



Making in India... for the World



BHEL - An Overview

- India's premier state-owned public sector enterprise Bharat Heavy Electricals Limited (BHEL) has been playing a pivotal role in shaping the engineering and manufacturing capability in India across several core sectors, including power generation and transmission, transportation, renewables, water, oil & gas and defence & aerospace, notching up an annual revenue of around 4 billion USD.
- BHEL has established strong linkages with other public sector enterprises as well as research institutes in India and is also having technology tie-ups with leading OEM's in various sectors.
- With 16 manufacturing facilities spread across the country that manufacture equipment compliant with latest national and international standards, BHEL's state-of-the-art facilities specialise in engineering, manufacturing, testing, aftermarket services for equipment in the power sector segment and various industrial sectors. These manufacturing units are supported by four overseas offices, four regional offices, eight service centres and 15 regional marketing centres to deliver value to its customers.
- BHEL is credited as one of India's largest employers, in the engineering sector with more than 34,000 highly skilled employees which includes 9,000 engineers with qualifications, experience and skills spanning a wide range of technology areas. Needless to say, BHEL's employees have been one of the strongest pillars in building this successful business.
- With an R&D spend of over 2.5% of the annual turnover, BHEL is one the highest in the capital goods manufacturing industry in India. BHEL's dedicated R&D centre in Hyderabad has been instrumental in shaping technology and innovative manufacturing capabilities.
- BHEL has established over 75 technology collaborations with several global players over the years and these partnerships have helped both parties by sharing of technologies, know-how and resources.
- BHEL's unique ability to provide pan-India access has been one of its core strengths. There are about 150 ongoing projects in different parts of India, served through the manufacturing and business units spread across the country. BHEL's expertise in exports can be utilised by global manufacturing firms to have a manufacturing hub in india.



Power



Transmission



Industry



Transportation



Oil & Gas



Renewables



Water
Business



Defence &
Aerospace



E-mobility & Energy
Storage Solutions



International
Business

POWER

The power generation segment comprises thermal, gas, hydro and nuclear power plant businesses. BHEL has been in this business for almost five decades, having commissioned its first coal-based set in 1969. The company has proven turnkey capabilities for executing power projects from concept to commissioning.

- BHEL offers a wide variety of coal-based sets of up to 1,000 MW rating, including 660/700/800 MW rating sets based on supercritical technology and sub-critical sets of up to 600 MW unit rating.
- The company also offers state-of-the-art emission control equipment for coal-based plants for lower carbon footprint and compliance with the revised emission norms notified by the Government of India.
- Additionally, the company supplies co-generation and combined cycle plants with higher plant efficiencies.
- The company manufactures a wide range of products for nuclear reactors viz. steam generators, reactor headers and end shields, besides nuclear turbine-generator sets ranging from 220 MWe to 700 MWe ratings.
- Customised hydro sets from Francis, Pelton and Kaplan types for different head-discharge combinations, are also engineered and manufactured by BHEL.
- The company manufactures advanced-class large size gas turbines and matching generators.
- BHEL has proven expertise in plant performance improvement through renovation, modernisation and uprating of a variety of power plant equipment.





TRANSMISSION

BHEL is a leader in the field of power transmission in India with a wide range of transmission systems and products and a proven track record across the globe.

- BHEL undertakes turnkey transmission projects from concept to commissioning on EPC basis which includes execution of EHV & UI-IV substations/switchyards, both AIS and GIS types ranging from 33 kV to 765 kV, HVDC converter stations (up to ± 800 kV), and reactive power compensation schemes.
- The company has executed a number of high voltage direct current (HVDC) projects in India, notably the world's largest ± 800 kV, ultra high-voltage multi-terminal DC transmission link between North Eastern part of India and Agra (Uttar Pradesh).
- BHEL has indigenously developed India's first 400 kV phase shifting transformer (PST) and commissioned it at Kothagudem power plant in Telangana. The PST contributes towards improving the transmission

efficiency and also averts grid collapse in case of system instability.

The products manufactured by BHEL include:

- Power transformers up to 1200 kV
- HVDC converter transformers up to 800 kV
- Current transformers up to 400 kV
- Capacitive voltage transformers up to 1200 kV
- Dry type transformers
- Shunt reactors up to 765 kV, power capacitors
- Vacuum and SF₆ switchgears
- Gas insulated switchgear up to 400 kV
- Control and relay panels, SCADA
- IEC 61850 based substation automation system
- Thyristor valves and controls for HVDC application
- Ceramic and composite insulators
- FACTS devices – FSC, SVC, thyristor controlled shunt reactor (CSR) for dynamic reactive power management of long-range transmission lines.



INDUSTRY

BHEL supplies major equipment for a number of industries including oil and gas exploration, metallurgy and mining, pipelines, petrochemicals, chemicals, automobiles, steel, aluminium, refinery, cement, fertiliser, sugar, paper, textiles, etc.

The range of products offered includes, AC machines, alternators, centrifugal compressors, heat exchangers, pressure vessels, columns, fired heaters, cryogenic air separation plants, gas turbine based co-generation and combined cycle power plants, steam turbine based captive and co-generation power plants to suit requirement of different industries, turbo-generators, complete range of steam generators for process industries capable of burning a wide variety of fuels, diesel engine based power plants, electrostatic precipitators and fabric filters.



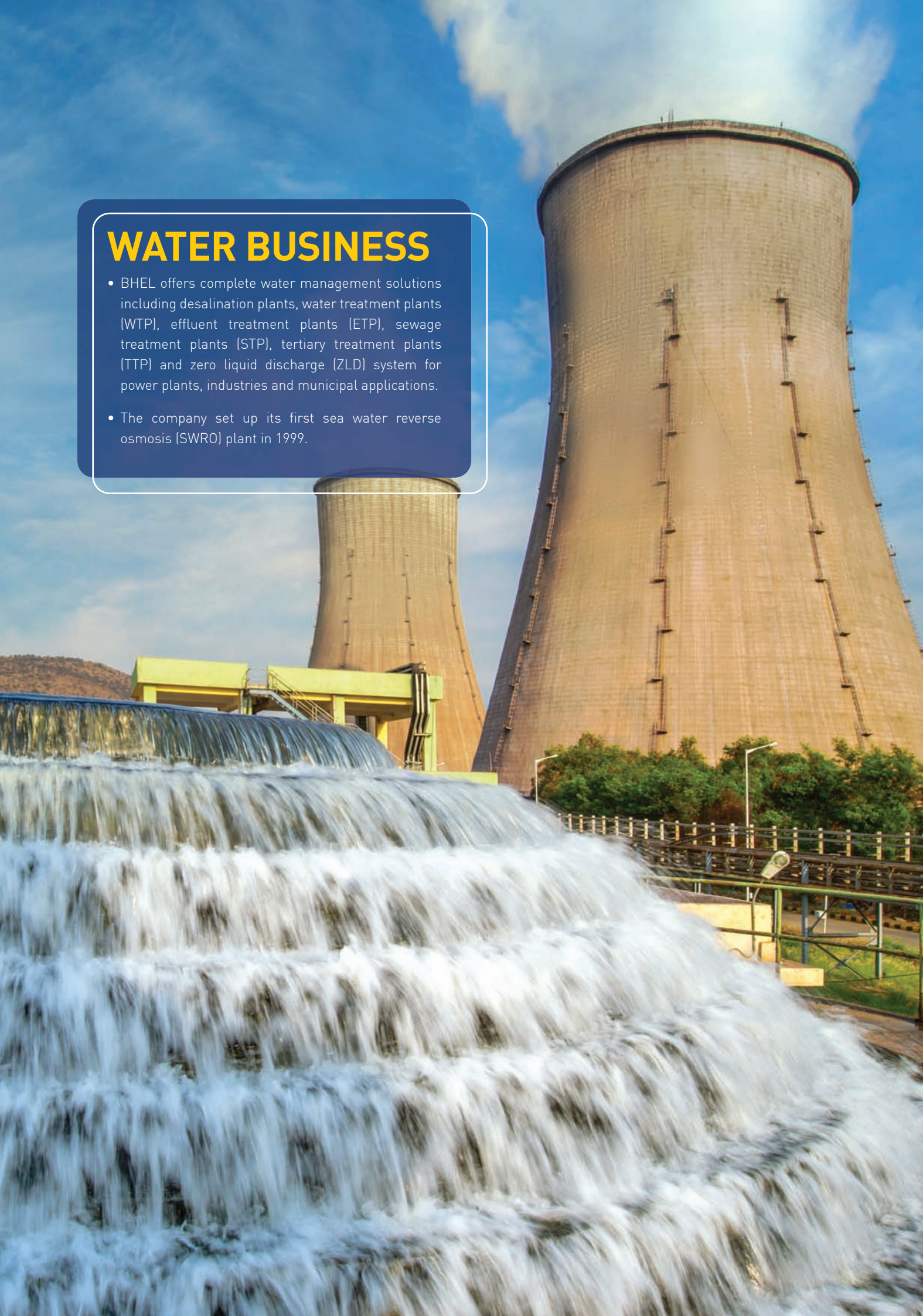
TRANSPORTATION

BHEL is a leading supplier of electrical propulsion systems and traction equipment for all types of rolling stock to Indian railways, which operates one of the world's largest railway networks.

- India's first fully air-conditioned AC EMU is equipped with BHEL-supplied IGBT based propulsion equipment.
- The company also manufactures complete electric locomotives (up to 6000 HP) and EMU coaches for Indian Railways.
- BHEL manufactures diesel electric locomotives (up to 3000 HP) catering to the shunting requirements of various industries and power utilities.
- BHEL has diversified into the area of track maintenance machines and coach manufacturing for metro trains and Indian Railways.

WATER BUSINESS

- BHEL offers complete water management solutions including desalination plants, water treatment plants (WTP), effluent treatment plants (ETP), sewage treatment plants (STP), tertiary treatment plants (TTP) and zero liquid discharge (ZLD) system for power plants, industries and municipal applications.
- The company set up its first sea water reverse osmosis (SWRO) plant in 1999.





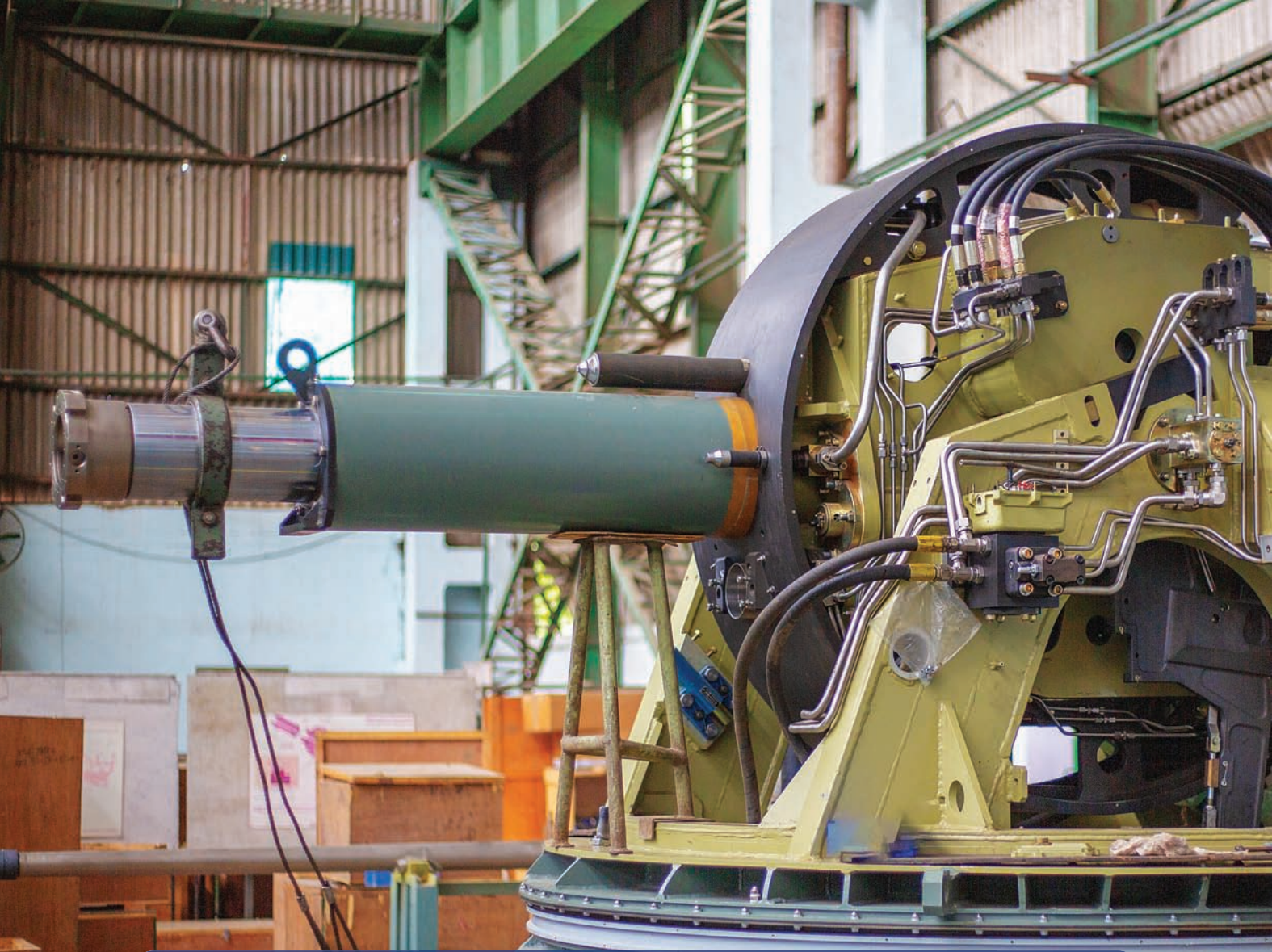
OIL & GAS

- BHEL supplies complete onshore drilling rigs capable of drilling up to 9,000 M, with AC-SCR system or AC drives incorporating the latest state-of-the-art technology, mobile rigs, work-over rigs and sub-sea wellheads.
- BHEL also supplies onshore drilling rig equipment like draw works, rotary-table, travelling block, swivel, mast and substructure, mud systems and rig electrics to leading oil and natural gas exploration companies of India.
- Wellheads and X-Mas tree valves up to 10,000 Psi rating onshore as well as offshore applications are also provided by BHEL to drilling companies.
- The company has also supplied casing support systems, mudline suspension systems and block valves for offshore application.

RENEWABLES

- With a current portfolio of more than 465 MW in the field of photovoltaics, BHEL has generated expertise in critical parts of the silicon value chain, like, processing of silicon wafer to cell, processing of cell to PV module and in design, supply, installation, commissioning and O&M of grid interactive utility, rooftop solar, canal top and floating solar PV power plants. Thus, offering turnkey solutions for solar PV plants.
- BHEL has a dedicated R&D group in the area of semiconductor materials, nano and thin film devices.
- ISRO has partnered with BHEL for space-grade solar panels and satellite batteries.





DEFENCE AND AEROSPACE

BHEL has emerged as a reliable supplier of equipment and services to Indian defence forces for more than two decades with dedicated engineering and manufacturing facilities.

- Major products include super rapid gun mount, strategic naval equipment, integrated platform management systems, thermopressed components, turret castings for T72 tanks, simulators, castings and forgings, etc.
- BHEL has been a reliable supplier to ISRO for solar panels and batteries for their satellites.
- BHEL is one of the few firms worldwide with capability to design and manufacture heat exchangers for military aircraft and is supplying heat exchangers for 'TEJAS'. BHEL is rapidly expanding its offering in the aerospace segment.





E-MOBILITY AND ENERGY STORAGE SOLUTIONS

BHEL is committed to nation's e-mobility mission in a significant way. BHEL had manufactured and supplied more than 300 battery powered road vehicles in the past.

- It is geared up to provide end-to-end integrated e-mobility solutions for cities. BHEL is focusing on a diversified portfolio consisting of traction motors and controls, lithium ion battery packs and charging infrastructure.
- BHEL has a state-of-the-art facility for packaging and testing of Li-ion batteries for space applications. The company has assembled, tested and supplied more than 70 batteries of 45 Ah - 180 Ah to ISRO for use in its satellites during the last 15 years.
- BHEL is also capable of delivering complete grid storage solutions with in-house developed power conditioning system and SCADA.



BATTERY ENERGY STORAGE SOLUTIONS

- BHEL offers battery energy storage solutions, to support the infirm power delivered by a SPV system or a standalone battery energy storage system connected with grid, with features like energy time shifting, power smoothing, frequency regulation, anti-islanding and VAR support.
- BHEL also offers grid connected/ off grid with solar plants or standalone systems.
- BHEL commissioned 1 MWh battery energy storage system (BESS) with in-house developed PCS (power conditioning system) and EMS (energy management system) featuring three different types of battery chemistries- lithium ion battery, flow battery and advanced lead acid battery





RESEARCH & DEVELOPMENT

BHEL places strong emphasis on innovation and creative advancement, which leads to the development of technologically competitive products and services. The research and developmental efforts of the company are not only aimed at improving the performance of the products of current manufacture, but also developing new products and systems using state-of-the-art technologies, relevant to the needs of various business sectors and new growth areas. Spearheading this process is BHEL's Corporate R&D Division, Hyderabad, and the Research and Product Development (RPD) centres at its manufacturing units.

- R&D expenditure (→2.5% of Turnover) – one of the highest in Indian engineering field
- Filing patents/copyrights applications regularly – more than 4,800 filings
- Strong engineering and R&D base for in-house development of indigenous technologies
- Technology collaboration agreements with leading global manufacturing and engineering companies.
- Focus on clean coal technologies
- 14 Centres of Excellence and five specialized institutes for carrying out advanced R&D in various engineering disciplines and identified technological areas



پانی افغانستان ہند
د دوستی پند
AFGHAN-INDIA FRIENDSHIP

INTERNATIONAL BUSINESS

BHEL has established itself as a global player with footprints in 82 countries across the globe. Starting its journey with the first export order for Malaysia in the early seventies, the company has been expanding its references year by year. These references encompass complete power projects on EPC basis (thermal, hydro, gas), substation and rehabilitation projects, along with a wide gamut of products including turbines, generators, boilers, DG sets, control equipment, transformers, capacitors, bushings, insulators, switchgears, solar modules, motors, wellheads, castings, valves and locomotives. The company has also been providing after-sales support to its overseas customers in the form of spares and services. The cumulative installed capacity of power plants overseas with BHEL-supplied equipment stands at close to 11 GW.



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