



BHARAT ELECTRONICS

PREAMBLE: -

Bharat Electronics Ltd. has emerged as a leader in the highly advanced and competitive sphere of professional Electronics with its commitment to quality, continuous upgradation of technology and innovation as a way of life.

Established in 1954, to meet the specialised electronic needs of the Indian Defence Services, BEL has grown into a Multi-product, Multi-technology and Multi-unit Company serving the needs of customers in diverse fields.

In the process BEL has set up impressive infrastructure and manufacturing facilities, spread over nine ISO 9001/9002 certified modern production units around the country.

The product range of BEL is quite vast. Professional electronic communication equipment in the HF/VHF/UHF ranges, SATCOM equipment, Fire control & Surveillance Radar systems, Radar's for Airport Surveillance, Navigational Radar's, Naval fire control systems, Underwater systems like SONARs/TOTEDs, Communication systems, EW systems, Antenna, Equipment for Sound & Vision Broadcasting (AIR & DD), Communication equipment for DoT, Night Vision Devices, Vacuum Devices like Transmitting tubes, Microwave tubes, TV Picture Tubes & X-Ray Tubes, Integrated circuits, crystal, EVM (Electronic Voting Machines), SIMPUTER (Simple Inexpensive Multipurpose compUTER) constitute the major product profile of BEL.

The product manufacturing activity in BEL undergo a series of processes right from the manufacturing stage to testing. The processes involved do not have an established pattern of Energy consumption. Even at International and National level specific Energy consumption for manufacturing of the similar products has not been established.



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TEAM WORK IN ENERGY CONSERVATION, MONITORING AND REPORTING SYSTEM AND ROLL OF ENERGY MANAGER

Realising the importance of energy conservation and effective implementation of energy conservation measures BEL Management has set up a "Standing committee on energy Conservation and Energy Audit" at Corporate level with the following terms of reference:

- Identify and quantify various forms of energy inputs and peak demand in all units.
- Prepare specific proposal on implementation of energy conservation measures and reduction of peak demand, along with investment needed.
- Study the scope of energy conservation and use of non-conventional energy sources e.g. solar energy, biogas, wind power etc.,
- Audit the usage and suggest energy conversion measures.
- Communicate Energy Management policy to all employees and encourage their involvement through training and participating.

The Committee has been continuously monitoring the energy consumption and conducted several energy audits and formulated guidelines for implementation of energy conservation policies. The Committee has also utilised the services of Tata Energy Research Institute (the energy & Resources Institute) for conducting energy audit and has implemented their recommendations.

At the Unit level also BEL management has constituted Energy conservation and Energy Audit Committee with the same terms of reference.

The Energy Conservation and Energy Audit Committee at the Unit level is headed by a Senior Officer and its members are drafted from the production area and Plant Engineering groups. The Committee meets every month to: -

- Monitor and review the Energy consumption in the Plant study and analyse the results obtained from the energy conservation measures already adopted.
- Plan for adoption of Energy Conservation measures in energy intensive area by working our cost benefit analysis for long term, medium term and short term return on investments.
- Draw action plan to improve the energy efficiency of energy utilisation in the processes.

The successful implementation of an energy management program rests with the firm commitment to the program. BEL management is committed to the cause of Energy Conservation by closely monitoring and guiding the activities of Energy Conservation and Energy Audit Committee and also providing adequate funds for implementation of energy conservation measures. The company has instituted an annual



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award scheme for the "Best Energy Conservation Unit" with a view to create healthy competition among the units.

BEL firmly believes that an energy conservation program can only be successful if it arouses and maintains the participative interest of the employees. To this end, communicating the employees, the importance of energy conservation is done in the following ways:

- Quarterly publication of "**Energy News**" highlighting the energy conservation activities and case studies.
- Quality Circle presentation on Energy Conservation and Suggestion schemes.
- Displaying posters on energy conservation at strategic places.
- "**Energy Conservation Day**" celebration every year in the month of December.
- Issue of circular by the Management on Energy Conservation aspects.



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ENVIRONMENTAL ACHIEVEMENTS

Bharat Electronics is an electronic industry in general, requires a very clean environment and some of the critical processes require ultra clean enclosures of highest class. In order to ensure these conditions, a large-scale tree planting and turfing program has been undertaken. The achievements are:

- **Afforestation**

➤ Total land area (Factory and Township)	:	705 acres
➤ Lawn area	:	2,30,000 sq.mtrs
➤ Hedges	:	10,000 R.M
➤ Total tree population	:	2,00,000 nos.

- **Pollution Control**

Pollution caused by manufacturing process in an electronic industry is negligible. Even then, BEL is eager to see that the effluent from the process and discharge from chimneys do not cause pollution and are kept within stringent standards stipulated by state Pollution Control Board.

- **Water Pollution**

➤ **Effluent Treatment of Industrial Wastes**

The daily water consumption of the factory is around 5,000 cubic metres. The industrial activity generates above 900 cubic metres of wastewater per day by the departments like PCB, Surface treatment, Plating, Finishing etc. This water contains acids, alkalies, heavy metals etc. These wastes are treated with physio-chemical treatment units to meet the standards laid down by Pollution Control Board before they are discharged out. For e.g. Cyanide bearing water is treated by alkaline chlorination, chromium-bearing water by acidic reduction and acid/alkali water by acidic reduction and acid/alkali water by chemical neutralisation precipitation methods. For the four major pollutants discharged from the industry, the requirements as specified by the Karnataka State Pollution Control Board are being met with the available infrastructure.

➤ **Effluent treatment of domestic water**

The domestic wastes are generated (2600 Cu.mtrs / day) from the toilets and Canteens in the factory and from more than 2000 tenements in the township. This domestic waste water is treated in three separate areas, by using aerated lagoons and oxidation ponds. A



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portion of the treated water (i.e. around 300 Cu.mtrs) is used presently for horticulture purposes in the Colony.

• **Air Pollution**

The factory has installed air-monitoring equipment such as high volume samplers, stack monitoring kits, wind velocity and direction indicators and carbon monoxide detectors. Air sampling is conducted periodically and corrective actions are taken wherever necessary. Air polluting sources are identified and steps taken to control the same are as follows: -

- ❖ Volatile toxic baths have been provided with lip extraction system through which fumes are scrubbed and discharged.
- ❖ BEL operates a large fleet of Transport vehicles numbering 188, including 73 buses in its Bangalore Unit. In order to have a check on these mobile sources of pollution, the exhaust gases are periodically monitored at a pre-scheduled frequency, by using Nissalco diesel smoke meter and Bosh gas analyzer. Vehicles which do not conform to the permissible standards are subjected to immediate corrective measures.
- ❖ Saw dust from the carpentry section is collected through cyclonic dust collectors and disposed off.

- ❖ Diesel generating sets, 30 mtrs height chimney have been provided. Exhaust gases emitted from the diesel generator sets are periodically examined to control pollution.
- ❖ All the stacks have been analysed and sent regularly to KSPCB.

RAIN WATER HARVESTING - PROJECT

An ambitious large-scale project " Rain Water Harvesting System " has been taken-up by BEL and is completed by March 2002.

Rain water harvesting, in simple terms, is capturing and storing rain fall to irrigate plants of for human consumption of recharging ground water table. Rain water harvesting could be considered as a possible alternative source for supplementing existing sources of water supply partially.

Annual water consumption in BEL

- **Area of consumption**
 - At factory - industrial processes cooling, drinking and horticulture purposes.
 - At colony - for domestic consumption of 1800 residential & public utility buildings and horticulture purposes.



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- **Annual Consumption in Million Ltrs. (ML)**

➤ At factory	-	fresh water	--	770
	-	Treated/recycled water for processes and horticulture	--	300
➤ Township	-	fresh water for domestic Consumption	--	490
	-	Treated/recycled water For greenery and horticulture	--	215

- **Water supply sources for BEL**

- Bangalore Water Supply and Sewage Board is the main stay for fresh water supply to BEL. The cost of BWSSB water supply is expensive. The supply of water from them is not uniform, besides non-availability of adequate quantity of water, particularly during critical months.
- Presently 43 nos. of active bore wells are being fully exploited to supplement the water requirement.
- Purchase of water from tankers

- **Additional Water requirement for BEL.**

- With the addition of new residential buildings and public utility buildings, fresh water consumption to domestic purposes is likely to increase by 10 to 20%.
- New areas have been identified for development of lawns and greenery. The expected increase in water consumption in these areas is to the extent of 70 to 75%.

- **Need for Rain Water Harvesting**

- Availability of water from BWSSB may not be uniform. BWSSB Water supply cost is likely to go up steeply since cost of water supply is directly related to revision of electricity tariff.
- The ground water table in BEL area has gone down drastically during the past two decades. Due to this, yield from bore wells has substantially reduced.
- Purchasing water from tankers is a short-term measure. This is not practicable to cover a large area in a long run.
- Therefore the best option available to meet additional water requirement of BEL is by way of **rain water harvesting**



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- **Rain Water Harvesting system at BEL**

The Energy Research Institute was engaged to make a detailed feasibility study of setting up Rain Water Harvesting system in BEL township area. The feasibility study made by TERI, covered the following aspects:

- Terrain
- Catchment area
- Rain fall over a period of time
- Surface run off
- Availability of rain water for storage.
- Construction of storage pond
- Conveyance and utilisation of water
- Return on investment.

The feasibility study revealed that there is a large potential exists for harvesting rain water for effective usage.

- **Benefits from rain water harvesting**

- Availability of sufficient water for usage in future at no extra operational cost except initial investment.
- Charging of ground water, thus, increased yield from bore well. This is to large extent save energy cost
- Energy saving due to availability of water at ground level by reduced pumping operation.

- **Details on rain water harvesting system**

- Storage capacity - 135 million ltrs
- Available water for usage - 90 million ltrs
- Investment - Rs. 50.00 lakhs
- Payback period - 2 years.

COMPANY ENVIRONMENTAL POLICY IS ENCLOSED

ENGINEERING SERVICES DIVISION IS CERTIFIED WITH ENVIRONMENTAL MANAGEMENT SYSTEM ISO 14001.



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SAFETY:

Industrial safety has become an essential & integral part of M/s Bharat Electronics. The company has received the prestigious **NATIONAL SAFETY AWARD** for having satisfied the requirements prescribed by the

BRITISH SAFETY COUNCIL FOR 11 CONSECUTIVE YEARS

CONCLUSION:

Energy Conservation has not been viewed in isolation as a necessity for our Company alone. In larger perspective, this has been viewed as a National necessity. BEL is committed to the cause of Energy Conservation and has targeted to achieve 30% savings in energy by 2003-2004 when compared with the consumption level of 1988-89. BEL management is committed to provide all out support, assistance and finance to achieve the target.

ENERGY CONSERVATION ACHIVEMENTS DURING 2003-04

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Major projects implemented during the year 2003-04 are listed below.

ENERGY CONSERVATION PROJECTS:

1. a) OPTIMISING THE LOADING AND UNLOADING OF COMPRESSOR PLANT BY AUTOMATION

Before automation :

Annual energy consumption = 6.48 lakh units

After automation :

Annual energy consumption = 5.13 lakh units

Annual energy savings = 1.35 lakh units

Savings / year = Rs 6.61 lakh

Total Investment made = Rs 12.00 lakh



b) Decentralization of compressed air system by providing portable compressors of capacity about 20 HP locally in user places to operate on Sundays and holidays and then stopped operation of 125 HP main compressor on Sundays & holidays.

Annual energy savings = 29655 units

Minimizing the leakages by periodic monitoring and deployment of portable compressors and Valves.

Annual Energy savings = 1.85 Lakh units

Investment made = Rs. 4.00 Lakh

Annual Savings = Rs.9.874 Lakh



2. REPLACEMENT OF CONVENTIONAL WATER SPRAY TO CELDEK MEDIA COOLING PADS IN AIR COOLING PLANTS IN DCS, NAVAL, DPH

Pumps total power reduced to 8 HP from 100 HP

Annual energy savings = 1.62 lakh units

Savings / year = Rs 7.47 lakhs

Investment made/ cooling plant = Rs 8.5 lakhs



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3. DEMAND BASED WATER MANAGEMENT SYSTEM

Hydro pneumatic system for supply portable water to management block by replacing existing system of direct pumping system

Average required pumping capacity is reduced from 40 HP to 10 HP

Annual energy savings = 53640 units
Savings /year = 2.69 lakhs
Investment made = 5.00 lakhs



4. TRANSFORMER LOAD MANAGEMENT

Dealing with lightly loaded transformers and switching of idle charged transformers and optimum loading of feeders & Load management of distribution transformers.

Annual energy savings = 1.57 lakh units
Savings / year = Rs 8.1 lakh
Investment made = NIL

5. REPLACEMENT OF OPEN TYPE AHUs WITH DOUBLE SKINNED AHUs

AHU power requirement is reduced from 50 HP to 42 HP .

Annual energy savings = 14121 units
Savings / year = Rs 0.65 lakh
Investment made = Rs 5 lakhs





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6. A.C VARIABLE FREQUENCY DRIVES FOR AHU MOTORS at LPE

AHU'S power requirement is reduced from 105 HP to 60 HP.

Annual energy savings = 1.19 Lakh units

Savings / year = Rs 5.47 lakh

Investment made = Rs 6 lakhs



7. REPLACEMENT OF OPEN TYPE PUMPS TO SUBMERSIBLE PUMPS FOR PUMPING POTABLE WATER OVERHEAD TANKS

Before replacement:

75 HP – 4 nos, running hours – 5 hrs/day

30 HP – 6 nos, running hours – 5 hrs/day

Total power required = 357.6 kW

Energy /day = 1788 units

After replacement:

75 HP replaced by 40 HP submersible, running hours – 6 hrs/day

30 HP replaced by 15 HP submersible, running hours – 6 hrs/day

Total power required = 186.25 kW

Energy /day = 1117.5 units

Annual energy savings = 2.02 Lakh units

Savings /year = Rs. 9.26 Lakh

Investment made = Rs.4.5 Lakh



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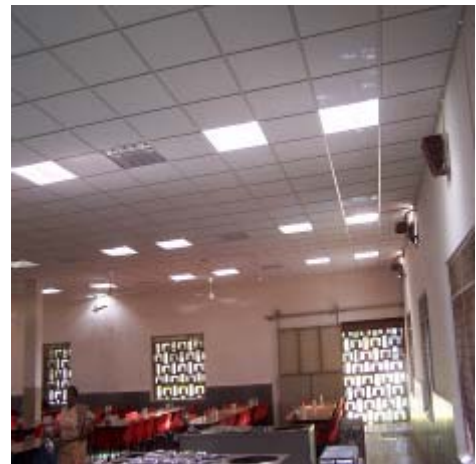


8. INSTALLATION OF SPLIT AIR CONDITIONERS

Installation of split air conditioners eliminated the running of high capacity central air conditioning plant during off peak hours

9. NATURAL LIGHT AND VENTILATION

Delamping of lamps wherever Natural light is available - providing canteen with translucent sheets and reducing electricity usage during day times



INTRODUCTION OF SOLAR WATER HEATING SYSTEM IN CANTEEN – II

Results in reduction of diesel consumption by boilers (saving is around 15 lts of diesel/day).



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OTHER PROJECTS IMPLEMENTED DURING 2003-04:

- Introduction of softener in boiler plant for improving the efficiency of boiler and saving the diesel
- Process improvement in X- ray tube
- Installation of additional APFC (Automatic power factor controller)
- Extensive replacement of conventional fittings by energy efficient lighting fixtures
- Incorporation of energy savers for discharge lamps
- Replacement of compressed air plant cooling tower to energy efficient unit-CT fan reduced to 7.5 HP from 15 HP
- Introduced automatic switching off of cooling tower fan based on basin water temperature in compressed air system
- Environment friendly dry type transformers.
- Removal of unwanted motors
- Photocell control for lighting.
- Timers for street lighting and vehicle parking areas.