participating in large tenders for key developers across the globe. Indian refineries and petrochemical units have started outsourcing their utilities' Operations and Maintenance (O&M) on an activities-and-workforce-supply basis. They are exploring combining O&M of multiple units / activities, which is providing opportunities for integrated Asset Management services.

The business remains optimistic about the outlook for Hydrocarbon and the various business adjacencies in the medium term.

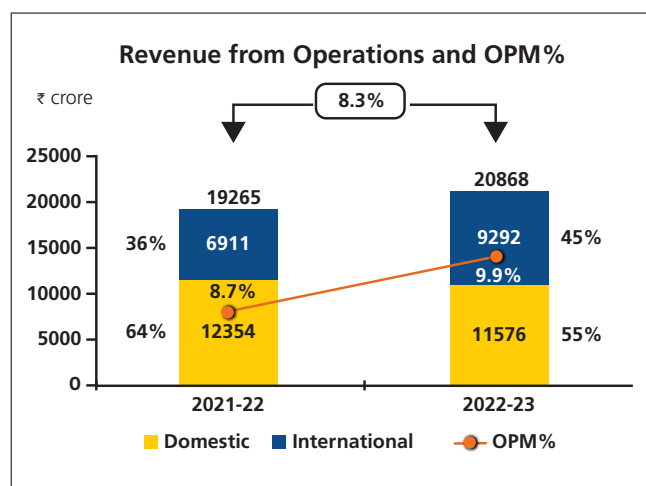
Financial performance of the business



The Hydrocarbon business achieved order inflows of ₹ 29,080 crore in FY 2022-23, registering a decline of 5.9% over the previous year due to deferment of some targeted prospects and a base effect. The share of international orders also reduced from 79% to 64% in March 2023, since the previous year included two large-value orders from Saudi Arabia.



400 MW Bibiyana South combined cycle power plant, Bangladesh



The Hydrocarbon business recorded revenue of ₹ 20,868 crore for the year, registering a growth of 8.3% y-o-y, due to a pick-up in execution momentum, mainly in the Offshore vertical of the business. The share of international revenue in FY 2022-23 was higher at 45% of the total revenue as compared to 36% in the previous year, with a higher opening international Order Book.

The operating margin of the business increased to 9.9% from 8.7%, mainly due to cost savings arising out of improved execution in a few international and domestic jobs.

Power Business

Overview

L&T has established itself as one of the leading EPC players in offering turnkey solutions for both Coal and Gas-based power plants, encompassing every aspect of design, engineering, manufacture, construction and project management. In addition to undertaking turnkey projects, it also offers equipment and other services for power plants.

The business has developed its own capabilities in executing large and complex power projects, which include engineering, state-of-the-art manufacturing facilities, a competent manpower pool and decades of experience earned in executing large and complex projects within and outside India. The business has a proven track record of delivering complete power plant solutions with scale and sophistication to meet India's growing energy needs.

The business also executes combined cycle and cogeneration power projects, based on LNG, Natural Gas and / or liquid fuel, on a turnkey basis. It has an excellent track record in implementing projects for utilities, refineries and Independent Power Producers (IPPs) in India and overseas. With extensive experience of over three decades in executing EPC contracts for Combined Cycle Power Plants (CCPP) and Cogen plants, the business has numerous references, deploying gas turbines sourced from major leading Original Equipment Manufacturers with Gas Turbine (GT) sizes ranging from 30 MW up to the most advanced GTs to date.



Turbine manufacturing facility at Hazira, Gujarat

The business has built on its core competencies and capabilities and has emerged as a major player in emission control technologies such as Flue-gas desulphurisation (FGD) in the Indian thermal power plant industry. It now has a sizeable presence in the FGD business.

The business has an integrated manufacturing facility at Hazira, Gujarat. It is one of the world's most advanced facilities having a manufacturing capacity of 5,000 MW per annum.

The facility manufactures ultra-supercritical / supercritical boilers, turbines and generators, pulverisers, axial fans and air preheaters, components of FGD and electrostatic precipitators. The business has project management offices at Vadodara, Faridabad, Dhaka and various other project sites.

The business has the following Joint Venture (JV) companies within its fold:

L&T-MHI Power Boilers Private Limited, a JV with Mitsubishi Heavy Industries (MHI), Japan – the world's leading power equipment maker – for the engineering, designing, manufacturing, erecting and commissioning of ultra-supercritical / supercritical boilers up to a single unit of 1,000 MW.

L&T-MHI Power Turbine Generators Private Limited, a JV with Mitsubishi Heavy Industries (MHI), Japan and Mitsubishi Electric Corp. (MELCO), for the manufacture of Steam Turbine Generator (STG) equipment of capacity

ranging from 660 MW to 1,000 MW. The Company is engaged in the engineering, design, manufacture, erection and commissioning of ultra-supercritical / supercritical turbines and generators.

L&T Howden Private Limited, a JV with Howden Holdings B.V. L&T Howden, is in the business of regenerative air preheaters and variable pitch axial fans (equipment, after-market spares and services) for power plants.

L&T-Sargent & Lundy Private Limited, a JV with Sargent & Lundy LLC, USA, is engaged in the business of providing design, engineering and project management services for power projects.

Business Environment

The thermal power sector is witnessing a revival after the pandemic-induced hiatus of around three years, amidst the continuing transition of India's power generation mix. With increasing economic activity, industrial expansion and power demand growing to record levels, many utilities are feeling the need to fast-track the brownfield expansion of their existing coal-based thermal power projects.

In FY 2022-23, EPC coal-based power projects having a cumulative capacity of around 8.3 GW were in various phases of tendering. This establishes that for sustained energy security, thermal power generation is going to co-exist with renewable energy for a longer period than envisaged – till India achieves its Net Zero Target by 2070.



2 x 660 MW Chhabra supercritical thermal power plant, Rajasthan

Tenders for FGD Units were delayed and retendered due to an increase in input costs, resulting in budget constraints for power producers and an extension in deadlines for compliance with SO₂ emission norms by the Ministry of Environment, Forest and Climate Change (MoEFCC).

The gas-based power generation sector in India remains muted due to higher fuel costs for the power sector, despite an improvement in the supply and distribution network for natural gas. While approximately 24 GW of installed / commissioned gas-based power plants in India are idling due to high costs of generation, the Administered Pricing Mechanism (APM) gas prices have also been rising during the past one year.

Though there are challenges in the international markets, such as a greater focus on renewables, geopolitical dynamics and financing of thermal power projects, a few select markets still offer specific opportunities based on the cleaner operation of gas-based thermal plants, added with new technologies like carbon capture, etc. The business continues to pursue certain targeted projects with reputed clients and OEMs.

Major Achievements

Some of the major achievements by the business during the year include:

- ▣ FGD order received from a Central Utility for a 3 x 660 MW Power project in Uttar Pradesh
- ▣ Boiler Hydro Test successfully concluded for Unit-1 of a 2 x 660 MW Central Utility Project in Uttar Pradesh

- ▣ Completion of Facilities for Cooling Tower Package of both the units of a 2 x 800 MW Central Utility Project in Odisha

Significant Initiatives

In line with the energy transition and sustainability requirements, the business formed a Technology Task Force (TTF) to identify, incubate and implement new technology opportunities to make the organisation resilient. The TTF has finalised a few focus areas like Coal Gasification and Integrated Gasification Combine Cycle (IGCC), Small Modular Reactors, Carbon Capture Technology, Biofuel / Ammonia / Methanol firing in Supercritical Power Boilers and Flexibilisation in Coal-based power plants. The business is also expanding into adjacencies like providing Life Cycle solutions (spares and services) to customers, which will cater to other OEM machines as well.

To improve profitability and on-time execution of Projects, the business introduced the Operational Excellence initiative in the mid of FY 2022-23. To improve productivity and reduce profit leakages, various digital and analytical levers such as IoTisation, Virtual Reality, Artificial Intelligence and Machine Learning have been imbibed into the day-to-day operations. The focus to achieve QEHS (Quality, Environment, Health & Safety) excellence remains of prime importance. It has also accelerated the usage of digital levers to increase the efficiency and productivity of operations.

To expand its international footprint, the business is focusing on business development activities in select



Boiler manufacturing facility at Hazira, Gujarat

international geographies, specifically GCC and select countries in Southeast Asia. It has taken steps to strengthen its presence in such geographies to capitalise on the opportunities available in this sector.

Outlook

In the wake of the expanding economy, growing population, rising urbanisation, and increased industrialisation, India is seeing a surging rise in energy demand and a consistent increase in the Plant Load Factor (PLF) of thermal power plants compared to previous years. In order to maintain the country's energy security amid rising demand, the thermal power sector has started gaining momentum after a temporary downturn. As per estimates from the Ministry of Power, India's power demand is set to double by 2030.

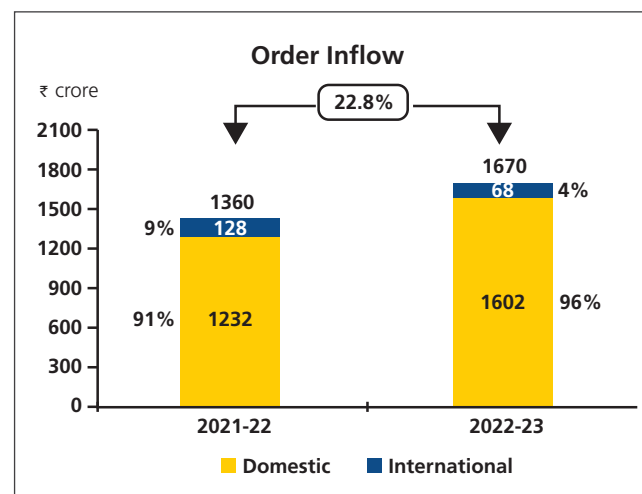
Considering the CEA's projections of 274 GW thermal power capacity by FY 2031-32 and in view of the retirements of old, inefficient, and polluting power plants, the addition of new thermal power capacity will continue in the near term, positively impacting the business' prospects. The business is envisaging more than 20 GW of thermal tenders in the next few years.

It is estimated that the total installed capacity of power plants for which FGDs are to be installed is around 167 GW, involving 440 FGD units. About 96 GW of FGDs have been ordered to date. Tendering of balance units is expected to gain momentum in FY 2023-24 if the revised deadlines stipulated by MoEFCC are to be adhered to.

The business is also focusing on international markets for opportunities. The inherent advantages of gas-based power projects like fuel flexibility and fast ramp-up and ramp-down capabilities, make it most suitable for grid balancing along with renewable energy projects.

L&T-MHI Power Boilers JV and L&T-MHI Power Turbine Generators JV are also looking forward to leveraging upcoming spares and service opportunities in the domestic market and will continue to explore business opportunities in the international market for export orders.

Financial performance of the business





Green Hydrogen Plant at L&T's A.M. Naik Heavy Engineering Complex in Hazira, Gujarat

The Power business recorded an order inflow of ₹ 1,670 crore for the year ending March 31, 2023, registering a growth of 22.8% as compared to the previous year with the receipt of an FGD order. Ordering activity remained subdued during the year largely due to the deferral of coal-based power project opportunities and the delay in tendering of FGD orders.

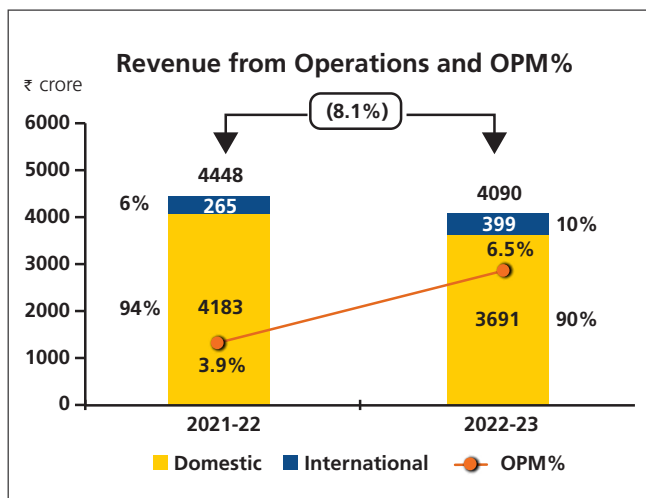
The operating margin improved to 6.5% from 3.9%, mainly due to the cost savings in a couple of international gas-based projects nearing completion.

Green Manufacturing & Development

Overview

L&T has decades of experience in providing solutions to the energy industry, offering critical Equipment Manufacturing and Engineering, Procurement and Construction (EPC) services for reputed Indian and International clients in Oil and Gas, Thermal Power, Renewable Energy (Solar and Hydel Power) and Nuclear Power. The Company has, over the years, helped India and the world meet their past and present energy needs.

Having been at the forefront of providing innovative and sustainable engineering solutions, L&T is aligned with the global movement towards the use of renewable energy and the adoption of clean technologies, which will help meet India's and the world's future energy needs. L&T is positioned to add value in the fast-evolving Green Energy space and emerge as an industry major.



The segment's revenue at ₹ 4,090 crore declined 8.1% on a y-o-y basis, with tapering of execution of jobs in the portfolio and a diminishing Order Book.



Green Hydrogen Plant at L&T's A.M. Naik Heavy Engineering Complex in Hazira, Gujarat

As part of its ESG commitments, L&T has pledged to achieve Water Neutrality by 2035 and Carbon Neutrality by 2040. L&T's Green Energy business with its focus on Green Hydrogen and its derivatives, will be an integral part of the Company's Clean Fuel Adoption Policy. The Company's Green Energy Vision is centred on the following three business segments encompassing the Green Energy Value Chain:

Green Manufacturing: The Company intends to leverage its Hi-Tech Manufacturing capabilities and facilities to venture into the Electrolyser and Stationary Battery (Advanced Chemistry Cell) manufacturing businesses to drive down costs and cater to both domestic and global markets. This is aligned with India's vision to become a Green Manufacturing Hub.

Green EPC: The Green EPC business of the Company endeavours to be a preferred partner of choice for clients in India and in the Middle East, offering integrated cost-competitive solutions for the low-carbon Ammonia / Hydrogen / Methanol / Carbon capture projects to achieve their energy transition journey. Beginning with concept and design, the business will also deliver comprehensive project management expertise to de-risk future execution of the project.

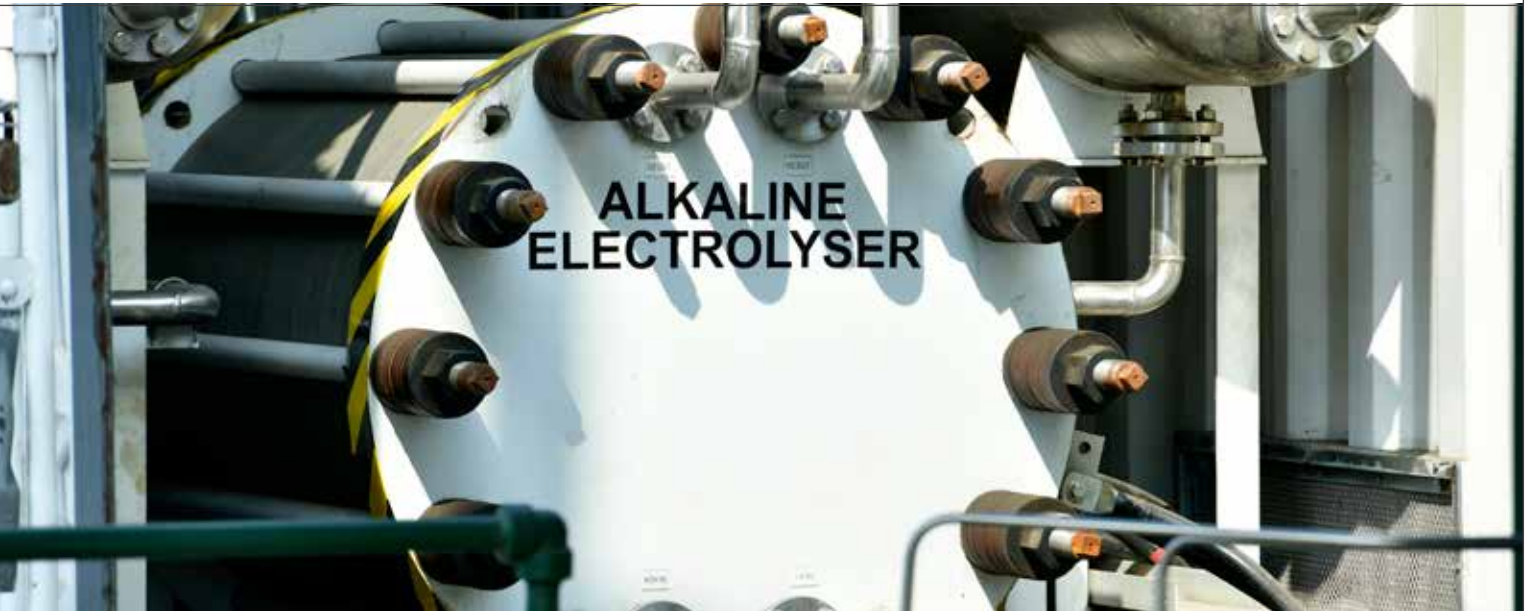
L&T Green EPC has a highly skilled engineering workforce well-versed in the latest technologies and processes involved in Green Hydrogen production. In addition, L&T has a

strong supply chain network and partnerships with leading technology providers, which enables the Company to source the necessary equipment and materials for Green Hydrogen projects at competitive prices. This, combined with the Company's project management and construction expertise, will enable the delivery of Green Hydrogen projects on time and within the budget.

Green Development: The Green Energy Development vertical will focus on Green Ammonia, Green Hydrogen and Green Methanol projects, which have the potential to provide a clean and sustainable source of feedstock and fuel to the hard-to-decarbonise / hard-to-abate industrial sectors like steel, petrochemicals, refining, etc.

The business has distinct but complementary capabilities to the EPC vertical, thereby enabling it to design and develop plants on a Build, Own and Operate (BOO) basis. The business will also leverage the Company's strategically placed locations having proximity to ports, for the storage, handling, transfer and export of Green Hydrogen and Green Ammonia to international clients and position itself as a leading subcontinent-based exporter.

The business will forge key partnerships and joint ventures with reputed national and international players across the Green Energy value chain and offer customers a single-point integrated solution that meets their market expectations.



Alkaline Electrolyser at the Green Hydrogen Plant in Hazira, Gujarat

Business Environment

The Government of India has launched the National Green Hydrogen Mission that seeks to incentivise the commercial production of Green Hydrogen and make India a net exporter of energy. The mission has laid out a target to develop a Green Hydrogen production capacity of at least 5 MMT (million metric tonnes) per annum by 2030 with an initial financial outlay of ₹ 19,744 crore. This will allow the decarbonisation of refineries, city gas-grids, fertiliser, petrochemical, steel and other hard-to-decarbonise sectors, reduce dependence on imported fossil fuels and feedstock, develop indigenous manufacturing capabilities, create employment opportunities and design new technologies such as efficient fuel cells.

States like Uttar Pradesh, Rajasthan, Odisha and Gujarat have announced policies in alignment with the Green Hydrogen Policy of the Union Government. Policy implementation and standard setting for Green Hydrogen are at an advanced stage nationally as well as globally.

The Union Budget 2022-23 has allocated ₹ 35,000 crore for capital investment towards energy transition, net zero objective and energy security. The Government of India has also developed a framework for Sovereign Green Bonds, in which it defines the 'green' sector and the process to ensure that investments will be directed to it.

The Energy Conservation (Amendment) Act, 2022, was enacted during the year, setting in place mandatory provisions for the use of clean energy.

Major Achievements

The business has entered into an Electrolyser Manufacturing Binding Agreement with McPhy Energy, a France-based leading electrolyser technology and manufacturing company, for a long-term partnership to explore the opportunities unfolding in the emerging Green Hydrogen market. Under this partnership, McPhy will grant an exclusive license of its pressurised alkaline electrolyser technology to L&T for the manufacturing of electrolyzers, including future product upgrades. The business plans to set up a Gigawatt-scale manufacturing facility for electrolyzers based on McPhy technology in India to serve the domestic requirements as well as cater to other select geographies.

The business has recently commissioned the first Green Hydrogen plant for captive consumption for Hydrogen Blending at the A. M. Naik Heavy Engineering Complex at Hazira, Gujarat, which includes a Solar Roof-top plant, Green Hydrogen Generation plant with a state-of-the-art energy management and data analytics system, Oxygen and Hydrogen storage and handling systems and Battery Energy storage systems. The plant has a production capacity of 45 kg high purity (99.99%) of Green Hydrogen daily using an electrolyser capacity of 380 kW.



Control Room of the Green Hydrogen Plant in Hazira, Gujarat

Significant Initiatives

Technology innovation plays a central role in the growth of an emerging industry such as green energy, which includes green molecules, energy storage and green energy application technologies. L&T envisages a state-of-the-art green technology innovation platform that will enable closer collaboration with its partners, components suppliers and leading academic institutions. The conceptualisation of new designs, architecture, test methods and innovation in materials processing is critical for the sector to improve energy efficiency, enhance reliability and reduce equipment cost.

Partnerships with leading Indian and global academic institutions are critical to support the development of the technology leadership of the Indian industry. As a first step, a collaboration with the Indian Institute of Technology – Bombay for Green Hydrogen value chain was signed in the Q1 FY 2022-23.

Outlook

The Government of India's commitments at COP26 to target Net Zero by 2070 requires a shift towards cleaner sources of energy. Specific targets such as setting up of 500 GW non-fossil fuel energy capacity, 45% reduction of carbon intensity and 50% energy through renewables by 2030, etc., continue to provide a thrust to the Green Energy businesses. Further, India can also position itself to become a global Green Hydrogen Hub.

The three business segments offer a truly integrated solution from EPC, OEM to BOO, which helps in improving competitiveness, aided by a planned presence across the entire value chain.