GAS BASED PROJECTS

L&T-S&L

L&T-Sargent & Lundy Limited

The Company

L&T-Sargent & Lundy Limited is a joint venture between Larsen & Toubro Limited, India and Sargent & Lundy LLC, USA providing engineering and consulting services for electric power business across the globe. Operating since 1995, it combines deep domain expertise, internationally aligned systems and processes, and unique 3D modeling technique to converge technical consultancy with high-end solutions and delivery.

Joint Venture Partners

The synergy created by coming together of an engineering and construction conglomerate and a consulting giant has enabled L&T-S&L to consistently deliver solutions, which are technically sound and operationally efficient.

Larsen & Toubro

Larsen & Toubro is a USD 14 Bn technology, engineering, construction, manufacturing and financial services conglomerate, with global operations. It is ranked 4th in the global list of Green Companies in the industrial sector by reputed international magazine Newsweek and ranked the world's 9th Most Innovative Company by Forbes International. L&T is one of the largest and most respected companies in India's private sector and has attained and sustained leadership in its major lines of business over seven decades.

Sargent & Lundy

Sargent & Lundy LLC, USA (S&L) - With over 120 years of experience in providing engineering services exclusively focused on power, S&L is acknowledged as a premier force worldwide. S&L has an extensive and credible consulting experience in projects as diverse as combined cycle power plants, gas and coal based projects, renewable energy and nuclear projects. S&L has been ranked second among engineering firms in USA by Engineering News-Record magazine (2011 & 2012).

Services Offered

Be it site selection, designing, project reports, detail engineering services, site support services or renovation and modernization services, L&T-S&L offers the complete gamut of Power Plant Engineering and Consultancy Services ranging from concept to commissioning and beyond.

EPC Contractor's Engineer

- Pre-bid Engineering Support
- Post-award Engineering
- Basic Engineering
- Detail Engineering Services
- Site Engineering Support
- Commissioning Support

Lender's Engineer

- Technical and Financial Due Diligence (Pre-financial Closure Phase)
- Construction Monitoring (Implementation Phase)
- Performance Testing (Start Up & Testing Phase)
- Operations Monitoring (Post Commissioning Phase)

Transmission & Distribution

- Basic and Detailed Engineering Indoor / Outdoor / GIS Substations
- Power System Studies
- Distribution System Design

Owner's Engineer

- Site Assessment Study
- Feasibility Study
- Detailed Project Report
- Tender Specification
- Bid Evaluation and Finalization
- Review Engineering
- Inspection
- Performance Testing
- Commissioning Support
- Project Management
- Site Supervision Services

Special Engineering Services

- Special Consulting Assignments
- Performance Testing
- Repowering Studies
- Technical Training
- Renewable Energy (Wind / Solar / Biogas)

Power System Studies

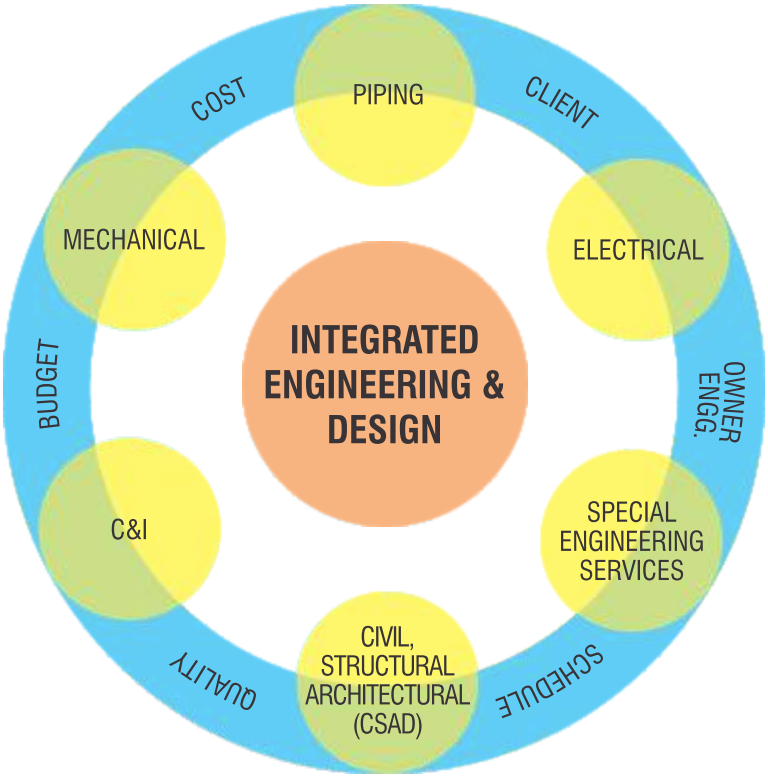
- Load Flow & Voltage Regulation
- Dynamic Motor Starting Study
- Short Circuit Study
- Transient Stability
- Relay Co-ordination
- Switching & Lightning Surge Analysis
- Insulation Co-ordination Study
- Harmonic Analysis

Renovation & Modernization

- Energy Audits including Boiler Performance Evaluation Test
- Steam Path Audits
- Remaining Life Assessment (RLA)
- Detailed Project Report
- Preparation of Techno-commercial Specification
- Evaluation of EPC Bids and Order Finalization
- Supervision of R&M Work as OE

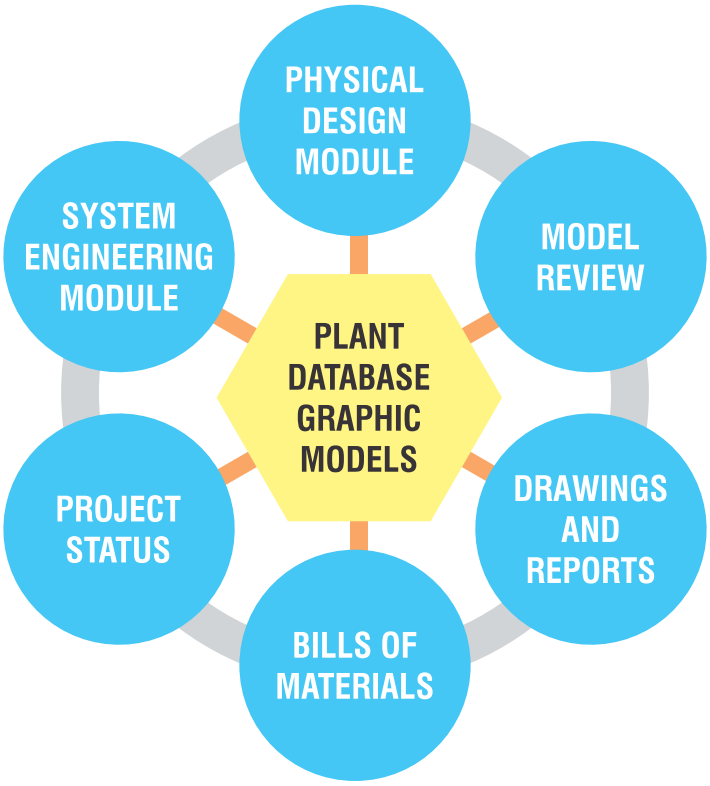
Professional Expertise

Processes, systems and technology yield better results when talent combined with experience drive them. The multi-skilled team at L&T-S&L consisting of 650 engineers and designers bring together specialists in the field of conventional and non-conventional energy, engineering disciplines, project management and client servicing. Integral to this team are experts in the field of information technology, quality assurance and finance.



Coupled with professional strength, L&T-S&L uses PLADES - proprietary 3D - modelling software for integrated plant engineering.

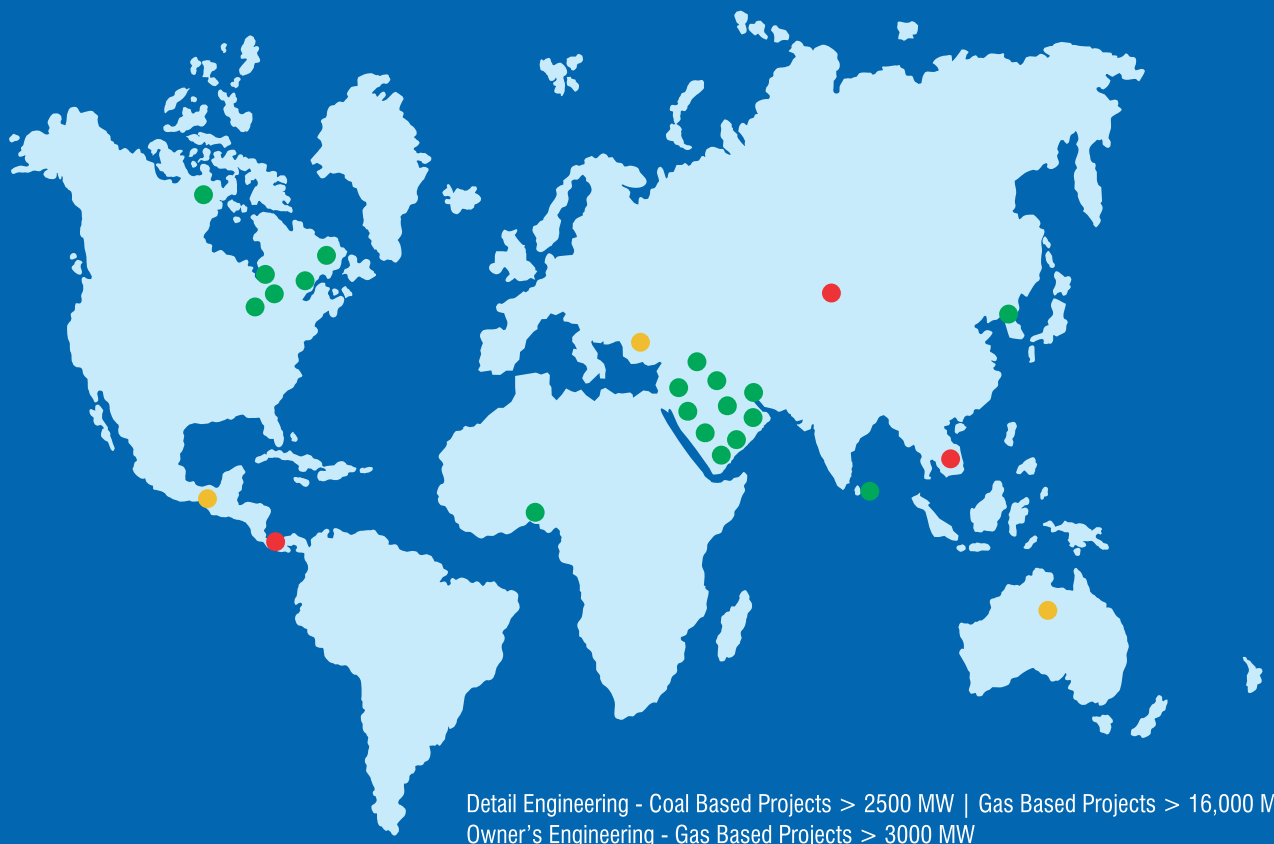
This enables optimized utilization of resource and interactive visualization ensuring ease of construction, operation and maintenance of the plant.



Benefits of PLADES

Shared Database
Unrestricted license
Integrated Engineering
3D Model Review
Intelligent Drawing
Interface Management
BOQ Extraction
Plant Walkthrough
Effective Visualization
Interference Checks
Space Planning

International Footprint

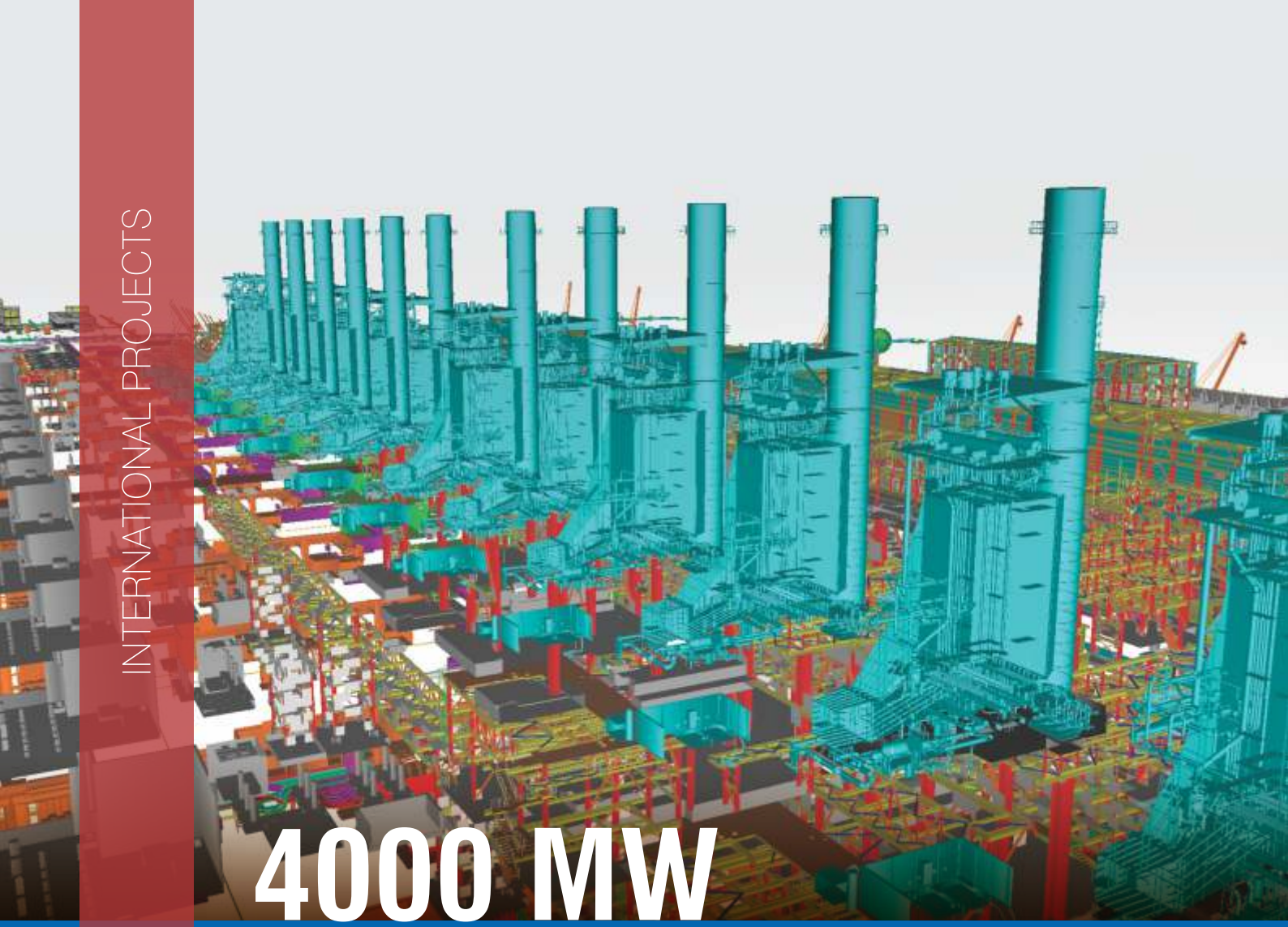


Detail Engineering - Coal Based Projects > 2500 MW | Gas Based Projects > 16,000 MW
Owner's Engineering - Gas Based Projects > 3000 MW

National Footprint

Detail Engineering - Coal Based Projects > 20,000 MW | Gas Based Projects > 3000 MW
Owner's Engineering - Coal Based Projects > 10,500 MW | Gas Based Projects > 300 MW

Legends: ● *Gas based Plants* ● *Coal based Plants* ● *Hydro-electric Plants*



4000 MW

Qurayyah Independent Power Plant

Kingdom of Saudi Arabia

Owner	Hajr Electricity Production Company (HAJR), Kingdom of Saudi Arabia
Client	Samsung C&T, South Korea / Sargent & Lundy, USA
L&T-S&L's Scope	Part Basic and Complete Detail Engineering for EPC of Entire Plant
Configuration	• Twelve (12) Siemens make Gas Turbine Generators (GTGs) • Twelve (12) BHI make Heat Recovery Steam Generators (HRSGs) • Six (6) Siemens make Steam Turbine Generators (STGs)
Key Technical Features	• Six (6) Units each having 2x2x1 Side-by-side Arrangement • Dual Fuel, Dry Low NOx GTGs SGT6-5000F; 229 MW each • Two (2) 226 MW Pressure Level Condensing STGs • Horizontal HRSGs Without Duct Firing at Two Pressure Levels • Bypass Deaerator • Seawater Intake System and Cooling System • Electrochlorination System • Desalination Plant for Seawater • Turbine Inlet Chilling System • Plant HVAC and Firefighting System
Fuel	Natural Gas / Diesel
Year of Commissioning	2014

3190 MW

(1890 MW SCPP + 1300 MW Conversion)

Qurayyah Combined Cycle Power Plant

Kingdom of Saudi Arabia

Owner	Saudi Electricity Company (SEC), Kingdom of Saudi Arabia
Client	Arabian Bemco, Saudi Arabia / Sargent & Lundy, USA
L&T-S&L's Scope	Part Basic and Complete Detail Engineering for EPC of Entire Plant
Configuration	Five (5) Blocks, each Consisting of: • Three (3) GE make 7 FA Gas Turbine Generators (GTGs) • Three (3) Doosan make Heat Recovery Steam Generators (HRSGs) • One (1) GE make TC2F-34.5" - LSB Steam Turbine Generator (STG)
Key Technical Features	• GTGs of Capacity 126 MW each • Triple Pressure, Vertical Type HRSGs • STGs-D11 of Capacity 260 MW each • Fuel Gas Compressors (6x30% Capacity) • Thermal Desalination Plant (3x50% Capacity) • Seawater Once-through Cooling Water System • Hypochlorite Generation Plant (4x50% Capacity) • Demineralization Plant • Compressed Air System • Lube Oil Storage, Forwarding and Purification System • Chemical Storage, Forwarding Dosing System • Hydrogen Generation Plant • Remineralization Plant • Wastewater Neutralization Plant • Plant Nitrogen Purging and Preservation System • Fire Protection System
Fuel	Natural Gas / Fuel Oil
Year of Commissioning	2013

370 MW

Amman East Combined Cycle Power Plant

Jordan

Owner	AES Jordan PSC, Jordan
Client	Doosan Heavy Industries and Construction Co. Limited, Korea
L&T-S&L's Scope	• Complete Basic and Detail Engineering for EPC of Entire Plant Excluding Switchyard • Pre-commissioning, Commissioning and O&M Manuals
Configuration	• Two (2) Ansaldo make V 94.2 Gas Turbine Generators (GTGs) • Two (2) Doosan make Heat Recovery Steam Generators (HRSGs) • One (1) SPX make Air Cooled Condenser (ACC) • One (1) Fuji make Axial Steam Turbine Generator (STG)
Key Technical Features	• GTG of Capacity 140 MW each, Designed to Operate on Natural Gas and Light Distillate Fuel (Dual Fired) • HRSG with Dual Pressure, Unfired Natural Circulation Design • STG of Capacity 140 MW • All Air Cooled Systems including Air Cooled Condensers
Fuel	Natural Gas / Distillate Fuel
Year of Commissioning	2009

2x60 MW

Reinforcement of Wadi-Al-Dawasir Simple Cycle Power Plant

Kingdom of Saudi Arabia

Owner	Saudi Electricity Company (SEC), Kingdom of Saudi Arabia
Client	Al-Toukhi Company for Industry, Trading and Contracting, Kingdom of Saudi Arabia
L&T-S&L's Scope	Complete Basic and Detail Engineering for Reinforcement of Existing Plant as per SEC Specifications
Configuration	Two (2) GE make Frame 7EA Gas Turbine Generators (GTGs) in Simple Cycle Mode
Key Technical Features	• GTG of Capacity 60 MW Each • Compressed & Instrument Air Systems with Auxiliaries • Crude Oil Treatment Plant • Crude Oil Forwarding Pump System with Fuel Skids • Distillate Oil Forwarding Pumps • Water Supply System • Fire Protection and Detection System • Isolated Phase Bus Duct, MV Switchgear / MCC, LV Switchgear, Unit Main Transformers and Unit Auxiliary Transformers, Synchronizing Equipment, MV & LV Power and Control Cables etc.
Fuel	Crude Oil / Distillate
Year of Commissioning	2009

4x120 MW

Riyadh PP-8 Ext-III Simple Cycle Power Plant

Kingdom of Saudi Arabia

Owner	Saudi Electricity Company (SEC), Kingdom of Saudi Arabia
Client	Al-Toukhi Company for Industry, Trading and Contracting, Kingdom of Saudi Arabia
L&T-S&L's Scope	• Complete Basic and Detail Engineering Services as per SEC Specifications • Interface Engineering with Existing 380 kV Substation • HAZOP Study
Configuration	Four (4) GE make Frame 7FA Gas Turbine Generators (GTGs) in Simple Cycle Mode
Key Technical Features	• Dual fired GTG of Capacity 120 MW each • Fuel Gas Pressure Reduction Skid • Fuel Oil System Comprising Three (3) Bulk Diesel Oil Tanks & Four (4) Diesel Forwarding Pumps • Filtration Systems • Instrument Air System • Gas Turbine Building • Transmission System Room • Fuel Management Skid • Hydrogen Plant
Fuel	Natural Gas / Fuel Oil
Year of Commissioning	2008

255 MW

Salalah Open Cycle Power Plant

Oman

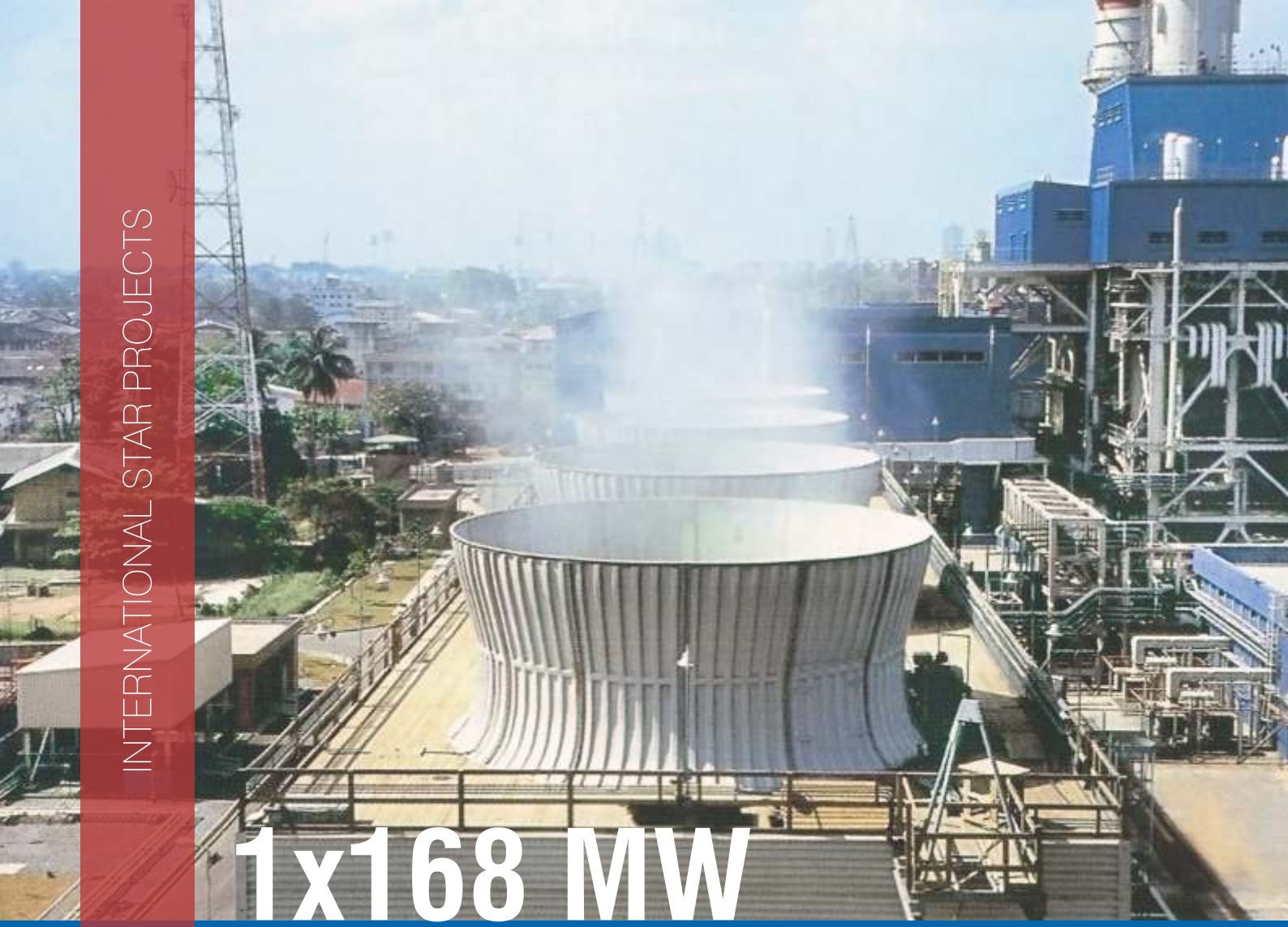
Owner	Dhofar Power Co. S.A.O.C, Oman
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	• Complete Basic and Detail Engineering for EPC of Entire Plant including Integration with Existing System • Integration and Modification of Transmission and Distribution System with the Plant
Configuration	Six (6) GE make PG 6581 B Gas Turbine Generators (GTGs)
Key Technical Features	• GTGs of Capacity 35 MW each • Integration of Existing Fr-6 GTG & Aeroderivative LM 2500 GTG • New GTG and Existing Fr-6 Generator to have Speedtronic Mark-V Control System Panel Interface with New Power Station (NPS), Control System and Central SCADA • 2x100% Emergency DG sets at NPS • Three (3) New 132 kV GIS • New Transmission and Distribution Facility with 132 kV Double Circuit Transmission System • 33 kV Distribution System
Fuel	Natural Gas / High Speed Diesel
Year of Commissioning	2007

1x500 MW

Charles Poletti Combined Cycle Power Plant

New York, USA

Owner	New York Power Authority, USA
Client	General Electric International Inc. / Sargent & Lundy, USA
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Two (2) GE make PG7241FA Gas Turbine Generators (GTGs) • Two (2) NEM, Holland make Heat Recovery Steam Generators (HRSGs) • One (1) GE make Steam Turbine Generator (STG) • One (1) Hamon make Air Cooled Condenser (ACC)
Key Technical Features	• 169 MW GTGs each with Dry Low NOx Burners for Emission Control • Triple Pressure, Natural Circulation Type HRSGs with Deaerating Type LP Drum and SCR to limit NOx Emission • 197 MW STG having Two (2) Cylinders with Combined HP / IP Casing • 32 cell ACC with Deaerating Condensate Tank & 100% HP, HR & LP Steam Bypass • Vapor Compression Inlet Air Chilling System • Unique layout with Indoor Gas Turbines, Inlet Air Chillers and ACC • One of the World's Shortest GTG Pitch of 110 ft. for STAG 207 FA Configuration • Extremely Compact Design complying with New York City Codes
Fuel	Natural Gas / Distillate Liquid fuel
Year of Commissioning	2005
Other similar Projects with GE/S&L in USA	• 1x500 MW Dresden CCPP, Ohio • 2x500 MW Fairless CCPP, Pennsylvania • 1x500 MW Possum Point CCPP, Virginia • 1x500 MW CCPP & 1x330 MW John S Rainey SCPP, South Carolina



1x168 MW

AES Kelanitissa Combined Cycle Power Plant

Colombo, Sri Lanka

Owner	AES Kelanitissa (Pvt.) Limited, Sri Lanka
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• One (1) BHEL make MS 9171 E Gas Turbine Generator (GTG) • One (1) L&T make Heat Recovery Steam Generator (HRSG) • One (1) BHEL make Steam Turbine Generator (STG)
Key Technical Features	• GTG Capacity 116 MW with Steam Injection for Emission Control • Double Pressure, Unfired, Unassisted Circulation Type HRSG • STG of Capacity 57 MW Having Two (2) Cylinders with Combined HP / LP Casing, Down Exhaust Condensing Type, with LP Injection and Dual Extraction • Two Pass, Single Shell Divided Water Box Type Condenser
	• Severe Space Constraints made Layout Engineering a Challenging Task • Induced Draft Cooling Tower, Basin, Fire Water Pump House and Transformers Located on Top of Clarified Water Storage Tank • Overhead Switchyard with Multi-tier Arrangement of Transformer Bay and Switching Bays • Single Push Button Start up and Shut Down • Global Positioning Satellite Synchronization for All Control Systems • Engineering Carried Out Using American and Other International Codes Customized to Local Regulatory Requirements
Fuel	High Speed Diesel
Year of Commissioning	2003

375 MW

Dhuvaran Phase III Combined Cycle Power Plant

Gujarat, India

Owner	Gujarat State Electricity Corporation Limited (GSECL), India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	One (1) Siemens make Single Shaft Turbine Train (SCC5-4000F SS)
Key Technical Features	• Natural Circulation Type Vertical L&T make HRSG • 245 MW Siemens SGT5-4000F Gas Turbine • 130 MW Siemens SST5-3000 Steam Turbine with Two Cylinder (HP, IP-LP) Axial Exhaust • 471 MVA, 20 kV Common GT / ST Generator - One of India's Largest • STG Auxiliaries like Boiler Feed Pumps (BFP), Condensate Extraction Pump (CEP), DM Cooling Water Pumps, Vacuum Pumps, Heat Exchangers etc. • Bypass Deaerator and Axial Condensers Having Divided Water Box • Balance of Plant including Water System with RO Facilities, HVAC, Firefighting System, Fuel Gas System etc. • Power Evacuation by 220 kV Outdoor Switchyard - 2M+1T, 7 Bays • Switchyard Control and Operation by SCADA • ETP-RO Plant and Induced Draft Cooling Towers by L&T • One of India's Largest Single EOT Crane of Capacity 370 Tonne • General Civil Works for Complete Plant
Fuel	Natural Gas
Year of Commissioning	2013

238.35 MW +

228 TPH Steam IOCL Panipat Naphtha Cracker Project

Captive Co-generation Power Plant, Haryana, India

Owner	Indian Oil Corporation Limited, India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Five (5) Hitachi make H-25 Gas Turbine Generators (GTGs) + Provision for One (1) Future GTG • Five (5) L&T make Heat Recovery Steam Generators + Provision for One (1) Future HRSG • Two (2) Ansaldo make Utility Boilers (UBs) + Provision for One (1) Future UB • Three (3) BHEL make EHNK - 50/90-B1 Steam Turbine Generators (STGs) + Provision for One (1) Future STG
Key Technical Features	• GTG Capacity 25.6 MW each • STG Capacity 36.8 MW each • Utility Boilers of 406.5 TPH each • Multi-fuel Capability viz. Blended Fuel Oil (for UB), HSD (for GT / HRSG) and RLNG (for UB, GT, HRSG) • Multi-pressure Level Steam System with Floating Header Concept and Cascading Bypass • 100% Common Deaerator, Day Tanks for HSD (for GTG and HRSG), Blended Fuel Oil (for UB) and their Forwarding Pumps, Liquefied Natural Gas (LNG) Conditioning Skid, Stacks and Online Stack Monitoring System • Plant Configured and Designed for 32 Different Operating Scenarios to Provide Uninterrupted Steam to Naphtha Cracker Complex and Meet Power Requirements During Equipment Upset Conditions or Blackouts
Fuel	Natural Gas
Year of Commissioning	2010

1x388.5 MW(Phase-I) | 2x384 MW(Phase-II)

Vemagiri Combined Cycle Power Plant

Andhra Pradesh, India

Owner	GMR Rajahmundry Energy Limited, India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Three (3) GE make PG9351FA Gas Turbine Generators (GTGs) • Three (3) L&T make Heat Recovery Steam Generators (HRSGs) • Three (3) Alstom make Axial Steam Turbine Generators (STGs)
Key Technical Features	• GTG of Capacity 232.54 MW (Ph-I) and 239.6 MW (Ph-II) with Dry NOx Burners for Emission Control • HRSGs Having Triple Pressure, Duct Fired, Reheat, Vertical Type CMI Design • STG with Capacity 155.96 MW (Ph-I) and 144.2 MW (Ph-II) each having Two (2) Cylinders with Combined HP / IP Casing and Separate LP Casing • Two Pass, Single Shell Divided Water Box Type Axial Condenser • Back to Back Induced Draft L&T make Cooling Tower with Common CW Pumps • Combined GTG / STG Building for each Unit • Combined Electrical and Control Building for each Unit
Fuel	Natural Gas
Year of Commissioning	Phase-I: 2006 and Phase-II: 2012

445 MW

Konaseema Combined Cycle Power Plant

Andhra Pradesh, India

Owner	Konaseema Gas Power Limited, India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Two (2) Siemens make V 94.2 Gas Turbine Generators (GTGs) • Two (2) L&T make Heat Recovery Steam Generators (HRSGs) • One (1) LMZ make Steam Turbine Generator (STG)
Key Technical Features	• GTGs of Capacity 139.43 MW each with Dry Low NOx Burners for Emission Control • HRSGs with Triple Pressure, Natural Circulation Having Integral Deaerator • STG with Horizontal Split of Capacity 155.5 MW Downward Exhaust with Combined IP and LP Steam Injection • Two Pass, Single Shell Divided Water Box Type Axial Condenser
Fuel	Natural Gas
Year of Commissioning	2010

90 MW+240 TPH Steam
IPCL Co-generation Power Plant
Gujarat, India

Owner	Indian Petrochemicals Limited, India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Two (2) GE make and Brush (U.K.) make LM6000 Aero-derivative Gas Turbine Generators (GTGs) • Two (2) L&T make Heat Recovery Steam Generators (HRSGs)
Key Technical Features	• GTGs of Capacity 45.03 MW Output each with Water Injection at Site Design Conditions • HRSG of Deltak (U.S.A.) Design with Supplementary / Auxiliary Firing with Integral Deaerator and Induced Draft Fan • Steam Generated at Two Pressure Levels viz. High Pressure (HP) Steam for Export to IPCL and Low Pressure (LP) Steam for Vapor Absorption Chiller Units
Fuel	• The Primary Fuel for the Gas Turbines is Naphtha with HSD as the Start up Fuel • HRSG is Designed to Fire Naphtha under Supplementary / Auxiliary Firing Mode • Both GTG and HRSG Firing System Have Been Modified for Natural Gas as Primary Fuel
Year of Commissioning	1999

116 MW
Haldia Combined Cycle Co-generation Power Plant
West Bengal, India

Owner	HPL Co-generation Ltd., Haldia, India
Client	Larsen & Toubro Limited, India
L&T-S&L's Scope	Complete Basic and Detail Engineering for EPC of Entire Plant
Configuration	• Two (2) Frame 6551B EGT make Gas Turbine Generators (GTGs) • One (1) ABB make Condensing Steam Turbine Generator (CSTG) • One (1) ABB make Back Pressure Steam Turbine Generator (BPSTG) • Two (2) L&T make Heat Recovery Steam Generators (HRSGs) • Two (2) Mitsui make Auxiliary Boilers
Key Technical Features	• GTG of Capacity 35.5 MW each with Steam Injection at Site Design Conditions • Condensing STG of Capacity 33 MW each • Back Pressure STG of Capacity 16 MW each • HRSG with Duct Firing with Steam Generation at Two Pressure Levels • Auxiliary Boilers of Capacity 120 TPH Each at SHP Steam Pressure and Temperature
Fuel	• Gas Turbines Primarily Fired with Naphtha. HSD is Used for Start up and Shut Down • Auxiliary Boilers Fired with Naphtha, Fuel Gas and Cracked Liquid Fuel
Year of Commissioning	2000

Contact Us

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