

ENERGY PROJECTS SEGMENT

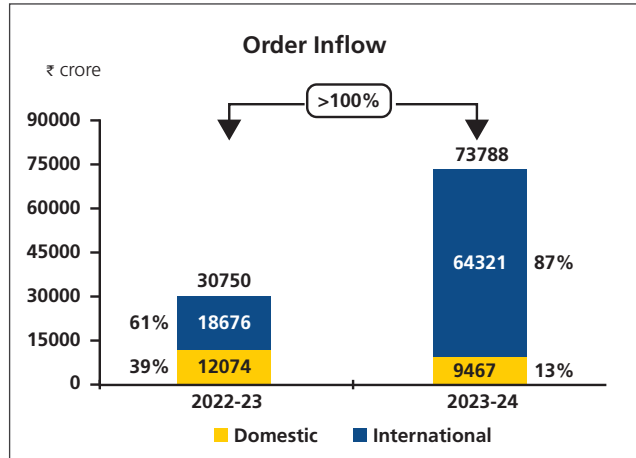


Modularised Reformer for a Blue Hydrogen project in Rotterdam, Netherlands

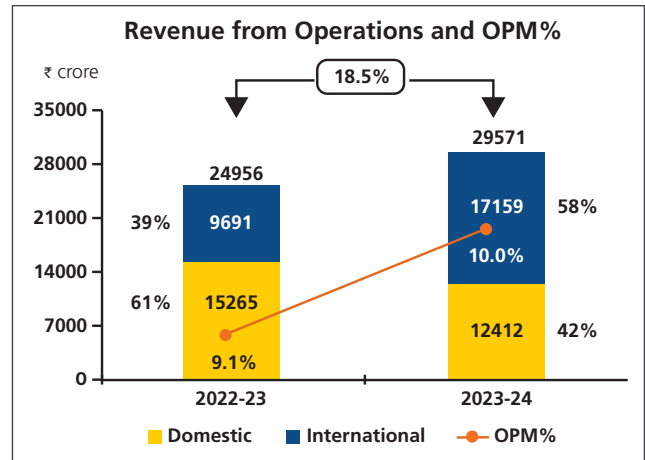
The Energy Projects Segment comprises:

- Hydrocarbon Business
- Power Business
- Green Energy Business

Financial performance of the segment



The Energy segment achieved order inflows of ₹ 73,788 crore in FY 2023-24, registering a substantial growth of more than 100% over the previous year on robust ordering momentum from the Middle East region, leading to an increase in the share of international orders from 61% in the previous year to 87% in FY 2023-24. The receipt of multiple ultra-mega international orders in the Hydrocarbon business aided the order inflow.



The Energy segment's revenue at ₹ 29,571 crore for the year grew by 18.5% y-o-y due to a pick-up in the execution momentum, mainly in the Hydrocarbon business. The Power business registered a decline due to a tapering order book. The share of international revenue in FY 2023-24 at the segment level was higher at 58% compared to 39% in the previous year on the execution of large international projects in the Hydrocarbon business.

The segment's operating margin increased to 10.0% from 9.1%, mainly due to cost savings and favourable award of claims.

Funds employed by the segment as on March 31, 2024, at ₹ 5,792 crore, increased by 34.7% over the corresponding number as on March 31, 2023, mainly due to an increase in contract assets in some large value projects.



Oil Production Deck Module for Saudi waters

Hydrocarbon Business

Overview

The Company's Hydrocarbon business provides integrated 'design and build' turnkey solutions for the hydrocarbon industry across multiple geographies. The business executes projects encompassing all functions, such as engineering, procurement, fabrication, construction, installation, project management, and asset life management services.

Backed by cutting-edge innovation, the business has integrated capabilities across the value chain, supported by in-house Front-End Engineering Design (FEED), project management, procurement, modular fabrication facilities, Onshore and Offshore construction, installation, and commissioning.

Modular fabrication facilities of the business are located primarily in India and the Middle East; at Hazira (near Surat), Kattupalli (near Chennai), and Sohar in Oman to serve the respective adjacent markets.

In India, the Engineering, Procurement, and Project Management centres are located in Mumbai and Vadodara. Overseas, the business presence is predominantly in the Middle East—spanning Kuwait, Algeria, Qatar, and the UAE—with a regional centre of excellence for Engineering and Project Management situated in the Kingdom of Saudi Arabia. The business has set up a Piping shop and a Heavy Wall Pressure Vessel Manufacturing shop at Jubail Industrial Zone to support the KSA In-Kingdom Total Value Add (IKTVA) services.

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

Offshore

The Offshore business offers lump sum turnkey EPCIC (Engineering, Procurement, Construction, Installation, and Commissioning) solutions for wellhead platforms, riser platforms, process platforms, accommodation platforms, subsea pipelines, brownfield developments, decommissioning projects, deepwater structures, manifolds, as well as transportation and installation services to the global offshore oil & gas industry.

The Offshore business has its dedicated comprehensive in-house engineering capabilities offering 'Fit for Purpose' engineering solutions, which cover 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 quality and timely dispatches. Own 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, besides ensuring on-time completion of projects.

As a contractor of choice for both domestic & international markets, the Offshore project management team delivers complex offshore projects in a time-bound manner with the utmost quality standards in a safe and incident-free environment.



Dual Feed Cracker Block Unit (DFCU) for HRRL, Barmer, Rajasthan

Onshore EPC

This business provides end-to-end EPC (Engineering, Procurement, Construction, and Commissioning) solutions for the oil & gas industry, offering turnkey solutions across the hydrocarbon value chain covering refining, oil & gas processing, petrochemicals, fertilisers, cryogenic storage, LNG, pipelines, and terminals, including storage tanks and underground cavern storage systems for LPG.

It also offers innovative construction solutions, such as automated welding (double-sided tandem SAW for horizontal joints and Semi-Auto FCAW for vertical joints), NDT (Non-Destructive Testing), and Automated UT (Ultrasonic Testing) for LNG Tank construction yielding high quality and productivity, enhancement of high deposition submerged arc welding process for duplex stainless-steel material in pipelines, new line of gas regulators for reduced gas wastage, and automatic pipe fabrication shop with cutting edge technologies.

The business has a track record of concurrent execution of multiple ultra-mega & mega projects successfully, both in domestic and international markets, with different technology process licensors. The world-class in-house Engineering Centres offer design and engineering services for onshore hydrocarbon plants, pipeline projects, and onshore oil & gas field development projects with a complete spectrum of FEED, process, detailed engineering, project management services, procurement assistance, and related services.

The business will continue to provide engineering and related services to the hydrocarbon industry in the domestic and international markets.

Onshore Petrochemicals and Fertilisers

Recently, a separate SBU has been carved out from the Onshore vertical to significantly focus on emerging opportunities due to significant developments in the downstream petrochemical and fertiliser sectors, such as Liquid to Chemicals, Blue Ammonia, and Urea projects.

Modular Fabrication

The Modular Fabrication business specialises in supplying plants & modular systems built as solutions for the Offshore, Onshore Oil & Gas, and Offshore Wind Farm industries, with the capability to deliver modules up to 6,600 MT.

Its dedicated engineering & project management expertise is extensive and draws strength from the EPC businesses for both Offshore and Onshore projects. Offshore solutions encompass structures and modules for Oil & Gas and Wind Farm projects, including Deepwater Subsea structures, Oil & Gas manifolds, Jack-up rigs, and Mobile Offshore Production Units (MOPU). Onshore offerings cover Process & Piperack modules, skids, structures, Static Equipment/ Pressure Vessels and Columns, Modular Specialty Furnaces, and Prefabricated Control Rooms/Substation Buildings (E-houses).

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 2,00,000 MT (depending on the product mix). The Heavy Wall Pressure Vessel manufacturing facility, along with an operational pipe fabrication shop in KSA, primarily caters to the local requirement of



Residue Upgradation Facility (RUF) for HPCL, Vizag, Andhra Pradesh

offshore and onshore projects while developing skills in the Kingdom of Saudi Arabia to support the country's localisation programme.

Modular Engineering capability also includes tailored 'Print to Build' solutions for technology companies, particularly in renewables and decarbonisation. The business is delivering modules globally, covering significant regions such as North America, Europe, Africa, the Middle East, Asia, and Australia.

Advanced Value Engineering & Technology Services (AdVENT)

Leveraging 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 business unit delivers customer-centric solutions for various elements of the value chain of the hydrocarbon industry.

AdVENT's technical capabilities and agility enable it to offer associated tailored value engineering solutions. Its offerings to clients encompass full-spectrum engineering—from concept to commissioning. It also provides EPC Project Solutions, Integrated Modular Solutions, Refinery Technology Solutions, and Sustainable Waste-to-Energy Solutions.

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

Asset Management

The Asset Management business delivers differentiated and value-added services across a wide spectrum of solutions to Hydrocarbon and allied Process Industries.

These comprehensive Asset Management Solutions cover operation, maintenance, performance enhancement, and health assessment of critical assets. This business complements the organisation's EPC Project offerings for mutually beneficial engagement with clients over the entire lifecycle of assets.

The comprehensive Operations & Maintenance Outsourcing model covers Consulting and Asset Integrity. It can also include Asset Performance Improvement & specialised services based on the needs of customers.

Offshore Wind

The vision of accelerating sustainable energy solutions is the driving force behind the Offshore Wind Business, which offers one-stop EPCI (Engineering, Procurement, Construction, and Installation) solutions for HVAC/ HVDC substations, and Wind Turbine foundations in both fixed and floating structures across the globe—from Far East, to Europe, and the USA. The business has strong multidisciplinary teams, partnerships with key industry stakeholders, and a robust network of suppliers backed by state-of-the-art fabrication facilities in Oman and India operating on the principle of 'Think Global Act Local'. The business is also partnering with electrical technology companies and collaborating with floating foundation technology providers and other key stakeholders to offer a comprehensive solution.



Jubail Industrial Gas Network, KSA

Business Environment

India's energy demand is poised to increase significantly, fuelled by strategic investments and initiatives such as the USD 67 billion plan in the next 5-6 years to bolster the domestic gas sector. Furthermore, the impending transition towards green energy is evident through initiatives like the Green Hydrogen Standard, backed by substantial incentives and agreements for green hydrogen production in states like Maharashtra, Rajasthan, and Odisha.

Integrated outsourcing of Operations & Maintenance gains momentum, with Vedanta Limited-Cairn and ONGC leading the change.

GCC-based oil companies are investing heavily in gas compared to oil. Geopolitical events have affected businesses both positively and negatively. Oil & Gas prices have remained significantly buoyant, enabling the oil companies in the Middle East to maintain their investment appetites. However, challenges continue to persist with regard to supply chain disruptions resulting from the ongoing conflicts in the Red Sea and Russia/Ukraine.

India's expertise in speciality chemicals and the potential extension of PLI schemes to the chemical and petrochemical sectors indicate promising growth prospects. Additionally, investments in coal gasification projects, viability gap funding for such projects, and the tripling of the Ammonia market by 2050 underscore significant opportunities in the sector.

Globally, the Offshore Wind market is poised to play a pivotal role in helping nations transition to Net Zero and decarbonise life. This sector is witnessing exponential growth, propelled by a confluence of factors viz. escalating

demand for clean energy, supportive governmental policies, technological breakthroughs, and an expanding global market. The growth is being fuelled by advancements in technology, improvement in infrastructure, and viability of projects.

International competition for EPC primarily emanates from Korean and European EPC companies. The business has diversified its exposure to more regions like Australia and Europe, leveraging technological solutions, and enhancing productivity to mitigate risks while maintaining competitiveness as it takes on new competitors. The business remains proactive in deploying measures to ensure cost leadership and focus on improved productivity.

Digital transformation in optimising operations, enhancing efficiency, improving safety, and increasing innovation is an ongoing effort with the adoption of Artificial intelligence (AI) and Machine Learning (ML).

Major Achievements

Major Orders Won:

- EPCI order for new offshore structures, secured from a prestigious client in the Middle East
- Contract from a prestigious client in the Middle East for engineering, procurement, and construction of large Gas Compression Plants consisting of Gas Inlet Facilities, Gas Compression Systems, Produced Water Handling, Propane Refrigeration Systems, Condensate Transfer, and Utilities for Gas Compression Facilities in new onshore facilities and its integration with existing Gas Compression Plants
- Saipem & Clough JV (SCJV), Australia, has awarded a contract for the fabrication and supply of process



Central Processing Facilities for Sonatrach project, Algeria

and piperack modules for a 2.3 MMTPA urea plant for Perdaman Chemicals and Fertilisers Pty Ltd

- ▣ Order from a prestigious client in the Middle East for EPC for an ultra-mega Gas Processing Plant consisting of Inlet Separation Facilities, Booster Compression System, Amine Gas Recovery Unit, Dehydration Unit, Mercury Removal Unit, NGL Recovery Unit, and Sales Gas Compression System in new onshore facilities and its integration with existing Gas Processing Plants
- ▣ EPCI contract for a new large offshore platform and brownfield integration work with existing facilities from a prestigious client in the Middle East
- ▣ Contract from Indian Oil Adani Ventures Limited, including engineering, procurement, construction, and commissioning of offsite tankages, bullets, and other associated facilities on a lumpsum Turnkey basis
- ▣ Order from Oil & Natural Gas Corporation (ONGC) for the MHN TCPP PGC BGC Project (MTPBP) off India's West Coast for engineering, procurement, construction, installation, and commissioning of new Process Gas Compressor (PGC) modules at ONGC's Mumbai High & Tapti offshore locations, along with the upgrade of existing facilities to enhance production
- ▣ EPC contract for an Enclosed Ground-Flare System and demolition of existing facilities, reducing flame and smoke visibility to the nearby ongoing large-scale residential developments from prestigious clients in the Middle East
- ▣ Gas Pipeline project from a prestigious client in the Middle East comprising engineering, procurement, and construction of two new 56" Pipelines along with associated scraper receivers and launchers and main line

isolation valve (MLIV) stations running parallel to the existing pipeline corridor

Projects completed

- ▣ Mechanical completion and gas-in achieved for Re-route Gas and Condensate Pipeline Midyan Duba Project
- ▣ Successful completion of Performance Guarantee Test Run (PGTR) for all three sites of the South-West Gas Fields Development (SWGFD) Project, Algeria
- ▣ Commissioning of New Strategic Gas Export Pipeline (NSGEP) for KOC, Kuwait
- ▣ Commissioning of Replacement of Hydraulic ESD Systems project for a client in the Middle East
- ▣ Mechanical completion of Replacement of 11 BERRI Pipelines project for a client in the Middle East
- ▣ Delivery of Linde Rotterdam HMU (Hydrogen Manufacturing Unit) Project
- ▣ Construction of Fuel (Hydrogen) and Utility facilities (Nitrogen/Oxygen) completed at Jubail, KSA for Air Products

Significant Initiatives

Productivity Enhancement

The business is implementing strategies geared towards streamlining processes, eliminating redundancies, and empowering its workforce to maximise productivity.

Value Engineering

Embracing value engineering practices is paramount to reducing quantities, leading to a competitive



LNG Storage Tanks for Adani Dhamra LNG Terminal, Odisha

business strategy. Good value engineering entails standardisation, templatisation, rework avoidance, surplus management, and resource optimisation to drive efficiency and minimise costs.

Digitalisation and Automation

Recognising the pivotal role of technology, the business is making substantial investments in digitalisation and automation initiatives. These encompass 4D visualisation, critical path integration, construction ability simulation, material handling studies, interactive VR simulations, AI/ML-based video analytics, predictive analytics, and increased yard automation to enhance operational efficiency and accuracy. Generative AI will be used over time to enhance productivity.

Smart Procurement

The business is adopting smarter procurement practices to optimise resource utilisation and enhance cost-effectiveness. This involves the implementation of e-procurement platforms, data-driven decision-making processes, vendor consolidation, spend analysis, and fostering strategic supplier partnerships to drive value and efficiency across the procurement chain.

Outlook

The opportunity landscape of India's refining capacity currently stands at approximately 250 MMTPA, with ongoing additions of 40 MMTPA capacity, coupled with value-added petrochemical units. Anticipated investments in Refinery-Petrochemical integration and the pursuit of achieving targeted Net Zero emissions in India and the

Middle East underscore a promising market trajectory for the business in the medium-term.

The Indian government's focus on the 'National Coal Gasification Mission' aims to curtail dependence on imports by utilising coal to create value-added products, further supported by an incentive allocation of ₹ 8,500 crore. Additionally, initiatives aimed at increasing the share of Gas in India's energy mix to 15% by 2030, coupled with the development of a robust National Gas Grid, present avenues for growth and diversification.

For the Offshore industry, the Indian government's recent focus on enhancing energy security has unlocked 99% of previously restricted areas within India's Exclusive Economic Zone (EEZ) for oil exploration and production (E&P). Previously, 42% of the EEZ was off-limits, but now only 1% remains restricted, presenting significant opportunities.

ONGC continues to press ahead with its deepwater exploration and production plans, buoyed by sustained high oil prices. It intends to develop more than 25 offshore facilities and lay more than 1000 Km of subsea pipelines in the next three years with investments of USD 7.3 billion spread across both the West and East coasts.

There is a considerable demand for Value-Added Services like Consulting, Shutdown and Turn-around Management, Performance Improvement, Asset Integrity Services, etc.

With a strategic focus on asset monetisation and value maximisation, coupled with increased capital expenditure in upstream projects, the Middle East region is poised for growth, especially in the downstream processing of crude to chemicals.



New Strategic Gas Export Pipeline for Kuwait Oil Company, Kuwait

The business expects Saudi Aramco to continue its investment spending in the medium-term. Due to supply-side capacity constraints, which were affecting the completion schedule of various projects, Saudi Aramco has temporarily paused investment in the increment programme. Once a few of the ongoing programmes achieve significant progress, the increment CapEx programme should be revived. Overall, as per the guidance released by Aramco, even in this revised scenario, there is an increase of up to 20% CapEx growth to USD 58 billion expected for 2024, with 60% of this investment in the Upstream sector.

Qatar Energy intends to boost its LNG production capacity from the current 77 MTPA to 126 MTPA by 2026 and plans to contribute 40% of global LNG demand by 2029. It is continuing with expansion under its USD 12 billion North Field Production Sustainability programme.

OPEC expects an increase in oil demand over the next two years, which will be met by crude supply from non-OPEC+ producers.

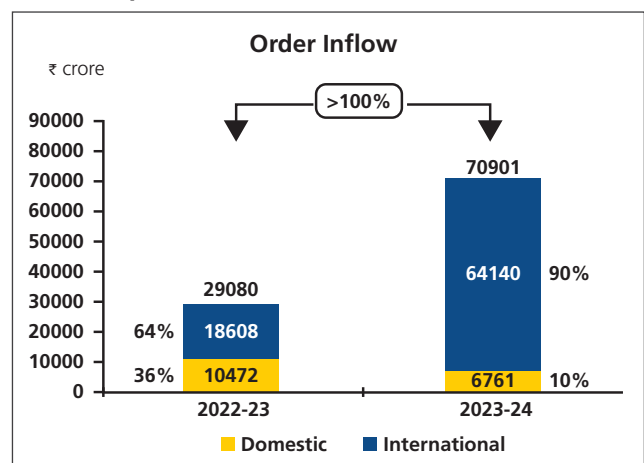
Commitment to offshore wind energy with the formation of Offshore Wind Business, the business is participating in global tenders for key developers. In Global Offshore Wind Capacity, the European market has renewed urgency to replace fossil fuels with renewables. There is a strong demand for renewable energy in the US as well (Inflation Reduction Act).

Globally, new wind power installations are projected to exceed 100 GW in 2026, with an additional 680 GW of new capacity expected to be added in the next five years. Additionally, there are business opportunities in Far East

countries like Korea and Taiwan. Offshore Wind is also gaining momentum in India with the announcement of 30 GW capacity by 2030. Government initiatives for the allocation of offshore wind blocks are setting the ecosystem in motion.

With dynamic market conditions, the business remains steadfast in its commitment to a customer-centric approach, prioritising innovation, driving sustainable growth, and fostering competitiveness to achieve the mission of ‘Execution Par Excellence.’

Financial performance of the business

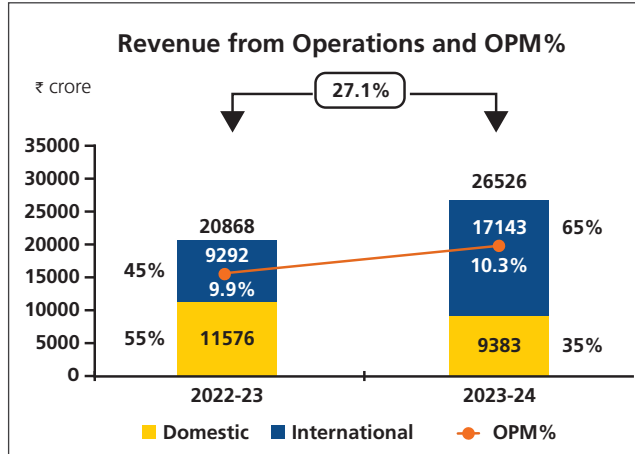


The Hydrocarbon business achieved order inflows of ₹ 70,901 crore in FY 2023-24, registering a growth of more than 100% over the previous year with the receipt of two ultra-mega orders from Saudi Arabia and a mega



Flue Gas Desulphurisation (FGD) system at India's first ultra-supercritical thermal power plant, Khargone, Madhya Pradesh

order from the domestic client. The share of international orders also improved from 64% in the previous year to 90% in March 2024 with the receipt of ultra-mega orders in Saudi Arabia.



The Hydrocarbon business recorded revenue of ₹ 26,526 crore for the year, registering a growth of 27.1% 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 2023-24 was higher at 65% of the total revenue as compared to 45% in the previous year, with a higher opening international order book.

The operating margin of the business increased to 10.3% from 9.9%, mainly due to cost savings arising out of improved execution in a few international and domestic jobs, further aided by the reversal of provisions on the receipt of a favourable arbitration award in a legacy project.

Power Business

Overview

L&T is one of the leading EPC players offering turnkey solutions for both Coal and Gas-based power plants. These solutions encompass every aspect of design, engineering, manufacturing, 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. These include engineering, state-of-the-art manufacturing facilities, a competent manpower pool, and decades of experience earned in executing large & 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.

The business has built on its core competencies and capabilities and has emerged as a major player in emission



2x660 MW Shree Singaji Thermal Power Plant (Stage-II), Madhya Pradesh

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 & generators, pulverisers, axial fans and air preheaters, components of FGD, and electrostatic precipitators. The business has project management offices in Vadodara and various other locations.

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

L&T-MHI Power Boilers Private Limited, a joint venture with Mitsubishi Heavy Industries (MHI), Japan, the world's leading power equipment maker, for the engineering, designing, manufacturing, erection, 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 joint venture 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 joint venture with Howden Holdings B.V, 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 Limited, a joint venture 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 around three years amidst the continuing transition of India's power generation mix. With increasing economic activity, high GDP growth, 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 2023-24, EPC coal-based power projects with a cumulative capacity of around 7 GW were awarded. Currently, around 10 GW of projects are 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.

The gas-based power generation sector in India remains muted due to high fuel costs despite an improvement in the supply and distribution network for natural gas. Approximately 24 GW of installed/commissioned gas-based power plants in India are idling due to high costs



Boiler manufacturing facility at Hazira, Gujarat

of generation. The Government of India has no plans to increase gas-based power generation.

However, to meet the anticipated surge in power demand during the upcoming summers, the government has mandated the activation of the existing gas-based power plants across the country and has issued directives to make these plants fully operational to meet the surge in power demand.

Major Achievements

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

- ▣ Flue Gas Desulphurisation System for a 2 x 500 MW Central Utility Project inaugurated in West Bengal
- ▣ FGD orders received from State Utilities for a 2 x 300 MW + 2 x 500 MW Power project in West Bengal and a 1 x 800 MW Power project in Gujarat
- ▣ Completion of facilities for three FGD units of Central Utility Projects in Chhattisgarh, Madhya Pradesh, and Odisha
- ▣ Reliability Test Run completed for three FGD units of Central Utility Projects in Chhattisgarh, Madhya Pradesh, and Uttar Pradesh
- ▣ Final Acceptance Certificate received for an International Combined Cycle Project in Bangladesh
- ▣ Auxiliary Boiler Light Up achieved for a 2 x 660 MW Power Project in Uttar Pradesh

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. TTF has finalised a few focus areas like Carbon Capture Technology, Small Modular Reactors, Flexibilisation in Coal based power plants, Coal Gasification, Integrated Gasification Combine Cycle (IGCC), and Biofuel/Ammonia/Methanol firing in Supercritical Power Boilers, etc. 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 various Operational Excellence initiatives. To improve productivity and reduce profit leakages, various digital and analytical levers such as Artificial Intelligence (including Machine Learning), IoT-isation, Immersive Technologies like Virtual Reality, BIM, Drones, Process Automation, and Business Intelligence & Analytics have been imbibed into the day-to-day operations. The focus on achieving 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.



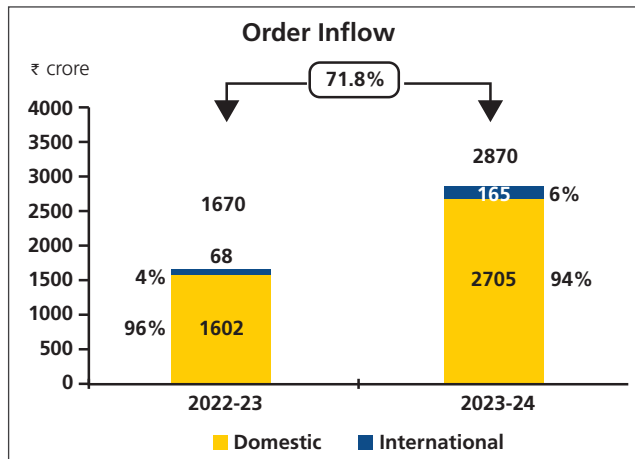
Turbine manufacturing facility at Hazira, Gujarat

Outlook

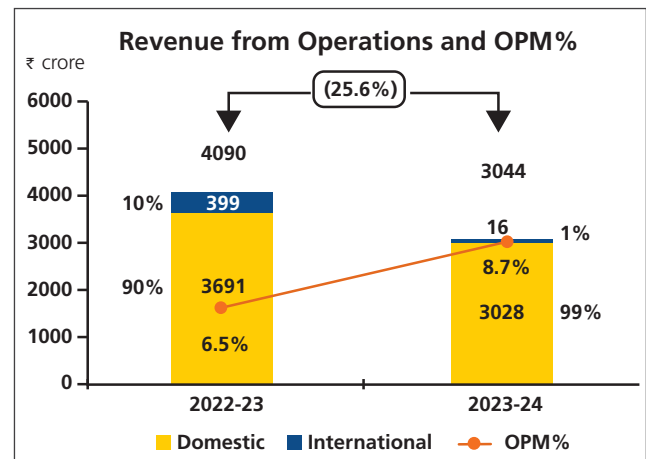
India is continuing to see a surge in energy demand and an increase in the Plant Load Factor (PLF) of thermal power plants to maintain the country's energy security amid rising demand. As per estimates from the Ministry of Power, the capacity additions in thermal power will continue up to 2032. More than 49 GW of coal-based power projects are expected to be awarded in the next 3-4 years.

Focus on execution and improvement in profitability of operations continue to remain critical for the continuity of the business.

Financial performance of the business



The Power business recorded an order inflow of ₹ 2,870 crore for the year ending March 31, 2024, registering a growth of 71.8% as compared to the previous year, largely aided by the receipt of a few FGD orders.



The Power business revenue at ₹ 3,044 crore declined 25.6% on a y-o-y basis, with tapering of execution of jobs in the portfolio and a declining order book.

The operating margin improved to 8.7% from 6.5%, mainly due to the cost savings in certain international gas-based projects.



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

Green Manufacturing & Development

Overview

L&T's Green Energy business affirms the Greener Planet vision by aligning with the initiatives of global decarbonisation and the National Green Hydrogen Mission (NGHM). It focusses on a green energy portfolio to meet the domestic and global future energy needs while achieving the global climate goals.

To achieve this vision, L&T Energy Green Tech Limited (LTEGL), a wholly-owned subsidiary of Larsen & Toubro Limited, focussing on Green and New Energy transition business segments, has been created. The Green Energy business shall focus on the entire Green Energy value stream, including Green Molecules and their derivatives (Hydrogen, Ammonia, Methanol, etc.).

The business is centred on three principal business segments, viz. Manufacturing, EPC, & Development. The Green Manufacturing unit at Hazira (Gujarat) would focus on end-to-end manufacturing of electrolyzers as an OEM supplier, with value stacking and advanced technologies. The EPC arm would cater to domestic and global projects in the Green H₂, Derivatives, and Carbon Capture Solutions. The Development division would focus on Integrated Development of Green H₂ & Derivatives projects. The business has incorporated three companies that cater to these three lines of business.

L&T Energy Green Tech Limited (LTEGL) will provide single-point integrated solutions in the hydrogen economy.

LTEGL aims to undertake complex and mega projects in the hydrogen value stream of renewable power, hydrogen, and derivatives (Ammonia, Methanol, DME, etc.) generation, storage, and transportation infrastructure. LTEGL would undertake extensive research and development (R&D) activities through its Technology & Innovation centres and assess the best global technologies, acquire strategic interests, licensing in technologies aligned with green and new energy opportunities.

L&T Electrolysers Limited (LTEL), a subsidiary of LTEGL, is the manufacturing arm for modular & mass manufacturing of smart, efficient, and reliable electrolyzers. Electrolysers are hi-tech equipment that use electricity, water, and electrolytes to produce green hydrogen. The units consist of transformers, rectifiers, electrolyser stacks, electrolyser processing units (EPUs) for gas separation, and purification & distillation units (PDUs) for making fuel cell grade hydrogen with 99.999% purity.

The company will use pressurised, alkaline technology under licensing arrangements with its European partner, M/s McPhy. The technology does not use noble materials and is competitive with a compact modular footprint. These devices have a fast start-up from hot standby to full load and demonstrate a quick response to intermittent renewable energy supply.

GH4India Pvt Ltd, a JV between L&T, ReNew Power, and IOCL, is formed to develop the nascent green hydrogen sector in India. GH4India will focus on developing Green Hydrogen & derivatives projects to supply Green Hydrogen at an industrial scale in a time-bound manner under various ownership and operatorship models.



Electrolyser manufacturing plant at L&T's A. M. Naik Heavy Engineering Complex in Hazira, Gujarat

Business Environment

The Green Hydrogen and New Energy sectors are experiencing a remarkable surge globally, driven by the urgent need to combat climate change and transition towards a low-carbon economy. Governments worldwide are recognising the importance of investing in renewable energy technologies, including Green Hydrogen, to achieve their climate targets outlined in the Paris Agreement.

Competitive renewable energy sources, aided by advancements in electrolysis technology, low-cost financing, and government incentives, are accelerating the pace of achieving parity between green energy and conventional alternatives. This has led to a proliferation of projects and investments across various regions, ranging from Europe and the USA to Asia-Pacific and beyond.

Over forty nations have hydrogen strategies, with early adopters revising their plans for higher ambitions. Low-emission hydrogen is seen as vital for decarbonising hard-to-abate sectors, highlighted by the energy crisis sparked by the global geopolitical situation. Additionally, major economies are integrating hydrogen technologies into their new industrial strategies.

Countries such as India with abundant renewable energy resources, have a competitive advantage in green hydrogen production, potentially reshaping global energy trade dynamics.

In the global electrolyser market, China, after a slow beginning till 2022, added 30% to the global electrolyser capacity addition in 2023. North America and Europe lead

in promoting low-emission hydrogen production, backed by significant government funding initiatives like the US Inflation Reduction Act (IRA), Hydrogen Production Tax Credit, the EU Important Projects of Common European Interest, and the UK Low Carbon Hydrogen Business Model. The European Union Emissions Trading System – EU ETS is a cornerstone of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost-effectively.

The National Green Hydrogen Mission (NGHM) of India has come up with incentives to accelerate Green Hydrogen adoption in India through the Strategic Initiative for Green Hydrogen Transition (SIGHT). Over ₹ 19,500 crore is earmarked towards the adoption of Green Hydrogen. These incentives are mainly directed towards Electrolyser Manufacturers and Green Hydrogen Producers.

Major Achievements

- ▣ LTEL engineered, developed, and commissioned the first Indigenous Electrolyser in its newly set up factory at A. M. Naik Heavy Engineering Complex at Hazira, Gujarat
- ▣ LTEL is awarded a PLI benefit of ₹ 444 crore for manufacturing electrolysers with an allotted capacity of 300 MW and also a grant of ₹ 120 crore as a fiscal incentive under the Gujarat Electronics' Policy
- ▣ LTEGL has bagged its first Front End Engineering & Design orders from global players making a foray into the Green EPC space

- LTEGL and GH4India have received pre-qualifications for developing Green Hydrogen & Derivative assets from domestic and overseas off-takers
- LTEL has established an Electrochemical Testing Facility at A. M. Naik Heavy Engineering Complex at Hazira, Gujarat

Significant Initiatives

- The R&D Lab is being enhanced, and the New Energy Technology Lab is being set up to develop various green & sustainable technologies
- LTEL has taken definitive steps towards indigenisation by developing a local supplier ecosystem for electrolyzers
- LTEL is establishing a Giga factory with manufacturing automation and Industry 4.0 solutions ensuring productivity, safety, efficiency, and traceability
- The Green Energy business is initiating world-class quality systems per ISO and implementing L&T's Business Excellence Models at its manufacturing facility
- Set up an advisory 'L&T Green Energy Council' (GEC), a global think-tank comprising eminent thought leaders and experts from various facets of Green Energy, towards identification of technology trends, analyse global policy developments, evaluate emerging business models, and explore collaborations

Outlook

The global outlook on green hydrogen and its derivatives business seems encouraging and reflects a growing recognition of its potential to decarbonise industries and power systems. Most countries that have set ambitious targets towards carbon neutrality are exploiting the production of Green Hydrogen from renewable energy sources. Therefore, Green Hydrogen emerges as a key solution to reduce carbon emissions across various sectors, including transportation, manufacturing, and energy generation. Investments in Green Hydrogen infrastructure and technology are increasing, mainly driven by Government incentives, private sector initiatives, and

international collaborations. Moreover, the development of hydrogen derivatives such as ammonia, methanol, and synthetic fuels further expands the potential applications of Green Hydrogen, offering scalable solutions for energy storage, transportation, and industrial processes.

Despite challenges such as cost competitiveness and scaling up production, the global momentum towards a hydrogen economy is palpable, signalling a transformative shift towards sustainable energy systems amidst the pursuit of economic growth.

In India, the Green Hydrogen and New Energy Sectors are poised for significant growth and innovation. As the country aggressively pursues its renewable energy targets, the demand for clean and sustainable energy solutions is escalating rapidly. Besides, the Government's commitment to reducing carbon emissions is evident from various announcements around favourable policies and incentives. NGHM creates a conducive environment for the expansion of green hydrogen and new energy businesses.

In addition, India's vast renewable energy potential, particularly in solar and wind power, presents abundant opportunities for Green Hydrogen production through electrolysis. The integration of Green Hydrogen into various sectors such as industry (especially cement, steel, refineries, fertilisers, etc.), transportation, and power generation offers promising prospects for market penetration and revenue generation. Additionally, collaborations with government agencies, private enterprises, and research institutions will play a crucial role in driving innovation and scaling up production capacities.

However, challenges around financing and regulatory complexities need to be addressed to unlock the full potential of the Green Hydrogen and New Energy markets in India.

Overall, with the right strategies and investments, the outlook for this sector is highly optimistic, promising a substantial contribution to India's energy transition and sustainable development goals.