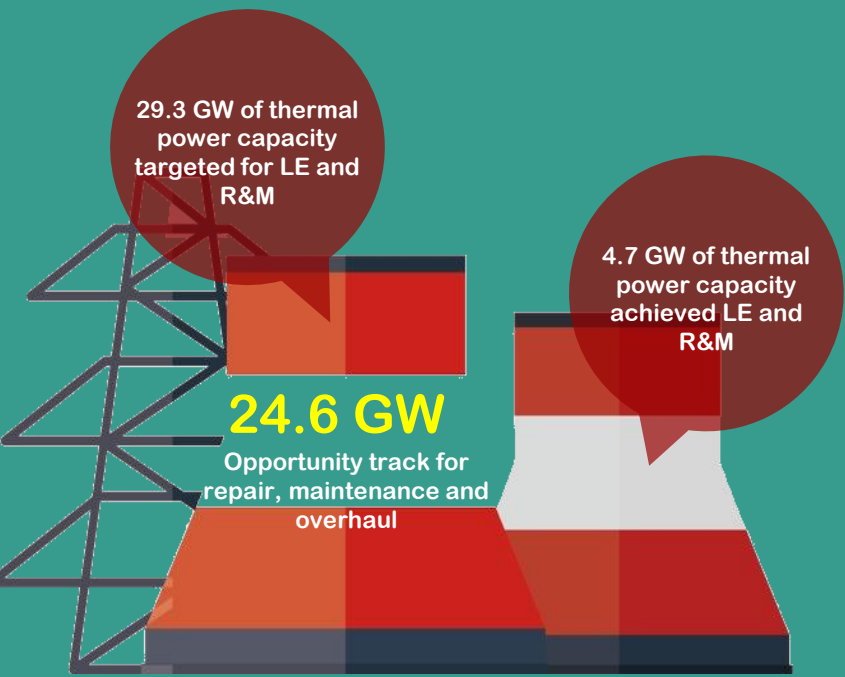


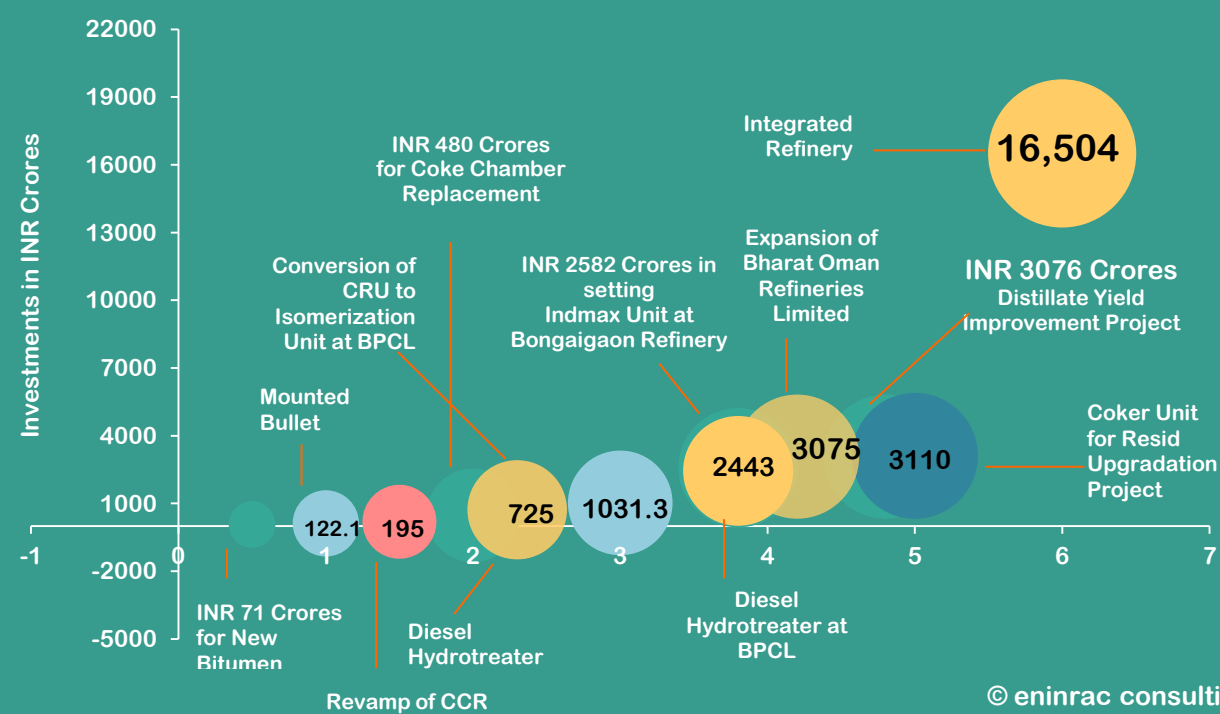
The logo for MRAC+, consisting of the letters 'MRAC' in a bold, sans-serif font enclosed in a rectangular box, with a plus sign to the right.

Maintenance , Repair & Overhaul
(MRO) Market Opportunity in India
Across Energy Sector and Outlook Till
2022 (Vol-I)

December 2018



Opportunity Track for Renovation & Modernization of Thermal Power Units in GW



Tuning up Investment Opportunities in Indian Refineries –Modernizing , Upgradation and Technology Development etc.

- Mangalore Refinery & Petrochemicals Limited
- Indian Oil Corporation Limited
- Numaligarh Refinery Limited
- Chennai Petroleum Corporation Limited
- Bharat Petroleum Corporation Limited

Why eninrac's report upon "Maintenance, Repair and Overhaul Market Opportunity in India Across Energy Sector and Outlook Till 2022 "

LOWERING CARBON EMISSIONS, IMPROVING PLANT EFFICIENCIES, NEED FOR TECHNOLOGICAL UPGRADATIONS – STRONG BUSINESS CASE SURFACING UP FOR MAINTENANCE, REPAIR AND OVERHAUL SERVICES IN INDIAN ENERGY SEGMENT

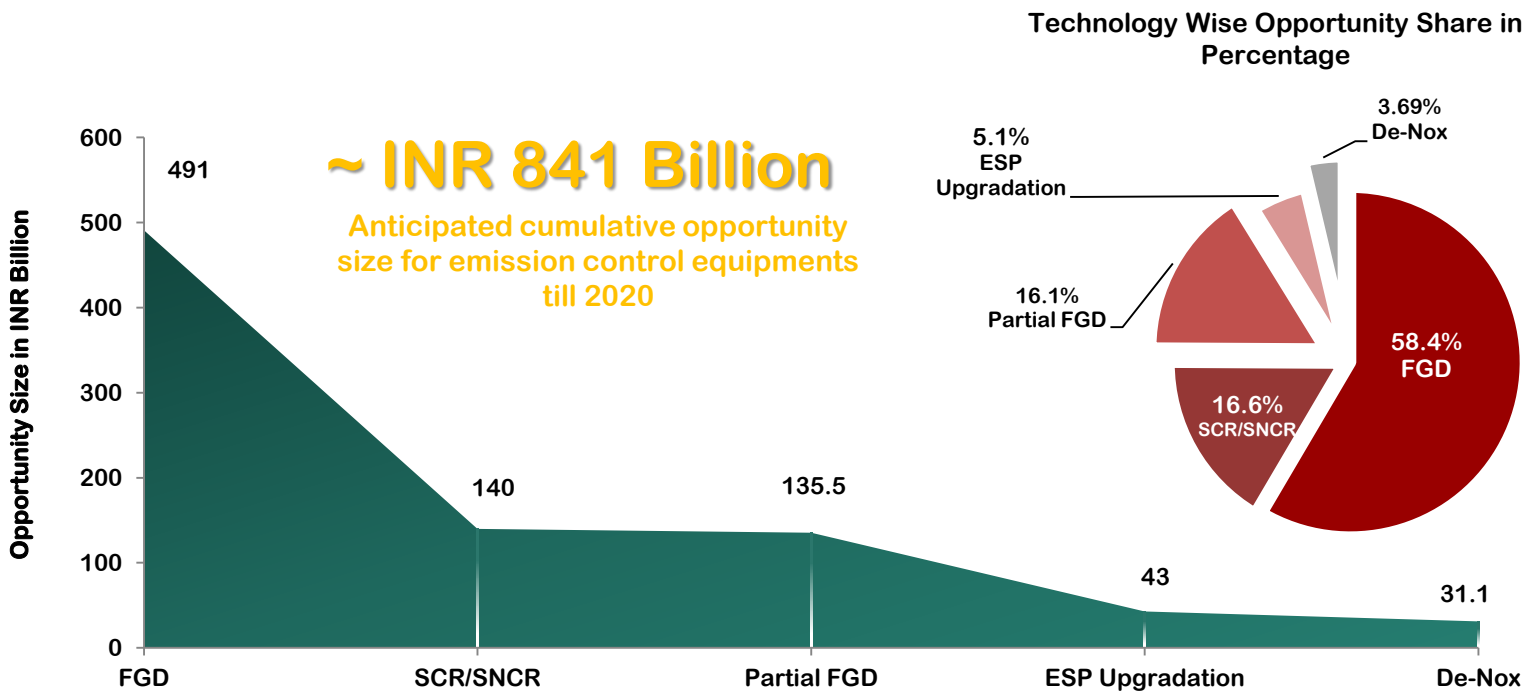
STRINGENT EMISSION NORMS FOR MAJOR POLLUTING INDUSTRIES IDENTIFIED BY CPCB IN INDIA – LIKELY TO BRING GOOD INVESTMENT PROSPECTS FOR AIR POLLUTION CONTROL EQUIPMENTS

India, historically has been dependent upon coal based thermal generation at large to meet its base load requirements which indeed is a polluting source of energy generation. Moreover, aging thermal power units, falling plant efficiencies, rising power demand and the need for meeting global environmental standards is diverting the existing thermal power generation market more towards upgrading and modernizing the existing units than adding up the fresh capacities. Infact about 17 GW of state and centrally owned thermal power capacity was targeted to be upgraded and modernize by the end of 12th FYP. Having said that close to 2 GW of the total targeted capacity has been renovated so far creating an immediate market opportunity for approximately 15.2 GW of carry over capacity to be modernize. Apart from this, the thermal power units that are already hitting the operational age of 10-15 years do hold significant business potential for repair and maintenance in the years to come. Not only the thermal power units but the oil marketing companies (OMCs) too are investing big in the technological upgradation, expansion and overhauling of existing refineries. It is pertinent to note that an investment to the tune of approximately USD 5.2 Billion, is what Indian refining industry is anticipating till 2020 in developing its brownfield refineries.

Talking about the new environmental standards that aimed reducing the carbon footprints and improve the air quality in and around the thermal power plants/refineries/captive power plants etc. opens up a huge a market for emission control instrument manufacturers like BHEL, L&T, Thermax, ISGEC, Tata Projects, GE Power India and many more likewise. More than 300 thermal power plants have been given a period of 2-5 years by CEA to adhere to the strict air pollution standards notified as on June 2017. Infact, a roadmap has been put in place by CEA for these plants to install essential pollution abatement technology within a period from 2020-2024.

Like thermal power generation segment, refineries & petrochemical units too hold great opportunities for pollution control equipment manufacturers. Infact, to categorically identify opportunity for BTG OEMs, BoP OEMs, EPC and other service providers into maintenance, repair and overhaul eninrac is coming up with a report on “ Maintenance, Repair & Overhaul (MRO) Market in India and Outlook Till 2022”. It is a path finding guide for tracking investment potential for all the MRO value chain players. The report has two volumes, Volume I unleashes market opportunity in MRO across energy sector - Thermal Power Plants, Captive Power Plants, Refineries and Petrochemical units, Solar Power Plants and Wind Power Plants. Volume II analysis market opportunity in MRO across infra sector – Railway, Metro Rail, Roads & Highway, Ports, Airports, Power T&D, Gas Pipeline Infra, Steel Plants. The report too covers a holistic list and details of 500 + projects offering /most likely offer MRO opportunities across different sectors in each volume.

Exhibit 01: Likely Opportunity Size for Emission Control Equipments in Thermal Power Generation Segment Till 2020 – Technology Wise Break up



Source: NTPC, HDFC, eninrac research

BUSINESS CASE FOR MAINTENANCE, REPAIR AND OVERHAUL MARKET IN INDIA

- Government has identified 7,738 MW of old/aging thermal power units that shall be replaced with energy-efficient supercritical plants with a capacity of 18,560 MW. Under this initiative, the state power generation utilities have marked out 6,608 MW of aging capacity which will lead to the creation of 16,580 MW. The central utilities have marked about 1,130 MW for replacement that will create 1,980 MW of energy efficient capacity
- The new emission standards/norms laid down by environment ministry on cutting down the pollution generated by thermal power plants, steel plants, fertilizer units, refineries & petrochemical units, captive power plants. These norms brings in picture good investment opportunity in pollution control devices. It is anticipated that given the current scenario, cumulative opportunity size for emission control equipment manufacturers stands to be INR 840 Billion till 2022 into thermal power generation segment
- BHEL awarded INR 137 crore for renovation and modernization of electrostatic precipitators (ESPs) of three units of 200 MW each at Ramagundam Super Thermal Power Station (STPS) Stage I (3×200 MW). BHEL is already executing similar R&M projects for NTPC and state utilities including Gujarat State Electricity Corporation and Chattisgarh State Power Generation Company
- An investment to the tune of approximately USD 5.2 Billion, is what Indian refining industry is anticipating till 2020 in developing its brownfield refineries
- Approximately INR 33,414 crores has been invested by major Indian refiners so far expanding, modernizing & upgrading of existing refineries in the country. Of the identified investment tune about 68% is the standalone contribution of BPCL
- Of the total 17.3 GW of thermal power capacity targeted for renovation & modernization in 12th FYP only 2.06 GW has been achieved. 15.24 GW of opportunity exist till 2022

1. Examining Current MRO Market Opportunity in India– Track of Business Case in Volume & Value , 2015-2018

- a. Industry Practice – Thermal Power Generation
- b. Industry Practice – Captive Power Generation
- c. Industry Practice - Refineries & Petrochemicals
- d. Industry Practice - Solar Power Generation
- e. Industry Practice – Wind Power Generation

2. Forecasting MRO Market Opportunity in India– Outlook of Business Case in Volume & Value , 2018-2022

- a. Industry Practice – Thermal Power Generation
- b. Industry Practice – Captive Power Generation
- c. Industry Practice - Refineries & Petrochemicals
- d. Industry Practice - Solar Power Generation
- e. Industry Practice – Wind Power Generation

3. Regional Market Opportunity for MRO in India and Outlook – Track of Business Case in Volume & Value , 2015-2018 & 2018-2022

- a. Opportunity in Northern Region States of India for Indicated Industry Practices
- b. Opportunity in Western Region States of India for Indicated Industry Practices
- c. Opportunity in Eastern Region States of India for Indicated Industry Practices
- d. Opportunity in Southern Region States of India for Indicated Industry Practices

4. Existing Trends in MRO Market in India – Examining the Market Leaders & Competition

- a. Tracking the market capitalization trends for MRO in Thermal Power Generation Industry
- b. Tracking the market capitalization trends for MRO in Captive Power Generation Industry
- c. Tracking the market capitalization trends for MRO in Refineries & Petrochemical Industry
- d. Tracking the market capitalization trends for MRO in Solar Power Generation Industry
- e. Tracking the market capitalization trends for MRO in Wind Power Generation Industry

5. Projecting Business Case for the Classified Value Chain Players till 2022

- a. Business Case for Independent MRO Service Providers
- b. Business Case for Original Equipment Providers
- c. Business Case for EPC Players
- d. Business Case for MRO Consultants

6. Covering Database of total 500+ Existing and Upcoming Projects for MRO in India for all the Regions

- a. Industry Practice – Thermal Power Generation
- b. Industry Practice – Captive Power Generation
- c. Industry Practice - Refineries & Petrochemicals
- d. Industry Practice - Solar Power Generation
- e. Industry Practice – Wind Power Generation

KEY HIGHLIGHTS

- Opportunity track for air pollution control equipment providers till 2022 – Opening of new business segment
- Ranking the players as per competitiveness for thermal power generation segment/ solar power generation/ wind power generation/captive power generation/ refineries and petrochemical units
- Opportunity assessment for “predictive” and “corrective” maintenance in thermal power segment/solar power generation/wind power generation/captive power generation and refineries & petrochemicals
- Plant age wise MRO opportunity track in India for thermal power plants/solar power plants/wind power plants/captive power plants and refineries & petrochemical plants
- State wise business case track in MRO for different industry practices
- Opportunity track for BTG-BoP players in maintenance, repair and overhaul market for thermal power generation segment till 2022
- Opportunity track for independent MRO service providers till 2022
- Opportunity track for turbine manufacturers, generator manufacturers, gear box and other equipment suppliers in maintenance, repair and overhaul market for wind power generation segment till 2022
- Opportunity track for solar panel manufacturers, structure manufacturers, Solar Cell Manufacturers, Inverter Manufacturers etc in maintenance, repair and overhaul market for solar power generation segment till 2022
- Ranking of players in MRO business segment in India as per competitiveness for each identified industrial segments
- Profiling of top two players and examining the challenges for new market entrants into the MRO segment

PRESS EXCERPTS

“ IOCL plans to invest INR 1.75 Trillion to nearly double its refinery capacity, boost petrochemical production, expand gas business and lay new pipelines ”

Live Mint

“ IOCL is investing INR 16,628 crore to upgrade the refineries to produce Euro-VI emission norm compliant petrol and diesel as against Euro –IV fuel that was being produced now. The investment cycle is anticipated to be completed by 2020”

Bloomberg Quint

“ INR 800 crores has been spent by Telangana State Power Generation Corporation Limited on thermal power plant repairs over last two years ”

Times of India

KEY QUERIES ADDRESSED

- What is the current thermal power generation scenario in India ?
- What is the current status of thermal power capacity under maintenance , repair and overhaul in India ?
- What shall be the opportunity for MRO players in thermal power plants owned by NTPC till 2022 ?
- What business case does state owned thermal power plants hold for MRO players in India till 2022 ?
- What investment opportunity does privately owned thermal power plants hold for MRO players in India till 2022 ?
- What is the region wise opportunity track for MRO players in thermal power generation segment till 2022 ?
- What is the current captive power generation scenario in India ?
- What is the current status of captive power capacity under maintenance , repair and overhaul in India ?
- What shall be the MRO opportunity for captive power plants with age 5-10 years of existence ?
- What shall be the MRO opportunity for captive power plants with age 10-15 years of existence ?
- What shall be the MRO opportunity for captive power plants with age 15-25 years of existence ?
- What shall be the opportunity for air pollution control equipment manufacturers in India till 2022 ?
- What is the current wind power generation scenario in India ?
- What is the current status of maintenance , repair and overhaul in wind power generation sector in India ?

KEY QUERIES ADDRESSED

- What shall be the opportunity size of MRO in India's wind power generation segment till 2022 ?
- What is the current solar power generation scenario in India ?
- What is the current status of maintenance , repair and overhaul in solar power generation sector in India ?
- What shall be the opportunity size of MRO in India's solar power generation segment till 2022 ?
- What is the current status of refining and petrochemical industry in India ?
- What is the current scenario of maintenance , repair and overhaul in refineries & petrochemical industry in India ?
- What shall be the opportunity size of MRO in India's refineries and petrochemical segment till 2022 ?

MUST BUY FOR

- Independent Maintenance, Repair & Overhaul (MRO) Service Providers
- Original Equipment Manufacturers (OEMs)
- Equipment Sub contractors/Suppliers
- Pollution Control Equipment Manufacturers/Suppliers
- Engineering , Construction and Procurement Players
- MRO Consultants /Consulting Agencies/Firms
- Thermal Power Plant Developers
- Captive Power Plant Developers
- Solar/Wind Power Plant Developers
- Refineries & Petrochemical Plant Owners
- Government & Regulatory Bodies
- Research Institutions/Bodies
- Funding Bodies/Banks

KEY COMPANIES MENTIONED

- BHEL
- L&T
- GE Power
- Tata Projects
- Thermax
- ISGEC
- Hindustan Dorr-Oliver Limited
- MHI Engineering & Industrial Projects
- Toyo Engineering
- Sterling & Wilson
- Technip India
- Steag Energy Services
- Nuberg Engineering Limited
- Srei Infra and many more



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THANK YOU!

Happiness does not come from doing easy
work but from the afterglow of satisfaction
that comes after the achievement of a
difficult task that demanded our best

- Theodore Isaac Rubin