



BATRA HOSPITAL & MEDICAL RESEARCH CENTRE



1. BUILDING PROFILE

The Batra Hospital and Medical Research Centre was founded in 1987, and is spread over 12 acres of prime real estate. The Hospital meets the objective of providing high quality Medicare with value for money for privileged patients and at the same time offers its charitable services for the



economically weaker sections of society. BHMRC is a 495 bed superspeciality centrally air conditioned Hospital located at New Delhi and is ISO 9001 certified.

BHMRC has an enviable list of specialties and super-specialties on offer. Each department has been painstakingly built over the years into a completely networked facility, designed for maximum convenience to the patient. Batra Hospital offers over 42 specialties, ranging from Cardiology, Oncology, Nephrology and Nuclear Medicine, to Paediatrics, Gynaecology and Obstetrics, dentistry and Physiotherapy.

BHMRC has 2 blocks – new and old building and each has a basement, ground floor and 5 floors. The total built up area is 41217 sq mt. BHMRC.

2. ENERGY CONSUMPTION

The sources of energy for BHMRC include electricity from the grid, LDO for boilers, HSD for DG, and LPG for canteen. The total energy bill for 2006-07 was Rs. 617 Lacs (electrical and thermal).

2.1 Electricity

The connected load is about 2550 KW. The electrical energy consumption for the last 3 years is given in the following figure:

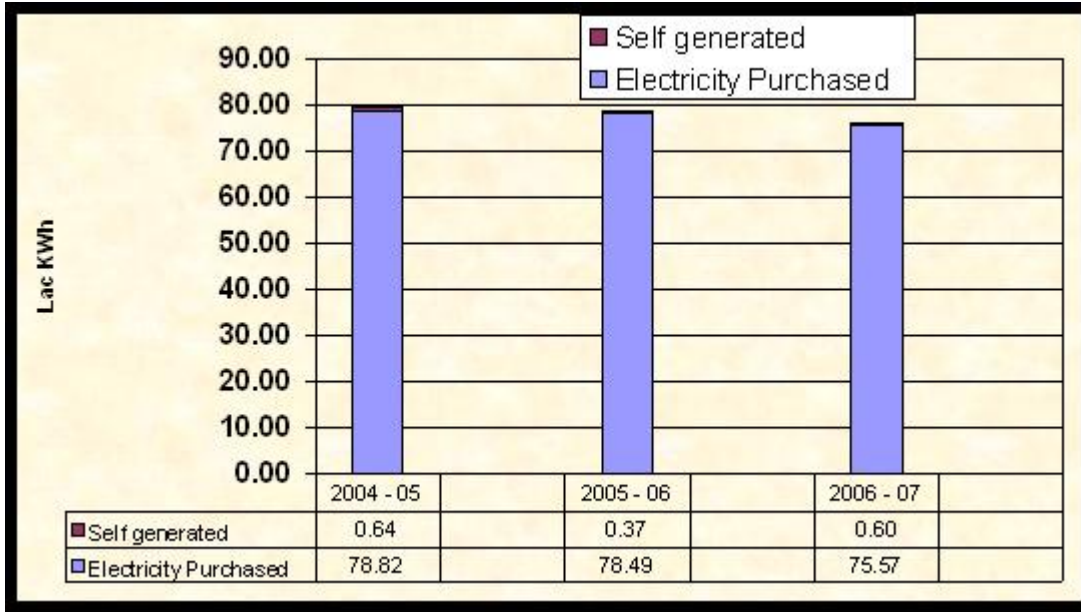


Figure 1: Electricity Consumption Trend in BHMRC

The cost of electricity purchased from the grid is shown in the following figure

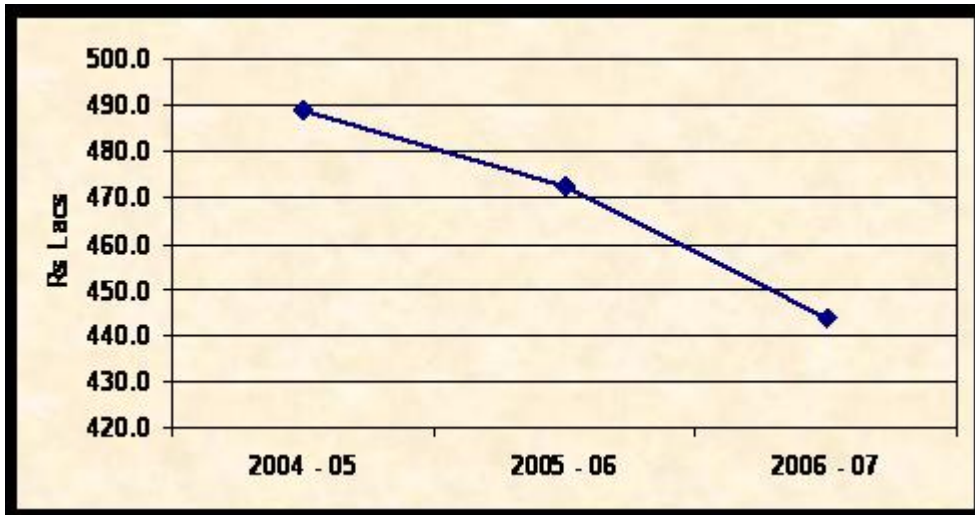


Figure 2: Electricity Cost Trend in BHMRC

The monthly electricity consumption for 3 years prior to undertaking of the energy conservation activities is shown below:

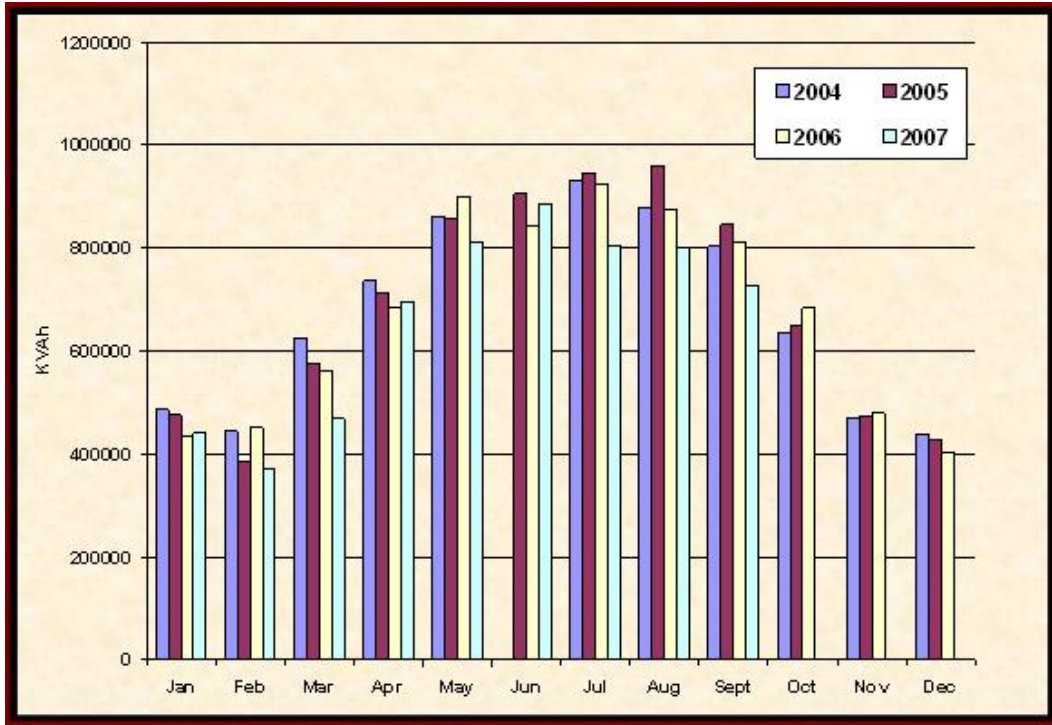


Figure 3: Electricity Consumption Before and After Energy Conservation

2.2 Thermal Energy

The consumption of LDO for the same period is shown below

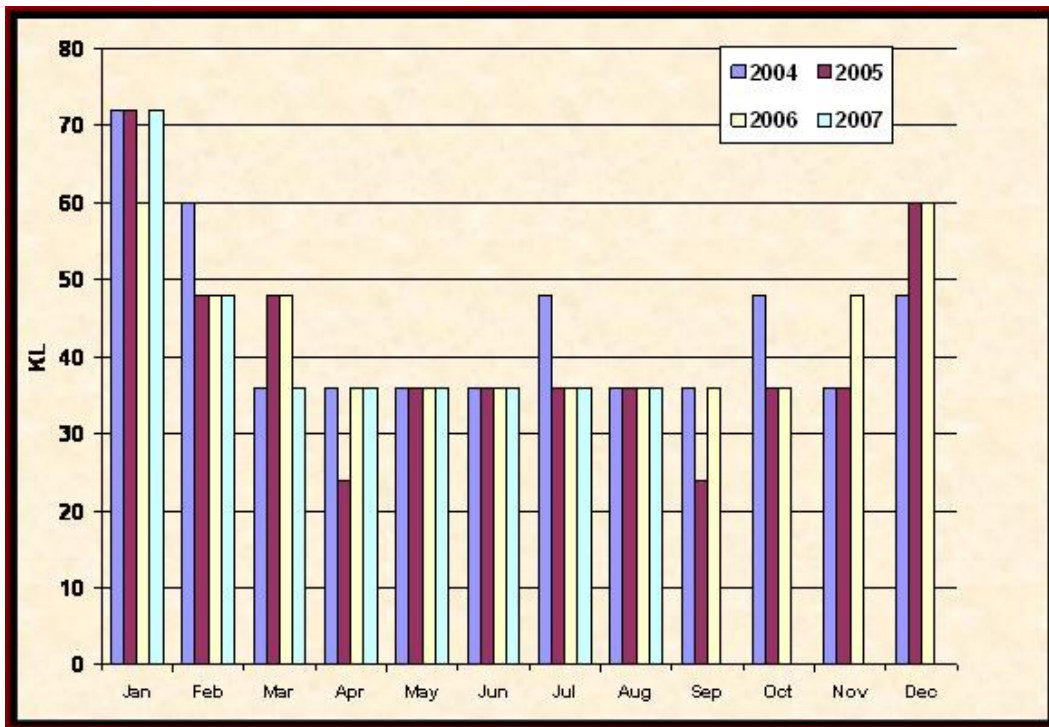


Figure 4: LDO Consumption Before and After Energy Conservation

3. ENERGY CONSERVATION COMMITMENT, POLICY AND SETUP

The EC cell at BHMRC closely monitors the energy consumption (shiftwise/daywise/monthwise/year wise) and these are reviewed on a regular basis.

Energy conservation activities have been undertaken under the broader policy framework of the Hospital to develop the most environment friendly facility in India. Under this policy decision taken at the Board level, following programs have been launched:

3.1 Energy conservation

1. Self audit on annual basis
2. Periodic audit using external resources
3. Project implementation both through self efforts and under performance contract by ESCOs-BHMRC is probably the 1st Hospital in India to have implemented ESCO PC Projects covering the entire system including:
 - a. Lighting
 - b. HVAC
 - c. Hot water generation
 - d. Laundry and kitchen energy system

As a result of these efforts, electricity consumption has been progressively reduced in the last three years despite increase in connected load on account of expansion of facilities and providing more comfortable working environment.

3.2 Renewable Energy Development

Investment of close to Rs 1.0 crore has been made to build a massive solar water heating system for reducing the electricity and oil consumption for heating purposes to practically 'zero' level. The installation work has already been completed and the facility is under commissioning.



Figure 5: Solar Water heating Systems - Under Implementation

3.3 Waste water management

Waste water is treated to conform to the norms of the authorities and over close to 30% of the same is used for horticultural purposes. Balance quantity is presently being discharged as treated effluent.

An ambitious project has been undertaken to achieve 'zero' effluent status for which a state of the art water treatment facility using RO backed up by other required physical and chemical treatment methods are being installed.

3.4 Rain Water Harvesting

Eleven (11) number rain water harvesting system has been developed covering the entire hospital complex.

3.5 Energy Conservation Set Up

A formal energy conservation cell is in place and the organizational arrangement is as follows:

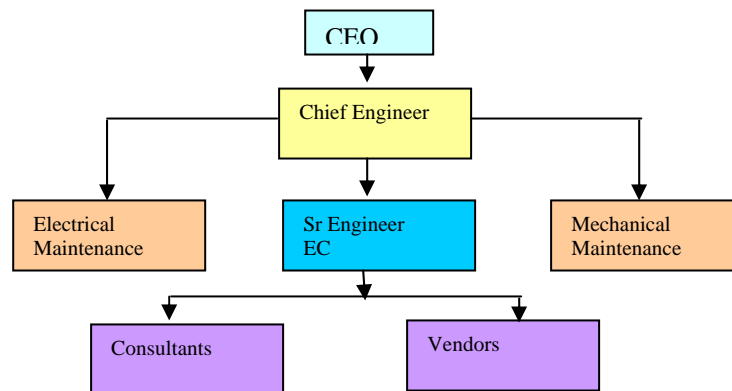


Figure 6: Organization Structure of Energy Conservation Cell

The senior engineer in charge of the energy conservation (EC) cell reporting to the Chief Engineer is exclusively responsible for managing the EC program, which includes:

- Managing the energy and water related logbooks and monitoring system
- Preparing daily report for the Chief Engineer and organizing review meetings
- Co-coordinating with external consultants and vendors for energy audit, diagnostic studies, project implementation and post implementation verification of savings
- Conducting internal audit and implementation of self identified projects

3.6 Top Management Involvement

Energy conservation along with environment management is on the regular agenda for review at the highest management level. This includes:

- Monthly review meeting at CEO level
- Project review meeting at CEO level
- Annual review at Board level

Following the Board review specific programs are launched as part of annual business plan. The results of such programs are also reviewed at board level.

4. ENERGY CONSERVATION ACHIEVEMENTS

4.1 Implemented measures

The following energy efficient measures have been implemented in the following areas

1. Installation of economizer in the boiler to recover the flue gas waste heat

BHMRC has 2 nos of TPH fire-tube boilers (one standby). Steam is generated at a pressure of 7.5 to 8.5 kg/cm². The flue gas temperature was measured to be 280 deg C.

This high temperature increases the losses in the boiler. It was suggested to install an economizer in the flue gas path to recover the heat from the flue gases. This would heat up the boiler feed water and hence the total system efficiency would increase. The economizer was installed along with 2 boiler feed water tanks.



Figure 7: Economizer Installed in BHMRC

2. Use of steam from boiler to meet the hot water requirement at New Block thereby cutting off the hot water generators

There are 3 nos oil fired hot water generators (1 of 6000 kcal/hr capacity and 2 each of 3000 kcal/hr capacity) of which the 6000 kcal/hr generator and one 3000 kcal/hr generator were in operation. The hot water temperature varies from 60-65 deg C. The flue gas temperature measured at the outlet of the HWG was 547 deg C and the operating efficiency was about 65%.

The boilers at the old block had sufficient margin to generate steam to meet the requirement of hot water for the new block. The efficiency of the boiler was about 80% and was expected to go up after installation of the economizer. It was suggested to install a steam pipeline up to the hot water tank at the new block and cut off the HWG. This was implemented along with a new 10 KL tank.



Figure 8: Hot Water Generators Installed in BHMRC

3. Installation of Energy Efficient lighting system in old and new blocks

The following were the measures implemented in the lighting system at the new and old blocks

- Change of 4ft T8 FL (Magnetic ballast) with High Lumen T8 (Electronic Ballast)
- Change of 2 ft T12 FL (Magnetic ballast) with High Lumen T8 (Electronic Ballast)
- Change of 60 W GLS with 13 W CFL
- Change of 30 W GLS with 10 W CFL
- Change of 15 W GLS with 5 W CFL

(In the above cases the double fittings were changed to single fittings with reflectors)



Figure 9: Lighting Retrofit Measures Implemented in BHMRC

The above mentioned projects were fully implemented in the previous years and the resultant energy savings have already been verified and reflected in the annual energy bill.

4. Power factor improvement

The power factor varied from 0.95 to 0.98. By maintenance of the capacitor banks and close monitoring of pf and proper operating the power factor is being maintained at 0.99/1. A copy of the bill for Jan-07 is given below.

A Joint venture of BSES Limited with Govt. of NCT, Delhi
BSES RAJDHANI POWER LTD.

**KEY CONSUMER
ELECTRICITY BILLING**

K C C, Room No.-222 -B, BSES Bhawan
Nehru Place, New Delhi-110019

Registered Office:
BSES Bhawan
Nehru Place - 110019

REFERENCE NO 2120/9000/0056
K-NUMBER Y10191000835/2121/KHAN PUR(ALN)
NAME :- BATRA HOSP. & MEDICAL RESEARCH
CH. AISHI RAM BATRA PUBLI
MAILING ADDRESS :- CHAR.TRUST 1,TUGHLAKABAD
AREA,MEHRAULI BADARPUR RO

SUPPLY AT :-

REMARKS :- Regular Connection

BILLING MONTH :- Jan-2007
PAYMENT ACCOUNTED UPTO: 31-Dec-2006
BILL DATE :- 02-Jan-2007
DUE DATE :- 17-Jan-2007
DUE AMOUNT :- 2528477
TARIFF :- 9000(Y4) HT-MLHT
Prev. Rdg. Date 01-Dec-2006
Curr. Rdg. Date 01-Jan-2007

METER TYPE	METER NO	PRESENT READING	PREVIOUS READING	DIFF	M.F.	Consumption
1HCP KWH	BSR00163	4679.99	4613.58	66.41	6000/1	398460
2HCP KVAH	BSR00163	4987.04	4919.71	67.33	6000/1	403980
3HCP KW	BSR00163	.15	0	.15	6000/1	900
4HCP KVA	BSR00163	.16	0	.16	6000/1	960
LAST SIX CONSUMPTIO						
NS:	479880	683460	809640	874020	923820	844140

DEMAND(MDI) 960 KWH 398460 KVAH 403980 KWH-OTHER 0 Adv./Ajd.Units
SANC.LD./CONTR.DEM./ 4043.07/2550/2043.07 POWER FACTOR :- 0.99 0
CONN.LD

Figure 10: Power Factor Improvement

4.2 Summary of Projects Under Installation

In addition to the above, number of other projects were also undertaken in the year 2006-07 and most of these projects have been completed by the time this report is being made.

However, impact of these projects is being reflected in the energy consumption results in the current year.

Summary of these projects are as under:

1. Change of impellers in the pumping system for the air conditioning system

During the study it was found that some of the condenser and chilled water pumps were mismatched. It was suggested to install new pumps but later on it was decided to change the impellers to change the pumping operating conditions. The impellers were changed for

- 2 nos of condenser pumps in old building (1 standby)
- 4 nos of condenser pumps in new building(2 standby)



Figure 11: Pump retrofits

2. Change of existing inefficient AHU's to new AHU's

The performance of all the AHU's was measured and it found that some were operating inefficiently. In some cases the power consumption of the blowers was on the higher side even though they were not delivering sufficient quantity of air. The following AHU's were changed to new ones.

- Ground floor OPD
- X-Ray
- Simulation room
- Doctors rest room
- Bracheotherapy
- Oncology OPD



Figure 12: AHU Modification

3. Installation of VFD's for AHU blowers and CT fans

As the air flow required is variable depending on the area of installation it was suggested to install VFD's in the blowers and in the CT fans. This would take care of the varying loads and also save on the power consumption. VFD's were installed in the following locations.

- Ground floor OPD
- CTVS old
- Cardiac OPD
- Angio Care
- III Floor
- Oncology OPD
- New Block CT-1
- Cardiac Casualty
- New Lab
- Cath Lab C
- X-Ray
- CTVS new
- Cath Lab A
- Old Lab
- MICU-1
- One Day Care
- New Block CT-2
- CCU-A
- II Floor
- 564



Figure 13: VFD

4. Online Transfer of water to Overhead Tanks through filters for both New & Old Building Blocks

Initially there were 2 pumps running to deliver soft water and chlorinated water to the over head tanks. Chlorination was done online at the soft water pumps and hence the chlorinated water pumps were stopped



Figure 14: Chlorination Tank

5. Stoppage of one Cooling Tower by doing proper maintenance & de-scaling of the Chiller

The chiller condenser tubes were choked and hence was not able to deliver proper TR. Descaling and maintenance of the chiller was done. By this measure one cooling tower was stopped.



Figure 15: CT Retrofit

6. Modifications in Air-conditioning System for Telephone Exchange.

Certain modifications were carried out in the AC system for telephone exchange and 144 units per day of power were saved.

5. Energy Conservation Plans and Targets

Target for 2007-08:

- Reduction in monthly electricity consumption by 12%
- Elimination of use of oil for water heating
- Waste water recycling->50%

To achieve the above, several projects have been taken up for implementation. Few of them have already been commissioned in the last few months. Following other projects has also been taken up for implementation.

1. Modification of 2" Chilled Water Pipeline with 4" pipelines from New Building A. C. Plant of 2nd B Cardiac Ward. This would improve the cooling temperature of the particular area and also able to stop 02 in nos. 7 H. P. Pump for 18 hrs. a day. The estimated savings is Rs. 25 lacs
2. Supplying chilled water from New Building A.C plant to CTVS Area. This would help in cutting off a 40 KW Chiller Unit for 16 hrs.
3. Solar water heating Project – Hot water generation and for laundry purposes. The capacity would be about 43500 litres/day. The estimated savings would be about Rs. 30 lacs per annum with an investment of Rs. 96 lacs
4. Zero-effluent project – Installation of an R.O Plant with an investment of Rs. 80 lacs which would treat about 500 KL of effluent per day.
5. Energy conservation activities for West end centre and nursing college
6. Energy metering system block wise and in the residential areas