

CHHATRAPATI SHIVAJI MAHARAJ HOSPITAL Kalwa (Maharashtra)

Unit Profile

Chhatrapati Shivaji Maharaj Hospital was commissioned on 1st October 1991. The Rajiv Gandhi Medical College attached to hospital was inaugurated on 20th August 1992. The Indian Medical Council has inspected medical college and hospital in March 1998 and recognized medical college for MBBS course.

Medical College and Hospital are situated in the same premises and in same building. Hospital has 550 indoor beds distributed over 17 indoor wards. Total 14 OPDs are conducted everyday. Daily OPD attendance is on an average 350-400/days. The investigations facilities of X-ray, Pathology, Microbiology, ECG, Ultrasonography, 2-D Echo, Stress test, pulmonary function test are available in this hospital. Supportive services like laundry, boiler house, maintenance, PWD, mortuary, central medical store, kitchen facilities are available.

Indoor admissions per year are on an average 20000, daily average admissions are 55-60 patients, and average length of stay is 6 days. Total operations performed per year are 7500-8000. Total deliveries conducted per year are 3500. Total lab investigations done per year are 200000. Building has 8 operation theatres located in four areas. The major operations performed per year are 3500-4500. The minor operations performed per year are 3000-3500.

All National Health Programs are implemented by this hospital. Hospital provides preventive, promotive and curative services to the citizens of Thane Corporation as well as of Thane District and nearby surrounding areas. Present working staff is 347. This includes medical as well as paramedical and administrative staff.

The hospital has its own common biomedical waste disposal facility through biomedical waste disposable plant provided by NGO. C.S.M. Hospital has planned to expand facilities of medical care in stepwise manner. Under this CT Scan facility is provided through privatization. Various diagnostic facilities like N.S.T., Endoscopy, operative microscopy, operative laparoscope's, phaco imulsification and vitrectomy facilities are added this year.

TMC has obtained electric supply at 11 kV, double feeder system from State electricity distribution authority. The required power to hospital is fed through 2 X 1000 kVA, 11 kV/0.433 kV transformers, HT switchgears and further LT distribution networks.

Energy Conservation Achievements

Thane Municipal Corporation had initiated energy conservation measures from the year 2000-01 onwards and is pioneer in energy conservation activities in Municipal Corporation sector. It is constantly engaged in implementation of energy conservation measures for the last four consequent years.

Energy saving has been achieved by encouraging & developing in-house Engineering manpower. Since, entire Engineering manpower responsible for installation and maintenance work of electrical installation.

TMC has under taken various energy efficiency and energy saving activities at Chhatrapati Shivaji Maharaj Hospital, Kalwa as mentioned below;

1) Power saving in H.T. connections by providing Automatic Power Factor Control panels

As per the tariff of state electricity board power factor of the system should be above 0.9. However in case of all the H.T. connections of Thane Municipal Corporation power factor was below 0.9 and on account of low power factor Thane Municipal Corporation had to pay almost Rs. 23 to 25 lakhs every year to state electricity board as a penalty charges. Since power factor was low, energy charges as well as billed demand was increased. Hospital provided & maintained properly capacitor banks at all these H.T. connections and also provided Automatic power factor controllers.



Thane Municipal Corporation has earned total incentive of Rs.6.26 Lakhs from state electricity board for maintaining power factor near to unity during last three financial years.

AUTOMATIC POWER FACTOR CORRECTION PANEL

2) Optimizing use of central AC plant:

Leakages in process air / water in Central AC plant has been prevented. In respect of Chhatrapati Shivaji Maharaj Hospital, Kalwa, it was noticed that Centralized A.C. plant (3 X 90 tons) was put into operation for 24 hours. After studying the utilization pattern, it was noticed that Centralized A.C. plant was underutilized during nightshift. During nightshift only particular section of the Hospital i.e. I.C.U. and Gynac Operation Theater was required to be provided with air-condition. Therefore five split A.Cs. were provided in these areas. During the nightshift main Centralized A.C. plant was switched off and only five split A.C. were put into operation. This has subsequently reduced the energy charges by Rs.70,000/- to Rs.80,000/- per month and investment made on providing split A.C. was recovered within four months. In addition to this maintenance cost of Centralized A.C. Plant and manpower required is reduced.



**SOLAR WATER HEATING SYSTEM
(TOTAL 19050 LPD)**

3) Solar assisted water heating system

TMC has taken initiative for popularizing the use of solar energy in Municipal Corporation area. TMC has already made mandatory installation of solar assisted water heating system in all new functional buildings.

Thane Municipal Corporation has commissioned solar water heating system of capacity 17750 L.P.D. at Chhatrapati Shivaji Maharaj Hospital, Kalwa. The equivalent energy required for heating this capacity of water would be 2.59 lacs Units per year. This has resulted into saving of energy charges to the tune of Rs.8.29 lakhs per annum. The project cost of the same is Rs 16.0 lakhs.



4) Installation of Energy saver control panel for area lighting:

The need of lighting level differs for different hours of the nighttime. Higher lighting level is required from sunset to say 11.00 pm & thereafter during remaining night time comparatively less lighting level is required due to reduction in vehicular & pedestrian traffic. In conventional system prevailing in Thane Municipal Corporation, Electromechanical timers (L & T make TSQ 100 or equivalent) along with 3 phase contactors of suitable ratings were provided in streetlight panels for switching ON/OFF streetlights.

The management provided Energy saving panel with Almanac timer and facility of voltage reduction at late night say at 10.00 PM . This has resulted in 30% energy saving in area lighting.

5) Installation of FRP fan for cooling tower:

The casting fan of cooling tower of Central AC plant was replaced by FRP fan. Due to this air flow has been increased and power saving of 25 % has been achieved.

6) Production of Methane gas from Bio degradable waste :

Thane Municipal Corporation has commissioned 20 T capacity Methane gas from biodegradable waste through private participation.

This plants produces 1.83 lakh kg Methane gas per annum. The equivalent amount of this generated methane gas would be around Rs. 76.5.00 lakhs per annum. This gas is being utilized for various heating applications in hospitals, crematorium etc. resulting into reduction in conventional fuel i.e., Diesel.



METHANE GAS PLANT FROM BIODEGRADABLE WASTE

7) Installation of Energy Efficient luminary

Thane Municipal Corporation has modified 1950 no. of conventional tube lights with energy efficient Tri phosphor tube lights. Existing conventional ballast and tube lights have been replaced with electronic ballast and Tri phosphor tube lights. This has resulted in increased illumination. The power saving achieved is @ 30% as a result of this modifications.

8) V V F D for water pumping & motors for Central AC plant :

Thane Municipal Corporation has installed variable voltage variable frequency drive for water pumps & motors of central AC plants. This has resulted into 25% energy savings .

Energy Conservation Plans

Solar based Central AC plant :

Thane Municipal Corporation intends to install Solar power based Central AC Plant(2 X90 T). The project report has been submitted to MEDA (Maharashtra Energy Development Agency, a State Govt. undertaking) for technical scrutiny and getting subsidy from MoNES. This will be the first project of it's kind in India and perhaps in the world.

**DAK BHAWAN
(MINISTRY OF COMMUNICATION & IT)
Department of Post, New Delhi**

Unit Profile

Dak Bhawan houses the office of MOS C&IT, Secretary, Department of Posts and members of the postal services board and attached offices of department of posts. The building also houses a Head Post Office Parliament street & National Philately Museum.

The Dak Bhawan building was constructed in 1954. The building has ground floor and five floors having a total operated area of 25000 Sq. mtr.

The connected electrical load of the building is 1118 kW and two numbers 800 kVA transformers have been installed. The total electric consumption of the building during the year 2002-03 is 13.6 Lakhs units. The energy audit of the building was carried out in house and energy wastage points identified.



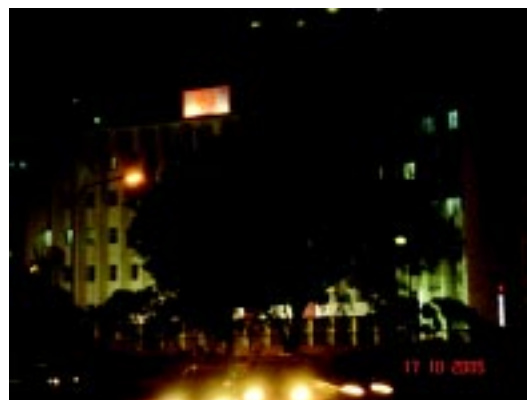
Energy Conservation Achievements

Over the year following retrofitting measures for energy conservation have been carried out which has resulted into energy savings. During the year 2004-05, the reduction in electricity consumption achieved was 4.82 lakhs units equivalent to saving of annual electricity bill charges of Rs. 38 Lakhs. Some of the measures implemented during the year are as under:

- DC drive lifts replaced with VVVF AC drive lifts.

- 2 x 40 W fittings replaced with 2 x 11 W energy saver fittings in all stairs & lobby.
- 4 x 20 W fitting at Lift lobbies on each floor were replaced by 2 Nos. 2 x 11 W energy saver fittings.
- 2 x 40 W fittings replaced with 1 x 40 W fittings in corridors. No expenditure incurred as the old fitting were reused.
- Re-orientation of fittings have been done in order to reduce the numbers of fittings and old 2 x 40 W fittings were replaced by 1 x 40 W fittings.
- Energy saver T-5 fittings (1 x 28 W) provided in place of old 2 x 40 W fitting in newly renovated sections.
- The ceiling fans installed in the corridors and lift lobbies removed.
- The old fans in some rooms are replaced by the new fans consuming less electricity
- After office hours, three out of five lifts installed have been switched off to save the energy.
- Timers have been provided to switch off half of the total compound light at midnight, thus saving the energy.
- The load balancing has been done by equalizing the load on all three phases and continuous efforts are being made to maintain the same.
- Maintenance schedule for effective and timely maintenance have been implemented in order to reduce the losses caused by the loose connections.
- Switching off one transformer on after office hours/ holidays.
- The servicing and preventive maintenance of air conditioners have been taken up time to time in order to get the maximum efficiency.
- Energy saver Rotary compressors are being used as replacement of reciprocating compressors in the existing units whenever gone faulty with digital remote controllers.
- Awareness amongst employees created by providing stickers and conducting training.
- Energy saver electronics chokes are being used in place of conventional copper chokes in existing fitting in a phased manner.

All the neon signboards were removed in order to save energy





Old DC drive Lifts 11 KW - Replaced



New VVVF AC Drive Lifts of 5 KW Installed. Power saved 6 KW / lift



Old 2x40 w fittings replaced



2x11 W energy saver fitting installed in all stairs and lobby



4x20 w fittings Replaced



2x11 W energy saver fitting installed in all lift lobbies



Old Ceiling fans consuming more energy



Ceiling fans consuming less energy installed



Timers provided to switch off At mid-night half of the compound light to save energy



After office hours and on holidays one transformer is switched off to save energy



Old faulty reciprocating Compressors in Window AC units replaced



Energy saver Rotary compressors installed



Digital remote controllers provided in window AC units



Smart controller provided for selective / sequential operation of AC units



Copper chokes are being replaced in a phased manner



Electronic chokes installed



To create awareness amongst employees sticker provided



Neon sign display boards replaced



Aluminum composite panel signage installed (not consuming any energy)



Halogen dichroic 50 W lamps in Philatelic Museum replaced



8W CFL lamps in Philatelic Museum installed



400 W halogen / HPSV lamps replaced



250 W metal halide lamps installed



- Balancing of load
- Equalisation of load in 3 phases



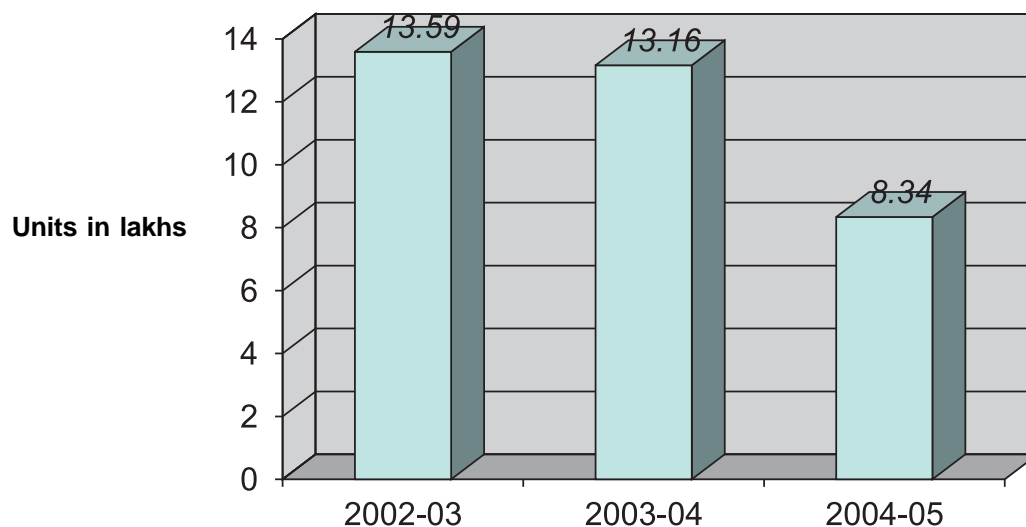
Adherence of maintenance schedule

RESULTS

- Energy conservation measures incorporated in Dak Bhawan building resulted into savings of **4.82 lakh units** (kWh) and electricity bill charges reduction of **Rs. 38 lakh**
- Specific energy consumption (sec) (Annual kWh consumption/ kW of connected load) reduction achieved.

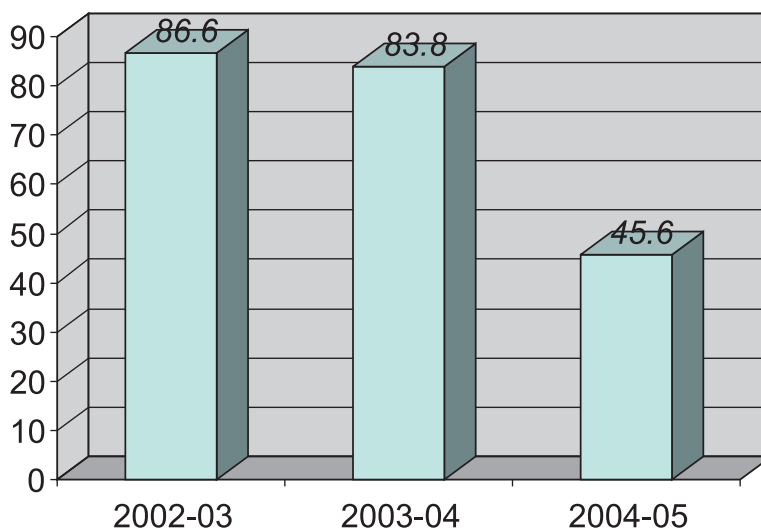
YEAR	SEC (Annual kWh consumption/ kW of connected load)	% reduction over 2002 - 03
2002-03	1216	-
2003-04	1182	2%
2004-05	782	35%

ANNUAL ENERGY CONSUMPTION OF DAK BHAWAN



SAVING IN ENERGY CONSUMPTION DURING 2004-05 : 4.82 LAKH kWh

ANNUAL ELECTRICITY BILL CHARGES OF DAK BHAWAN BUILDING



**SAVING ACHIEVED DURING 2004-05
Rs. 38 lakhs**

DIGITAL TAX - BUILDING
Bharat Sanchar Nigam Limited
Ernakulam, (Kerala)

Unit Profile

Digital Tax building is an important Telecommunication Building owned by BSNL in Ernakulam in Kerala state. It is a four storied building houses Telecom equipments for 60,000 TAX lines, 80,000 optical fiber circuits, a broad band exchange and a 4000 line local exchange.

Connected Load Details of D-Tax Ernakulam

Sl.No	Type Of Load	Qty	Wattage	Total (kW)
1	51TR Central A/C Plant	1Set	153000	153
2	Package A/C Plant(Fedders Lloyd / Blue star)	5Sets	10850	54.25
3	Package A/C Plant (Voltas)	5Sets	12350	61.75
4	Window/Split Type AC Units	24Nos	2000	48.00
5	Twin Fluorescent fittings(4'-40W)	220Nos	80	17.60
6	Single Fluorescent fittings(4'- 40W)	80Nos	40	3.20
7	56" Ceiling fan	50Nos	60	3.00
8	HPSV Lamp Fittings	08Nos	150	1.20
9	Water Heaters	08Nos	1000	8.00
10	18" Exhaust Fan	17Nos	160	2.72
11	Exchange Power Plant	-	-	276.3
12	Water Pumps	4Nos	2200	8.80
13	Twin energy Efficient T-5 Lamps	09	56	0.504
	Total			638.32

Energy Conservation Achievements

Comparison of electrical consumption before and after energy conservation measures

Sl.No	Period	Energy Consumption (kWh)	Electricity Cost (Rs.)
1	Apr-04 To Sep-04	831822	3484705.00
2	Apr-05 To Sep-05	720288	3148341.00
	Savings	111534	336364.00

Note:

Energy conservation measures in utilization of electricity were commenced in the building from march 2005 and hence the energy consumption and cost of electricity for the period of April05 to Sept 05 (After commencement of energy conservation measures are compared with the figures of corresponding period of the previous year to get better understanding about savings achieved due to energy conservation activities).

Energy conservation measures adopted for the building for 2004-05 period are detailed below:

1. A/C plant

For Digital Tax exchange (in first floor) there was one central A/C plant of 6 x 7 TR as standby. Following energy, conservation measures were undertaken for the plant.

Details of A/C plant

A/C Plant	Connected Load	Tonnage
Central A/C Plant	153 KW	51 TR
Package A/C Plant	72.60 KW	6 X 7 TR

It was noticed that return air/supply air grills are provided in OMC/IOP room where computers are housed and the temperature in these rooms are lower that required. Return air opening was there in corridor also. These air grills were closed to limit the air conditioning into 26° - 28°C range and to effectively increase the cooling in equipment rooms. All air grill and opening in non air-conditioned rooms and corridors (where air conditioning is not required) were totally closed.

This has brought in a considerable savings in Tonnage and 5Nos package A/C plants (with lesser power consumption) was sufficient to meet the peak air conditioning requirement of this area, instead of central A/C Plant bringing reduction in consumption of power. [Completed in March-2005]

2. A/C Plant In OFS Rooms

In Optical Fiber Station room there were 4 Nos. 7 TR A/C plants and two A/C plants were operated during normal period and three numbers in peak load period. But the air distribution was not proper in this area,

the plant were old and were delivering lesser tonnage. Following efforts are taken to increase the efficiency of air conditioning plants.

- 1.The old A/C plants are replaced with new package A/C plants.
- 2.Existing air grills were altered for Achieving proper airflow.

The result was, only one 7 TR package A/C plant is to be operated during normal period and only one compressor (3.5TR) of second plant is to be operated additionally during peak load period.

3. Exchange Power Plant

Existing conventional type power plant was replaced with 50V, 3000 Amps capacity SMPS power plant. The old conventional type power plant was having efficiency of less than 80%. But SMPS power plant is more efficient with an energy efficiency of about 90%. This has resulted in power savings.

4. Lighting

Re-arrangement of light fittings in office buildings, conversion of double tube fittings into single tube light fittings etc also has contributed for savings in energy. The 2 x 4' – 40W light fittings in D-Tax were replaced with 2 x 28W highly energy efficient T-5 lamp fittings in new EWSD Tax room in First floor.

Energy Conservation Measures for Engine Side

Following energy conservation measures were initiated for toning up energy efficiency of engine. Following E/A sets were functioning in the building.

For D-Tax

1. 380 kVA E/A set(main)
2. 320 kVA E/A set(standby)

For OFS

1. 180 kVA E/A set (main)
2. 160 kVA E/A set (standby)

But the capacity utilization of these E/A sets was very low. The load on engine in D-Tax side was only about 165 KW and load on OFS side was only about 60KW. The low capacity utilization due to operation of separate engines for individual blocks had resulted higher diesel consumption.

Hence both the engines in OFS were dismantled and entire load was connected to E/A sets in D-Tax. This has resulted in savings of diesel required for engine operation.

CALCULATION FOR SAVINGS IN DIESEL USED FOR E/A SET OPERATION

The E/A set was disconnected in first week of November 2004

Diesel consumed for 1 year prior to rearrangement from Nov2003 To Oct-2004

D-Tax	=	9518 Litres
OFS	=	2796 Litres
Total	=	12,314 Litres
Total hours of operation of E/A sets for the period (For 1 year)	=	186.87 Hrs
Average fuel consumption per hour	=	65.90 Litres/hr
No. of hours of operation of E/A set for Nov2004 to Sep 2005	=	180.35 Hrs
Diesel required @ 65.90 Litres/hr – On average basis(180.35 X 65.9) (If original arrangement continued)	=	11885 Litres
Actual diesel consumed	=	8101 Litres
Savings in diesel = 11,885-8801	=	3784 Litres (Within 11 Months)

Note : The figure is worked out by comparing diesel that would have consumed for the period after re-arrangement [Nov-2004 to Sept2005] if the same arrangement continued ,with the diesel actually consumed due to efforts for achieving higher fuel efficiency by increasing capacity utilization of E/A SET.

1	Total cost incurred for tuning up the fuel efficiency of E/A set	=	Rs 65,000/-
	Cost of diesel saved at current market rate (3784 liters @ Rs 33.50 / liter)	=	Rs126764 (Within 11 months)
	% Savings on expenditure	=	Rs126764 X 12 Rs 65000 X 11
		=	212.75 %
2	Cost incurred for reduction of electrical power consumption Savings made within 6 months (From Mar-05 To Sep-05)	=	2535000
	% savings on energy conservation cost on annualized basis	=	336364
		=	Rs 336364 X 12 Months X100 Rs 2535000 X 6 Months
		=	26.54%
3	Energy savings achieved in terms of percentage of total energy consumption		
	Total kWh consumed for 6 months during April-04 To Sept-04	=	831822
	Savings for corresponding period for the year 2005 (For 6 months)[After commencement of Energy conservation efforts]	=	111534
	Percentage savings on annualized basis[By comparing Energy consumption after commencement Of energy conservation measures with corresponding Period of previous year]	=	111534 X 12 Months X 100 831822 X 6 Months
		=	26.82 %

DHIRUBHAI AMBANI KNOWLEDGE CITY **Navi Mumbai (Maharashtra)**

Unit Profile

Dhirubhai Ambani Knowledge City (DAKC) is located in Navi Mumbai and houses the central offices of Reliance Infocomm, project implementation and Operational activities for Infocomm across the entire country as well as on the Interfaces with the Global communication partners.

Built in year 2002 has over 2 Million sq ft of office and Operations space in multiplex of buildings.

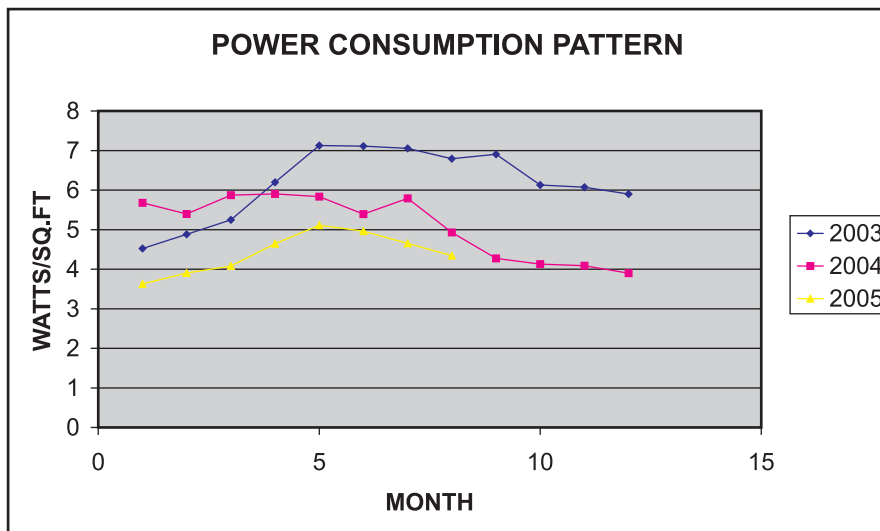


System

- Centralized utility block for Chillers with refrigeration capacity of 13,000 TR.
- Water cooled Air handling units (AHU) with variable frequency drives (VFDs).
- Control of the chilled water supply to each AHU through a motorized control valve.
- Diesel Generator with 100% power back up through 4 x 3.5 MW (total 14 MW) DGs.
- Start up and sequencing of the DG sets is automated using PLCs.
- Automatic start up of the DG sets ensures almost no power disruption during State grid failures.
- Distributed building management system (BMS) with centralized monitoring.
- The centralized BMS monitoring system provides on a desk top PC information related to the operations to the O&M staff and the energy conservation

Power Consumption Pattern (Watts/SQFT)

Year	Jan	Fab	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	MAX	MIN	%REDUCTION
	1	2	3	4	5	6	7	8	9	10	11	12			
2003	4.52	4.88	5.25	6.20	7.13	7.11	7.06	6.79	6.91	6.13	6.07	5.90	7.13	4.52	
2004	5.68	5.39	5.87	5.90	5.83	5.40	5.79	4.93	4.27	4.13	4.09	3.90	5.90	3.90	17.20
2005	3.63	3.91	4.08	4.64	5.11	4.96	4.65	4.34					5.11	3.63	15.45



Energy conservation achievements

Solar water heaters to generate 24000 liters of hot water to cater the hot water requirement of the Food courts which serve multi cuisine for 15000 people. It has saved the power to the tune of 697 KWH daily. No electricity is used for warm water supply for food courts.



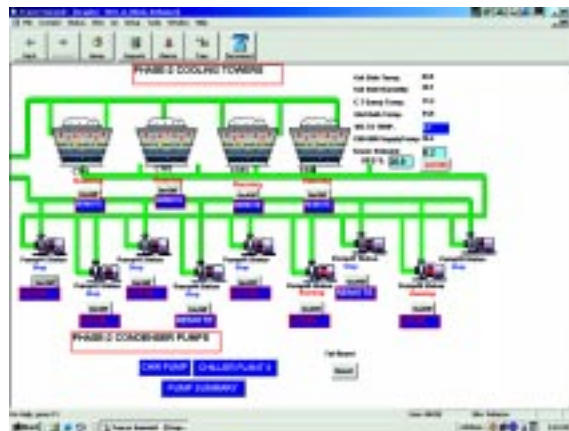
- Infra Red scanner installed for main street lighting on/off, which has reduced manual error of lighting stoppage.



- Rainwater collected from the roof of the chiller house and main electric substation is diverted to the cooling tower basin. With this simple measure, the make up water needs of the Cooling tower are met and resulted in a saving of nearly 7200 M³ of water per year and associated pumping cost.



- Variable set point instead of fixed set point for supply air, set from a centrally located BMS workstation. This has resulted in substantial saving of AHU fan power consumption and reduced the refrigeration load on chillers.
- VFDs installed for Cooling tower fan. Using the BMS control for decision on best possible approach. BMS checks the ambient WBT, cooling tower outlet temperature and load which controls the speed of CT fan. With this always best possible water temperature is achieved without wasting fan power.



- Advance chiller operation based on chilled water return header and supply header temperature.



- Sun Visors provided on High Rise Buildings to avoid Radiation.



- Venetian translucent rolls provided on all windows. The photograph shows effect of one glass panel with fully closed roll & half open roll.



- Double glass Panels provided for NNOC, PHQ, NHQ, G, and H & I Blocks.



- Dry cladding is provided on concrete facing Sun.



- Sun film on single glass panel.



Energy Conservation Achievements

- Drip and irrigation pump spray head optimized and the old pump is replaced with new low head pump.
- Condenser pump and chilled water primary pump were operating with high head compared to head required at site and hence impellers were trimmed to save power.
- Ozone generator installed in AHU of the food courts to reduce the food smell, this has resulted in lesser fresh air intake.

- Change of VFD in AHU as per actual demand.
- Natural light utilized for food courts. No artificial illumination during day time.
- Maintaining unity power factor to reduce T&D losses.
- Automated lighting ON/OFF switches for offices.
- Replacement of 40 W tube lights by 36 W.
- Replacement of ferromagnetic ballast by electronic chokes

Details of the some of the Projects implemented are as under:

1. Energy Conservation in rain water harvesting

The rainwater collected from the roof of the chiller house and main electric substation is diverted to the cooling tower basin. With this simple measure with minimum investment, the make up water needs of the Cooling tower are met and resulted in a saving of nearly 7200 m³ of water per year and associated pumping cost. During Monsoon seasons the entire make water of the Cooling tower is met from this.

Area of Chiller House roof & Sub Station Roof

$$= (33 \times 35) + (57 \times 37) = 3264 \text{ M}^2$$

Considering 2.2 M rainfall every year, building gets

$$= 3264 \times 2.2$$

$$= 7180 \text{ M}^3$$

say 7200 M³ per Annum Approx.

Cost of MIDC water saved
 = 7200 M³ x 20 Rs
 = Rs. 144000/- per Annum.
 Investment cost
 = Rs. 125000/- Approx.

Therefore pay back is of 11 months only

2. Replacement of gardening water pump

Installed Garden pumps were having capacity of 130 M³ / Hr at 60 M head. After assessing it was found that building is having requirement of 105 M³/ Hr at 45 M head. Present pumps were checked for trimming option from characteristic curve but even at minimum diameter required parameters were not getting. Therefore management decided to get new pump with energy efficient motor. This resulted in saving of 1.23 lakhs per year & pay back was only 10 months.

3. Impeller trimming for condenser and primary chilled water pump

The condenser pump and chilled water primary pump were operating with high head compared to head required at site. This was compared with characteristic curve and impellers were trimmed to get required parameters & save power.

a. Condenser pump.

Data from characteristic curve from Mather & Platt for Pump model 200/300 BST.

Original Dia of Impeller	= 335 mm
Trimmed Dia of impeller	= 315 mm
Saving per pump	= 12 Kw
No of pumps working	= 2.5 per day
Hence, saving	= 12 x 2.5 x 3.7 Rs. x 24 Hrs x 365 days = Rs. 972360/-
Total investment cost	= Rs. 3000 x 4 pumps = Rs 12000/-

Pay back is less than one week.

b. Primary Chilled water Pump

Data from characteristic curve from Mather & Platt for Pump model 8/8 ALE.

Original Dia of Impeller	= 305 mm
Trimmed Dia of impeller	= 267 mm
Saving per pump	= 11 Kw
No of pumps working	= 2.5 per day
Hence saving	= 11 x 2.5 x 3.7 Rs. x 24 Hrs x 365 days = Rs. 891330/-
Total investment cost	= Rs. 3000 x 4 pumps = Rs 12000/-

Pay back is less than one week.

4. Unity Power factor maintenance

Building was wheeling power from Patalganga plant till Oct 2004 as surplus self-generation capacity was available in the group. System power factor was around 0.91 at that time capacitor banks were not operated. PF incentive was not available. Due to Naptha price hike, wheeling was stopped in Oct'2004. As the PF incentive is available from the supply company, management switched on all the capacitor banks and installed capacitors wherever needed. Unity PF is maintained at the site always. 7% discount on energy cost was achieved as per MSEB tariff rates. Further, building has approx 5% T & D losses in all over power/distribution, plus cabling & internal distribution, which was brought down to 4% by PF improvement.

Saving Energy saved	= 60000 KWH /month
Yearly saving	= 7.2 lakhs units per annum. = Rs. 27 lakhs.
Total investment	= Rs. 6 lakhs.

Pay back is less than one week.

5.Replacement of Tube lights Policy

Total 20000 tube lights have been used at the complex. The management adopted a maintenance strategy of replacing these tube lights by 36 W. Originally filament was of 40 W ratings.

Annual savings = Rs. 3.7 lakhs.

6. Replacement of Magnetic ballasts with Electronic ballast

For most of the tube lights, magnetic ballast were used. As maintenance practice & energy conservation measures, these are getting replaced by electronic ballasts. In the year 2004, management replaced 500 Nos. ballasts on these tube lights and saved 4 kW of worth Rs.0.8 lakhs with a pay back period of 5 years.

Energy Conservation Plans

- Introduction of differential winding on the parallel transformer to reduce harmonics due to electronic load.
- Switching of light automatically by BMS with time delay after switching of the AHU in office area.

Energy conservation commitment

The management is committed to reduce power and water consumption continually which shall reduce the impact on environment. The substantial reduction to the level of 40% from the starting consumption has dramatically reduced the CO₂ load of about 150 000 kg annually.



Energy Management Policy

Reliance Infocom is committed to Green Environment and shall try all possible means to conserve energy and utilize maximum resources to its optimum level without sacrificing the comfort and productivity of customers.

MARRIOTT WELCOMHOTEL **New Delhi**

Unit Profile

This hotel is built on 9850 Sq. Mtrs area in the heart of the city on the South Delhi, 19 Km. from International Air Port & 18 Km. from Domestic Air Port. The hotel offers two specialties and one multicusines restaurants, banquet halls, boardrooms, lounge bar, swimming pool, shopping arcades & fit ness center.

Operation commenced from 31st December 2000. Currently it offers the Five Star Deluxe Hotel accommodation in the city of New Delhi.

Part of the Corporate giant – ITC Group, The Marriott WelcomHotel New Delhi is committed to bench marking practices and operational excellence in all areas including Environment, Health & Safety.

The hotel offers 220 rooms as Deluxe, Executive floor, Executive suits, Executive floor exclusive and Presidential Suits. The hotel has been one of the best choices for many dignitaries including Heads of states and Diplomats.

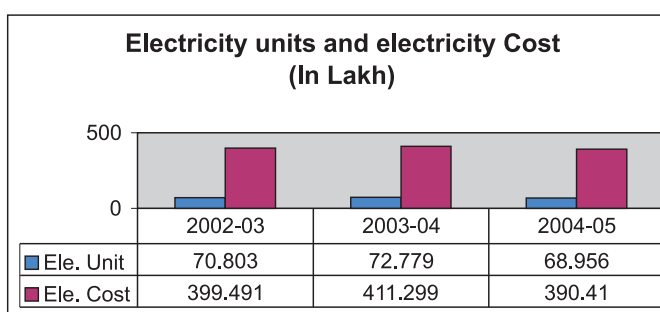
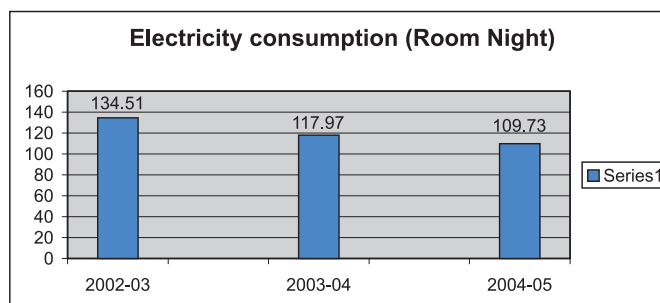
The unit has been faring very well in Environment, Health, & Safety performance. The unit is also a consistent performer in the ITC Corporate EHS Audits.

As part of its ongoing endeavor towards environment protection, the hotel had achieved the **ISO- 14001: 1996** in the month of April 2004, Greentech Environment award, **Greentech safety award and Golden Peacock Environment Management award.**



Energy Consumption

The connected load is approximately 2081.72 KVA; Energy consumption in Marriott WelcomHotel is shown in the fig. Below:



Energy Conservation Commitment, Policy & Set up

The Marriott WelcomHotel teams closely monitor the energy consumption (shift wise/day wise/month wise/year wise). The targets are decided by the corporate as below:

- Conservation of energy (Electricity) by 5% every year over the next three years.
- Reduction of fuel consumption by 5% every year over the next three years.
- Conservation of water by 5% every year for the next three years.
- Use of 100% Eco-friendly refrigerants.
- Working towards Zero Waste.
- Plantation of trees (450 trees per year for the next three years)
- Reduction of noise.
- Recharge ground water by rein water harvesting.
- Charcoal consumption reduction by using accurate size & good quality charcoal.
- EMS training to create awareness amongst employees.
- Maintain "0" accident statistics.
- Achieve more than 96% rating in forth coming audit.

Not only does the top management emphasize on achievement of highest level of energy efficiency but also provides the financial supports and best energy efficient equipments.

Regular training and monthly energy conservation meetings are done to help the hotel staff understands the terms related to energy consumption.

Energy Conservation Achievements

Implemented Measures: — **The following energy efficient measures have been implemented in the following areas:**

1. PC Based Energy Management System:

The building control automation system is a state of the art system that is microprocessor based system. One scalable system that pulls together all core building systems and integrates information from many different enterprise sub systems. With the Landis and Steffa (Siemens) building integrator, the building has the information needed to make critical decisions quickly- decisions that ultimately help us to conserve energy.



2. Energy Management Strategy For Chillers:

- a) **Load Reset:-** The chilled water flow control responds quickly to load changes by the microprocessor control panel, to maintain the chilled water temperature. The chilled water temperature may be reset from chilled water return temperature.



- b) **Chiller Sequencing:-** In the chiller sequencing the chilled water flow temperature is controlled by switching chillers ON /OFF. If the flow and temperature are below the specifications for the chillers, then the system first circulate the cooling load, checks the load and decides number of chillers to be on line.
- c) **Cooling Towers:-** The cooling tower's capacity to cool the water is limited by the ambient conditions, If the condenser water design temperature minus the approach temperature of the tower than the outside air temperature, then the cooling tower fans can be sequenced / VFD will vary the speed of C.T. Fans. Set point of the condenser water can be raised, quantity of water can by-passed to reduce the load on CT ,
- d) **VFD's:-** The VFD's are installed to reduce the energy consumption by the C.T. fans, it sense the temperature from the return water from the cooling tower and according to the condenser water the VFD's speed will vary.



3. Energy Management Strategy for Air Handling Units:

- a) **Duty Cycling:-** The duty cycling software program reduces energy consumption (Electrical and Mechanical) in the HVAC systems by switching fans ON/OFF periodically on a fixed time scheduler, however if space temperature exceeds the limits, duty cycling program is disabled.
- b) **Optimum Start/Stop:-** Air handling units are switched ON depending upon the outside air / inside air temperature and the capacity of the AHU to recover the space temperature to the middle of the comfort band before occupancy.

Chillers and Fan coil units optimization is also done during the low occupancy period OR lean Hours.

Optimum stop function is the opposite of optimum start function. It calculates the earliest possible point in time when the HVAC system can be stopped, ensuring that the minimum comfort condition has just been reached at the end of the occupancy period.

4. Energy Conservative Project Implemented:-

- a) VFD's for AHU's/ Fresh air fans/ Exhaust units, Cooling tower C.T. Fans, & Chilled water secondary pumps.

- b) Replacement of CFL tubes of External lights.
- c) Replacement of low capacity motors in place of high capacity motors.
- d) Solar road blinker at the staff entrance.
- e) Replacement of Tube lights with the energy saving tubes (Picostar-Osram) in the BOH/Basements/ Service Floor/Plant room etc.
- f) New steam Boiler (Thermax make) - Low fuel consumption.
- g) Increasing of the capacity of power capacitor bank (400 KVA- 725 KVA)
- h) Automatic taps in the Public toilets/staff lockers/staff cafeteria.
- i) Hot water spray for the LPG cylinders bank to enhance the LPG conservation.
- j) Use of anti scaling chemical in the Boiler feed water.
- k) Recycling of steam condensate water for the Boiler feed.
- l) Thermostatic steam control system for the hot water system.



5. Energy conservation Observations For Next Year Plan:

- a) **Auto Voltage Regulator** for constant voltage supply.
- b) More **VFD's** for AHU's/Fresh Air Fans/Exhaust Units for energy conservation.
- c) Replacement of Tube lights with the **energy saving tubes (Picostar-Osram)**.
- d) **CFL tubes** for the guest floor corridors for energy conservation.
- e) **Energy Audit** by the External agency.
- f) **Modification of Effluent Treatment Plant** with the energy saving pumps & motors.
- g) **Modification of Steam distribution system** as study carried out.
- h) **Area-wise Energy meters** for close monitoring.

6. Details on Energy Efficiency Improvement Projects/Measures:

Description of upgrades & approximate investment at Marriott WelcomHotel.

S.N.	Solution	Make	Description	Qty. (Nos.)	Value (In Lakh)
1.	Auto Voltage Regulator	ABB / Equivalent	To regulate / Increase the voltage	01 No	20.00
2.	VFD's	Schneider / Danfoss	Variable frequency Drives with panel suitable to drive	10 Nos	20.00
3.	Tube lights	Osram-Picostar	Energy efficient fluorescent tubes	600 Nos	5.00
4.	CFLs	Osram/GE	Energy efficient compact fluorescent lamps	480 Nos	4.00
5.	Energy Audit	UVK Rao (External Auditor)	For finding energy saving scope in the unit.	01 No	6.00
6.	Modification of ETP Plant	Prosyschem / Equivalent	Energy efficient equips. And process improvement.	01 No	3.50
7.	Energy Meters	Enercon / equivalent	For monitoring Area wise power consumption	10 Nos	80

Environment Health and Safety

ITC's mission is to sustain and enhance the wealth generating capacity of its portfolio of business in a progressively globalising environment. As one of the India's premier corporations employing a vast quantum of societal resources, ITC seeks to fulfill a larger role by enlarging its contribution to the society of which it is a part. The trusteeship role related to social and environmental resources, aligned to the pursuit of economic objectives, is the cornerstone of ITC's environment, Health and Safety philosophy. ITC's EHS philosophy recognizes the twin needs of conservation and creation of productive resources.

- Commitment of top management helps create greater awareness and under standing of environmental issues leading to improved corporate culture and industrial relations.
- Organization committed for identifying and meeting mandatory legal and other requirements and continued improvement.
- ISO-14001 provides a unique tool and framework to help address legal, commercial and other issues related to environment.
- Minimized occurrence of incidents / accidents and consequent liabilities.
- Emergency preparedness of the organization to face any eventuality.
- Improved overall efficiency by substantial reduction in operation costs, reduction and recycling of waste, conservation of material and natural resources.
- The organization is meeting its stated environmental policy, goals and objectives with out compromising on its standards.

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