



BHEL's Commitment In Support of U.N.G.C. Programme

BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing company of its kind in India engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products and services for core sectors of the economy, viz. Power, Transmission, Industry, Transportation (Railways), Renewable Energy, Oil & Gas, Water and Defence with over 180 products offerings to meet the needs of these sectors.

As a responsible organisation, BHEL is well aware of the direct linkage between the 10 principles of UNGC and tenets of Sustainable Development. In BHEL, Sustainability has been a way of life right from its inception and the company has been working with ever increasing zeal towards providing sustainable solutions to its customers. The company strongly believes in protection of natural environment and conservation of vital natural resources so that the benefits of today's development are fruitfully enjoyed by the future generations and survival of human civilization is not endangered. The company's mission statement underlines its resolve to be a sustainable organisation.

All major manufacturing units/divisions of BHEL are accredited to latest international standards for Environment, Occupational Health & Safety Management viz. ISO-14001 certification for Environmental Management System (EMS) and OHSAS-18001 certifications for Occupational Health and Safety Management System. Further, enabling framework in terms of Sustainable Development Policy and HSE Policy are in place to guide the organization and embed consideration for environment and sustainability in its day to day operations.

BHEL continues to be fully committed to the United Nation's Global Compact (UNGC) Programme by promoting the core values on human rights, labour standards, environment and anti-corruption and committed to advance these principles, which are embedded in its strategies & culture, within its sphere of influence. The company publically advocates UNGC principles to its Stakeholders through Annual Report, Sustainability Report, Press Conferences and other public communiqués.

BHEL's performance on each principle of Global Compact for the year 2016-17 is hosted on UNGC website and also available on company's website www.bhel.com.

Date: 03 July, 2017

(D Bandyopadhyay)

BHEL Performance 2016-17 – Global Compact Principles

Human Rights

Principle 1): Business should support and respect the protection of internationally proclaimed human rights

BHEL policies are in line with the principles of Human Rights, the Constitution of India, various Labour Laws, etc. Special provisions have been made in BHEL to safeguard women employees at the workplace. Internal Complaints Committee (ICC) has been formed to look into the cases of Sexual Harassment of female employees at workplace. The principles of Natural Justice are scrupulously followed in “The BHEL Conduct, Discipline and Appeal Rules” which are applicable to employees in Executive and Supervisory category and in “Standing Orders” which are applicable to employees in workmen category.

Principle 2): Make sure they are not complicit in Human Rights abuse

There is no reported instance of Human Rights abuse in the Company.

Labour Standards

Principle 3): Businesses should uphold the freedom of association and the effective recognition of right to collective bargaining

The Government of India has enacted various labour laws to adequately protect the interests of the working class. These laws are strictly complied with in BHEL. Further, all BHEL units/divisions are required to submit quarterly reports on compliances of various applicable laws, including labour laws, to The Board of Directors, so as to ensure that the interests of the workmen are protected.

Apart from this, BHEL has various bi-partite fora for workers, where the issues / problems pertaining to the workmen are discussed and settled. Towards this end, BHEL has an apex level bipartite forum namely “The Joint Committee for BHEL” wherein the elected representatives of all units of BHEL, along with the Central Trade Union Organizations, to which the unit level unions are affiliated, participate from the workers’ side whereas the Management is represented by The Chairman & Managing Director, Functional Directors and unit heads.

Continuing its thrust on taking the participative culture to higher echelon, BHEL has been organizing “workshops” related to various themes namely Productivity, Organizational Excellence etc. As a part of our effort in this direction, BHEL organized a “Special Session”

of The Joint Committee in November, 2016 at Bengaluru. During the workshop, workmen's representatives were sensitized about the performance of the company, business environment, challenges being faced by the company as well as strategies to meet these challenges. Syndicate Groups were formed on various subjects relevant to the interest of the workmen as well as the company viz. (1) Instilling sense of ownership, pride and belongingness towards the company, (2) Cost cutting through measures like war on wastages and zero tolerance for re-work /rejection, (3) Knowledge transfer and training/mentoring as tools of bridging the skill gap and developing new skills, (4) The role of trade unions in aligning employees aspirations with company's performance and motivating employees at work place and, (5) Measures for improving employee engagement.

In every manufacturing unit, there is a plant level body called "Plant Council" & department level bodies called "Shop Council". These bodies meet at stipulated frequency and discuss issues related to production/manufacturing, productivity, order book, cash collection, dispatch, general administration, discipline, etc. The Plant Council as well as the Shop Councils have representation from Workmen's unions besides participation from associations of Supervisors & Executives. Suggestions are invited and accepted on various subjects like cost reduction, meeting the production targets, sequential deliveries to project sites and improving quality. These suggestions are then evaluated for implementation and employees who have given good suggestions are rewarded. The involvement of employees of all the cadres in various participative fora has had a positive impact on the working of units. In addition, at the unit level, workshops are organized wherein the themes of workshops are generally related to the unit specific issues. Such workshops have not only resulted in better organizational climate but have also helped in enhancing cohesiveness among different categories of employees in resolving various issues.

Principle 4): The Elimination of all forms of forced and compulsory labour

The Company neither subscribes to nor indulges in any coercive practice. Towards this, it never asks its employees to deposit their original documents pertaining to educational qualifications or Date of Birth.

Principle 5): The Effective Abolition of Child Labour

As per BHEL's Recruitment Policy, the minimum age for employment in the Company is 18 years. In BHEL it is not permissible to employ any person below this age. As such, child labour is not employed in BHEL and hence the issue of its abolition does not arise.

Principle 6): Eliminate discrimination in respect of employment and occupation

Uniform set of rules are mentioned in “The Personnel Policy” of the company, which apply uniformly to all employees, irrespective of factors such as sex, caste, religion, race, etc. All recruitments are conducted in a transparent and impartial manner, thereby giving equal opportunity to all eligible candidates, without any discrimination whatsoever.

Environment

Principle 7): Businesses should support a precautionary approach to environmental challenges

BHEL is well aware of its responsibility towards protection of environment. Our commitment to environment especially with regards to the precautionary approach is reflected in our concerted efforts towards reduction in raw materials consumption, water & energy consumption, emissions, generation of wastes and recycling of reusable wastes generated in our premise, including effluents and waste/rejected products.

All major manufacturing units and regional divisions of BHEL have well established Environment Management Systems (EMS) accredited to international standard ISO 14001. The HSE management system provides us an excellent framework for identification and management of environmental risks proactively and ensuring compliance of applicable environmental, occupation health and safety related rules & regulations and drives us towards continual improvement. Periodic audits are carried out by the certifying agencies to ensure effective implementation of the established systems, including legal compliance.

All applicable environmental consents, authorizations & licenses are maintained and their terms & conditions are complied with. Regular monitoring of effluents and emissions as per the statutory requirements are being carried out across BHEL ensuring compliance to the applicable laws. Going beyond the legal requirements, every year as part of environment management programme, a number of projects related to water and energy conservation, tree plantation, waste management, resource conservation, etc. are taken by the units and divisions.

Principle 8): Undertake initiatives to promote greater environmental responsibilities

The tenets of Sustainable Development have taken deep roots in our business processes and has become embedded in our systems. Our concern for environment protection is manifested in our efforts towards development of products having a lesser environmental footprint, use of renewable energy & cleaner fuels having lesser carbon footprint in our operations, recycling of natural resources like raw materials & water to the extent feasible, and responsible waste management. Our concern for societal development is manifested in our CSR programme which is aimed at promoting inclusive growth in the society. Our ethos of working in socially responsible manner and economic value addition throughout the history of our existence is a strong manifestation of our commitment towards Sustainability of the business.

Like past years, this year too, the thrust continued on initiatives and projects in the area of generation of renewable power through solar power plants, energy conservation, energy efficiency, water conservation, conservation of various natural resources used in our operations, tree plantation, rainwater harvesting, development of green areas, waste management based on the concept of Reduce-Recycle-Reuse (3R) all aimed towards reduction of our environmental footprint.



World Environment Day-2016: Plantation by Unit Head at HPVP, Vizag

World Environment day was celebrated on 5th June, 2016 across BHEL. On this day, across



Poster making competition on World Environment Day-2016 at HERP Varanasi Unit.

BHEL, various programs were organised to promote environmental awareness among employees, students and society in general. Talk on environmental issues by senior officials, plantation of saplings, distribution of saplings, display of posters and banners on Environmental issues, competitions like slogan writing, poster making etc. were the key events organised

on the occasion of World Environment Day-2016.

The snapshot of some of the Sustainable Development related activities carried out during 2016-17 is provided in the following table.

A. Material and Natural Resource Management

1. **BAP-Ranipet unit:** Only treated wastewater from Sewage Treatment Plant was used for watering of the plantation inside the factory.
2. **HEP-Bhopal unit:** Saved approx. 550 MT of Furnace oil through condensate recovery & various improvement steps taken in the steam distribution system.
3. **HEP-Bhopal unit:** Saved 139 MT of LPG through the renovation of SR furnace & controlling heat loss from various furnaces.

B. Energy Management

1. **HEP-Bhopal unit:** Due to saving in use of furnace oil, avoidance of the use of LPG, renovation of SR Furnace & controlling heat loss from various furnaces and other activities, nearly 29.71 Tera Joules of energy was saved.
2. **HEP-Bhopal unit:** In order to save energy and improve workplace environment 200 nos. Turbo Ventilators were installed replacing old energy consuming exhaust fans.
3. **HEP-Bhopal unit:** The unit achieved a reduction in power consumption by almost 2.1 Million units by the implementation of various energy conservation projects & optimum utilisation of Light & Power inside the factory.
4. **HEEP-Haridwar unit:** Due to various energy conservation measures overall power consumption decreased by 5% in comparison to the last financial year , 2015-16.
5. **HEEP-Haridwar unit:** Installed 50 No. 150 W LED light in different workshops replacing 400 W metal halide bulbs. Similarly replaced 60 no. 400 W sodium vapour street lights with 120 W LEDs.
6. **BAP-Ranipet unit:** Installed 500 Nos. of 18 Watt LED tube lights replacing 36 Watt conventional fluorescent tube lights, resulting in electricity saving of around 25,500 units per annum.
7. **CFFP-Haridwar unit:** Installed 260 LED lights of 140W/120W rating replacing 400 W/250 W metal halide/sodium vapour lamps.
8. **EDN-Bengaluru unit:** Reduced electricity consumption by 0.708 Million units per annum by implementing various energy efficiency/conservation initiatives like installation of rooftop solar plant, replacement of 66 TR Reciprocating Chiller with Scroll Chiller for DOE AC Plant, Installation of Screw chillers for 105 MW PV Cell line manufacturing etc.
9. **HPEP-Hyderabad unit:** The unit received Energy Management System Certification conforming to ISO 50001 – 2011.
10. **HPEP-Hyderabad unit:** Installed over 20 light-pipes in the canteen building to avoid using electric lighting during day time. With the help of these light-tubes sunlight is used to illuminate the inside of the building.
11. **TP-Jhansi unit:** Installed rooftop Turbo-Ventilators providing ventilation inside the shops without the use of electricity. Also, the acrylic sheeting was provided on side walls of shops for use of natural lighting during daytime.
12. **TP-Jhansi unit:** Installed a Gasifier equipment of 40 kW rating for generation of producer gas using wooden wastes including dry twigs, leaves, saw dust etc. The producer gas is used in the unit canteen.
13. **Solar Power Generation:** Cumulative installed capacity for MW-scale solar power plants reached to 11.5 MW_p by March 2017 across BHEL. The total electricity generated from various solar systems stood at 14.82 Million units for 2016-17.

C. Water and Biodiversity Management

1. **EDN Bengaluru unit:** Approx. 150 KLD of sewage is being treated in STP and being used for horticulture.
2. **HEEP Haridwar unit:** 500 trees were planted during the year. A new park named “Gandhi Park” has been developed in the township.
3. **BHEL Trichy:** Water consumption was reduced by nearly 6.5 % with respect to the consumption in the year 2015-16.
4. **BAP Ranipet unit:** To reduce the water consumption in the township, water supply duration has been reduced and residents are given periodical communication on the optimum use of water.
5. **BAR-Ranipet unit:** About 3500 saplings were planted during the year.
6. **EDN-Bengaluru unit:** About 1000 saplings of various varieties were planted inside the factory premises & township during World Environment Day-2016 celebration. Further, thousands of saplings of various varieties were planted on the road median below Metro line from Nayandahalli station to Attiguppe station.

D. Carbon Management

1. **HEP-Bhopal unit:** About 1735.9 MT of CO₂-equivalent emission was avoided due to various energy efficiency/conservation initiatives.
2. **EDN-Bengaluru unit:** A number of solar systems totalling 216 kW_p and one 4kW_p wind power system was commissioned.
3. **Avoidance of CO₂ emission:** Due to renewable energy generated through various Solar systems across BHEL, during the year 2016-17 around 14,378 MT of CO₂-equivalent emission was avoided.

E. Waste Management

1. **HEP- Bhopal unit:** a Multi Effect Evaporation system was commissioned for recycling of all the effluent generated in the electroplating process.
2. **HEEP-Haridwar unit:** To ensure proper collection and segregation of wastes at source the existing waste bins for different types of wastes, constructed outside workshops inside the factory, were renovated and wherever bins were not there new bins were provided.
3. **HEEP-Haridwar unit:** Safe storage facilities were created for storage of hazardous wastes.
4. **BHEL Trichy -** Organic wastes are composted into manure and used for horticulture.
5. **EDN-Bengaluru unit:** Sludge from ETP is being used as manure for plantations inside the BHEL premises and excess manure is distributed to the farming community.
6. **Disposal of wastes:** Across BHEL, solid wastes/scrap having resale value were collected, stored safely and then sold to authorised agencies/recyclers. Similarly, Hazardous Wastes and e-wastes were disposed of following procedure/methodology prescribed in the relevant statutes.

There was sustained efforts for reducing our carbon footprint through various means like energy efficiency & conservation efforts and, as a result we have avoided significant amount of Carbon Emission. Use of solar energy is gradually increasing in our operations. In this direction, we have already established one 5.0 MW_p capacity solar power plant each at our Ranipet & Trichy units and a 1.5 MW_p solar power plant at HPEP, Hyderabad unit. In addition to the above several kW_p scale solar power plants are already working in various units and divisions. Also many solar street lights, rooftop solar power plants, solar water heaters etc. have been installed which has resulted in enhancement of use of green

energy. Due to these Solar Power Plants and various other solar-related initiatives, BHEL achieved Carbon footprint avoidance to the extent of 14387 MT CO₂-e during 2016-17 which is approximately 82% more compared to corresponding figures for 2015-16 (7887 MT). Total energy generated through various renewable energy systems stood at 14.82 Million Units during 2016-17 as compared to 8.08 Million units during 2015-16. The Company has also taken a number of projects related to water and energy conservation, tree plantation, waste management, resource conservation, etc.

Principle 9): Encourage the development and diffusion of environment friendly technologies

BHEL is contributing to a greener environment through development of environment friendly technologies, reduced emissions and improvement in efficiency of its equipments. Some of the steps taken in this direction are detailed below:

Power Sector

- Continuous improvement in cycle efficiency and reduced emissions has been achieved over time by evolution of technology from sub critical to super critical, Ultra super critical and Advanced Ultra Super critical parameters. Details are as given in table below:

Plant type with power rating	Steam Pressure (kg/cm ²)	Steam Temperature (°C)	Efficiency (%)	CO ₂ Emissions (g/kW-hr)
Sub Critical (500 MW _e)	170	540	35	900
Super Critical	247	565	40	830
Ultra Super Critical	250	600	42	784
Advanced Ultra Super Critical	310	710	46	740

- Development efforts have been undertaken to achieve breakthrough improvement in cycle efficiency by designing power plants to Advanced Supercritical (AUSC) parameters of 310 bar and 710° C. The project has National Thermal Power Corporation (NTPC) and Indira Gandhi Centre for Atomic Research (IGCAR) as consortium partners.
- Efficiency improvement in various power plant equipments is pursued by improving efficiency and reducing direct energy loss. BHEL has taken initiatives for producing/ using energy efficient gadgets/ motors/ drives etc. BHEL make HT Motors have now an improved efficiency up to 98%. BHEL has developed energy efficient IGBT based 1 MW High Performance Low Voltage Variable Frequency Drive (VFD) which has been successfully tested for all its design features on 25 HP induction motor.

- Environment friendly Air Cooled Condensers (ACC) have collectively improved operating efficiency and helped in conservation of valuable resources like water. In a typical 2 X 500 MW Thermal Power Plant the requirement of cooling water make-up can be eliminated and as a result water requirement reduced by almost 70 % by using ACC. BHEL is currently executing ACC based supercritical thermal power plant for 3 X 660 MW NTPC-North Karanpura.
- To reduce emissions and meet the stringent new emission norms, BHEL has initiated several measures like modification in boiler design, improvement in collection efficiency of ESPs, installation of Flue Gas Desulfurization (FGD) systems for SO_x capture, modifications in the wind box firing system of Boilers and development of Selective Catalytic Reduction (SCR) catalyst for NO_x reduction.
- BHEL developed a NO_x and Ozone Levels Evaluation Tool to estimate NO_x and residual ozone emissions formed in Electro Static Precipitator (ESP) using Artificial Neural Network (ANN) to predict NO_x values at ESP outlet. The work has resulted in precise estimation of NO_x and residual ozone at ESP.
- BHEL is also carrying out research in developing technologies related to CO₂ capture namely;
 - Oxy-blown Combustion-systems development and performance demonstration.
 - Membrane Electrode Assembly (MEA) based CO₂ capture systems (Post Combustion Techniques).
 - Chemical looped combustion technology demonstration.
 - Algal based CO₂ decomposition of industrial flue gases.
 - Oxy-blown IGCC gasification for H₂ production and syngas to liquid fuel conversion.

Renewables

- BHEL has a manufacturing capacity of 105 MW for solar Cell and a capacity of 226 MW for solar PV modules.
- Continuous R&D in the field has resulted in BHEL achieving solar cell efficiency up to 18.4% for monocrystalline and 17.5% for multicrystalline cells, which is among the best in the world.
- BHEL has demonstrated a 100 kW_p Solar PV Plant consisting of 50 kW_p SPV system using 18 numbers of 2.8 kW_p capacity polar axis passive trackers and a 50 kW_p SPV system using 36 numbers of 1.4 kW_p capacity horizontal axis passive trackers. This development has led to increase in energy output by 15 to 20% with respect to modules mounted on the fixed tilt structures.

- Electric Vehicle mobility is fast gaining recognition as the future mode of transportation. BHEL under a consortium with National Automotive board (NAB) and M/s. Ashok Leyland will develop the system for Motors / Alternators, IGBT controllers and VCU hardware for Electric powered vehicles.
- BHEL has developed 1 kW PEM (Proton Exchange Membrane) fuel cell stack for strategic applications in defence.

ANTI-CORRUPTION

BHEL believes in the highest levels of personal and institutional integrity. The Value Statement of the Company calls for the highest ethical standards to be observed in decision making and demonstration of the same in an honest, decent and fair manner. The Company has zero tolerance approach towards all forms of corruption. BHEL is committed to enhancing transparency in all its business dealings for which it has a Vigilance set-up in place to prevent irregularities.

Vigilance Department of BHEL is headed by the Chief Vigilance Officer (CVO) appointed by Department of Heavy Industry (DHI), Ministry of Heavy Industry & Public Enterprises, Govt. of India. Major manufacturing Units / Regional divisions of BHEL has a vigilance set up headed by a senior vigilance executive reporting to the CVO.

Preventive Vigilance has always remained the focus area of BHEL Vigilance. Additional impetus was also given for systemic improvements during 2016-17. Some of the preventive measures initiated are as under:

- ✓ Revision of Works Policy, 2016.
- ✓ Revision of Supplier Evaluation, Approval and Review Procedure (SEARP), 2016.
- ✓ Revision of Guidelines for Reverse Auction.
- ✓ Revision of Guidelines for Suspension of Business Dealings with Suppliers/ Contractors.
- ✓ Utilization of Unused Material.
- ✓ Review of Material Estimation Procedure.
- ✓ Implementation of Sequential Material Supply System by Units.
- ✓ Revision in tender conditions to check Cartelization in Transportation and Fabrication contracts.
- ✓ Review of Corruption Mitigation Action Plan for Potential areas.
- ✓ Emphasis on Open Tendering and Transparency in tendering process.
- ✓ Online Vigilance Clearance System for employees.
- ✓ Review of Township Revenue Collection System.

During the year, various training programmes were conducted in different units for employees as part of preventive vigilance. In all the General Management Programmes

and Strategic Management Programmes organized for employees there is a session on preventive vigilance and vigilance administration.

With a view to create awareness about procurement policy, rules and procedures etc., to disseminate the instructions/ guidelines issued by CVC and Government of India from time to time, to share best practices and case studies, Vigilance Department publishes a Quarterly **e-Newsletter** called '**DISHA**'. Sixteen issues of this e-Newsletter have already been published.

The Vigilance Awareness Week was observed from 31st October to 5th November, 2016. To spread awareness about ill effects of corruption amongst cross section of society, various programmes i.e. quizzes, debates, essay writing competition, Elocution, panel discussions, lectures, training programmes, Poster competition, slogan competition, Walkathon etc. were organized for students of various schools & colleges (30 colleges and 39 schools) and employees of the organization.

Routine as well as surprise Inspections were carried out by the Vigilance department. The learnings from inspections and surprise checks were shared with the management through structured meetings. Based on these feedbacks various system improvements have been initiated by the management. In addition, various circulars for systemic improvements were also issued.

BHEL signed Integrity Pact (IP) with Transparency International on 16.12.2008 and the same was adopted in Feb 2009. Structured meetings are held with the Independent External Monitors (IEMs) every quarter wherein the procurement related issues and complaints thereupon are discussed. Further, the threshold value of the contract for coverage under IP has been reduced from Rs.10 crores to Rs.5 crores.

With a view of efficient Vigilance Clearance of officers who apply for senior level posts in other CPSEs, Department of Personnel & Training (DOPT), Ministry of Personnel, Public Grievances and Pensions has launched a web portal for Vigilance status of Board Level and below Board level officials. Data in respect of officials of one level below the Board of BHEL has been updated in the system.

As part of Company's endeavor to set high standards of integrity, the Company has enforced its Conduct, Discipline & Appeal Rules.
