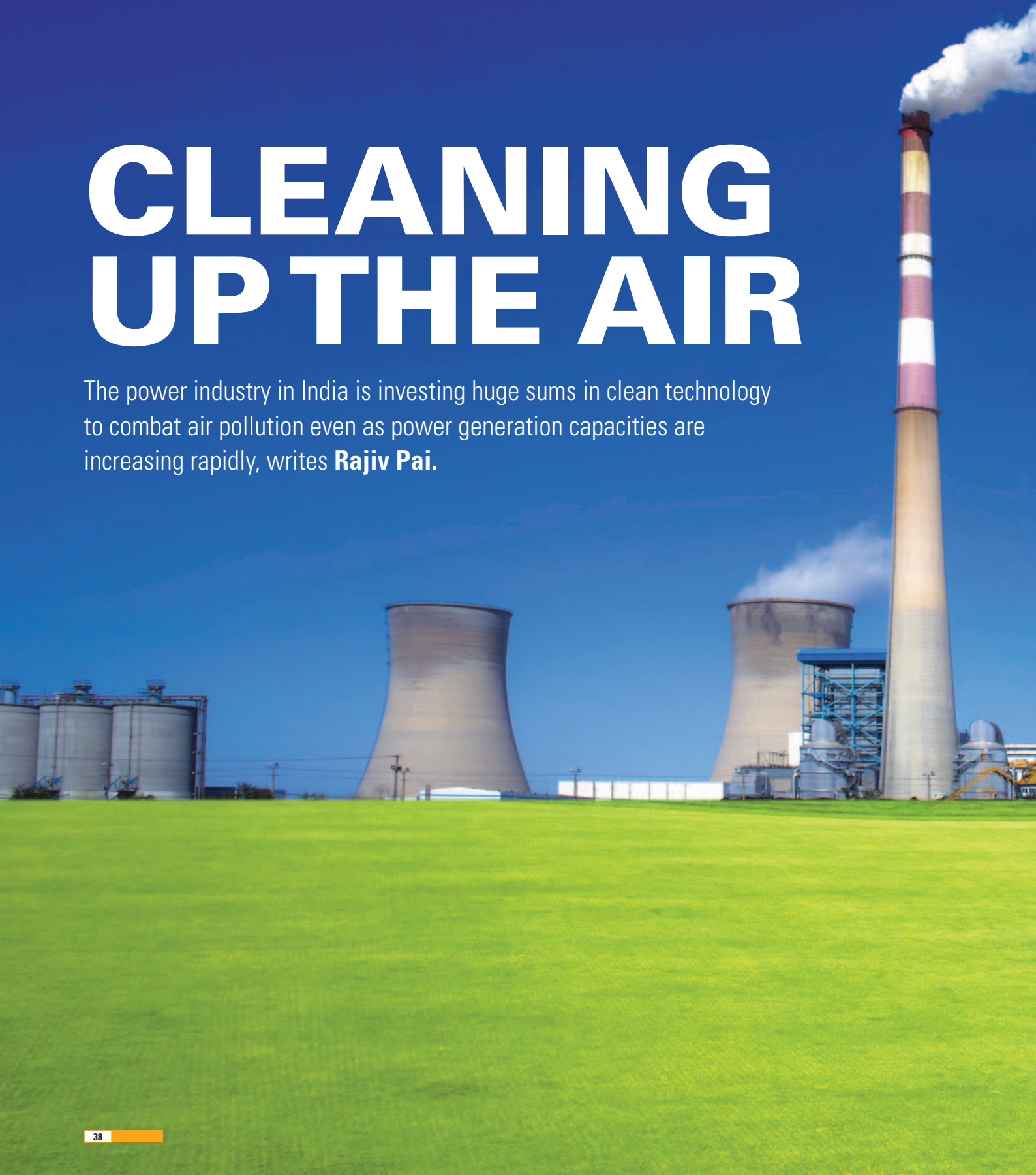


# CLEANING UP THE AIR

The power industry in India is investing huge sums in clean technology to combat air pollution even as power generation capacities are increasing rapidly, writes **Rajiv Pai**.







Plant for producing cement

**G**ROWING awareness about the hazards of pollution is triggering off demand for air pollution control equipment (APCE) as industries – ranging from power plants to cement manufacturing units – are investing in new technologies to curb emissions.

India's enormous energy needs are compelling huge expansion of its installed power capacities. But considering the environmental implications of these high targets, the Union Power Ministry has mandated clean coal technologies for the new generation of power plants, including the nine designated 4,000 MW Ultra Mega Power Projects (UMPPs).

Super critical thermal sets are integral to this policy as they ensure energy efficient and pollution-free operations. Commercially available largely in the higher ratings of 660 MW, 800 MW and 1,000 MW, these new generation thermal units have been deployed in over 400 power plants the world over to achieve higher cycle efficiencies and to generate

more power with the same amount of fuel.

Apart from maximising cost savings and minimising greenhouse gas (GHG) emissions and auxiliary power consumption, these units respond better to changes in load and handle a wide variety of coals more effectively. Their thermal efficiency is vastly superior to the conventional sub-critical steam generators of up to 500 MW capacities that have prevailed in India.

State-owned Bharat Heavy Electricals Ltd (BHEL) is currently the only Indian company that can produce such units. BHEL-supplied equipment accounts for 65 per cent of the total installed generating capacity and 73 per cent of the total power generated in the country. The government's mission of 'Power to All' by 2012, the end of the 11th Five Year Plan period, targets capacity addition of 78,577 MW by then to the prevailing 135,006.63 MW at an investment of nearly US\$ 165 billion.

BHEL had initiated efforts to build up competencies in the super critical

segment in 2002-03. According to the company spokesman, BHEL is now poised to introduce 800 MW super critical thermal sets and has established technology to manufacture up to 1,000 MW units that can use Indian as well as imported coal.

The company has tied up technology for boilers with France's Alstom and for steam turbine generator sets with Germany's Siemens. As with any technology transfer agreement, initial equipment will have high import content, declining with subsequent orders, till the manufacturing technology is fully established.

BHEL secured its first order for two 800 MW super critical units for a nearly US\$ 2 billion power plant it is setting up jointly with the Tamil Nadu Electricity Board (TNEB) in Tuticorin district. The first super critical boilers ordered for India have, however, been the two sets each of 660 MW being supplied by Russia's Power Machines for National Thermal Power Corporation's plants in Bihar and Chhattisgarh.

## TECHNOLOGY IS THE KEY

THE air pollution control equipment (APCE) segment in India is expected to grow from US\$ 300 million (2008 market size) to almost US\$ 700 million by 2013, according to an analysis by Frost & Sullivan, an international consultancy.

The prominent growth drivers for the APCE market in India are the investments in key end-user segments such as power, cement and ferrous industries, and emission control standards by the central pollution control board, says the analysis.

Increasing awareness of environment protection issues and the detrimental effects of air pollution are also fuelling the APCE market.

The Pollution Control Board (PCB) in India has framed emission control standards and the mandatory requirement of APCE in India has opened up huge opportunities for this market, says Nidesha Naidu, research analyst, Frost & Sullivan. "Swift and

stringent implementation of emission control laws will provide a shot of adrenalin for the market," she adds.

With the Indian Government's 'Power for All by 2012' programme and the line-up of ultra mega power projects, the demand for APC equipment is anticipated to continue on an upward trajectory. Electrostatic precipitators (ESP) dominate the current market. Installations of flue gas desulphurisation (FGD) equipment are anticipated to increase on the back of strong enforcement of emission control norms.

Naidu points out that technology is the critical success factor in this industry. "Developing a strong technical knowledge, dedicated and technically sound projects along with strategic cost management and market presence in attractive product categories are the areas that need focus in order to sustain and emerge as a successful participant in this market," adds Naidu.

Tata Power Company (TPC), the country's largest and oldest private sector power utility, contracted five 800 MW super critical boilers from South Korea's Doosan Heavy Industries and Construction Co Ltd for its UMPP at Mundra in Gujarat. "Doosan is a manufacturer of high repute and we were able to get a very competitive quote from them," remarks Prasad Menon, managing director, TPC.

Developing super critical technologies is a complex procedure and requires years of efforts and huge investments in research and development (R&D). "We made a start by sourcing the technology from OEMs (Original Equipment Manufacturers) including Siemens and Alstom," explains the BHEL spokesman. "It takes huge resources and time to establish even technology collaborations, which require sustained flow of initial orders."

Menon notes that the technology requires stable grid conditions, which are now available in the country.

Another independent power producer, Reliance Power, has tied up with China's

Shanghai Electric Equipment Corp. for 660 MW super critical units for the two UMPPs it has won bids for in Madhya Pradesh and in Andhra Pradesh. It already has contracts with suppliers for its 1,200 MW coal-fuelled plant at Rosa in Uttar Pradesh, and for the 600 MW and 1,200 MW projects in Haryana.

Global players including Doosan, Alstom, Toshiba and Mitsubishi are increasingly seeking collaborative manufacture of boiler-turbine-generator (BTG) and related power equipment with Indian power majors including Reliance, which has a planned investment of more than US\$ 22 billion for adding 28,000 MW of generation capacity.

According to Emmanuel Colombier, managing director and vice-chairman, Alstom Projects India, its 15-year agreement with BHEL will yield super critical boilers of cycle efficiencies in excess of 45 per cent in the heat rate (a measure of the fuel consumed to produce a unit of electric energy). "As these units do not have thick-walled steam drums, their start-up times

are quicker, further enhancing efficiency and plant economics," explains Colombier.

Super critical thermal sets, ultra high voltage transmission systems, advanced class gas turbines and higher rating nuclear power plants are planned to be introduced to generate power over the coming years, to ensure efficient and pollution-free operations.

Indigenisation has received a boost

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**Nidesha Naidu,**  
research analyst, Frost & Sullivan

with engineering and construction giant Larsen & Toubro having been nominated for setting up 800 MW super critical projects. L&T formed a joint venture with Mitsubishi Heavy Industries (MHI) for setting up a US\$ 68 million facility for manufacturing super critical boilers of capacities up to 1000 MW.

Another Indian producer, Thermax Ltd, Pune, is setting up a US\$ 10 million joint facility with Babcock & Wilcox of the US for manufacturing sub-critical utility boilers of up to 800 MW at a 100-acre plot in Gujarat. M S Unnikrishnan, managing director, Thermax, says the company will subsequently move up the value chain to produce super critical boilers for larger power plants such as UMPPs.

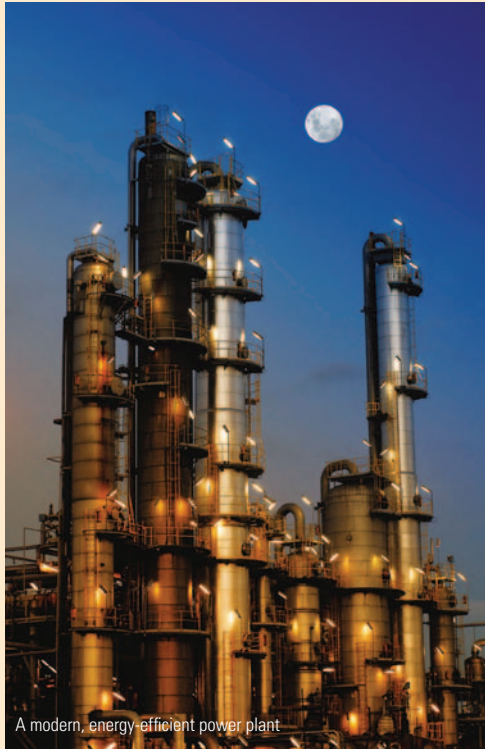
Thermax, which specialises in energy and environmental engineering, also forged a strategic joint venture (JV) recently with SPX Corp, a US-based global infrastructure leader in providing power plant equipment and services. Named Thermax SPX Energy Technologies Ltd, the JV operates on the basis of a licence

## DEPLOYING ADVANCED TECHNOLOGY

GROWING global concerns about climate change is making power-equipment majors including state-owned Bharat Heavy Electricals Ltd (BHEL) look at newer technologies including ultra super critical equipment, integrated coal gasification combined-cycle (ICGC) and solar power.

According to B Prasada Rao, chairman and managing director, BHEL, the company would play a lead role in the development and deployment of advanced ultra super critical power plants under the proposed National Mission for Coal (Carbon) Technologies.

The company – projected turnover of more than US\$ 10 billion in financial year 2011-12 – is one of only four Indian companies to figure in the 'The Global Innovation 1000', a list of 1,000 publicly-



A modern, energy-efficient power plant

traded companies which are the biggest spenders on research and development (R&D) in the world, brought out by Booz & Co. BHEL ranked 590 in the list.

The public sector company plans to increase its R&D spend in the current fiscal to US\$ 180 million. R&D investments are expected to touch five per cent of turnover over the next five years, nearly double the existing amount. Its research has resulted in the adoption of ICGC technology, ensuring maximum energy out of fuel that is burnt. The R&D unit has also developed equipment for super critical and ultra super critical power projects. BHEL has signed a lease agreement with the Indian Institute of Technology, Chennai, for a 6,000 sq ft R&D centre at its research park for the energy sector.

agreement with Balcke-Dürr GmbH of Germany, a wholly-owned subsidiary of SPX Corporation.

Unnikrishnan says the JV would provide a synergy of Thermax expertise in integrating energy and environment engineering with SPX technology solutions for large infrastructure projects.

Thermax has a technology licensing agreement with Balcke-Dürr for electrostatic precipitators (ESPs) up to 300 MW applications. ESPs remove dust particles from gases by electrostatic precipitation.

Its JV with SPX now provides technology solutions above the 300 MW range for large power plants. In the initial phase, it will provide air pollution control systems for power plants above 300 MW. Balcke-Dürr has a 70-year track record in air pollution control equipment, and has been a pioneer in the field with its patented designs. Over 3,000 of its ESP installations are in operation in power, cement, lime, biomass, pulp and paper, waste incineration and other industrial plants around the world.

India has embarked on the route to building large power plants requiring super

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**M S Unnikrishnan,**  
managing director, Thermax

critical technologies that need increased use of coal as fuel. "The new range of the Thermax-SPX ESPs will offer higher efficiencies by tackling the challenge of high ash content in Indian coal," explains Unnikrishnan. "They will help power plants to meet increasingly more stringent

emission norms, being benchmarked with international standards."

Another company working in the area of air pollution control equipment for the power sector is Ducon Technologies India Pvt Ltd, Thane (near Mumbai). It is executing a turnkey contract for the supply and installation of a limestone-based Flue Gas Desulphurisation (FGD) system for a 1,015 MW coal fired thermal power plant of Hyderabad-based Lanco Infratech Ltd. Using a 'wet limestone reagent' to scrub sulphur from the exhaust gases emitted by the plant, the system is designed to consume less power while removing more sulphur than comparable scrubber systems.

A subsidiary of US-based Ducon Technologies Inc, a manufacturer of emissions control equipment for power plants, it also won a contract for installing a similar FGD system for a 750 MW thermal power plant being set up by NTPC in Assam.

As India's energy demand soars, power producers and equipment makers are increasingly investing in clean technology to cut down on emissions. 🌱