

OFFICE BUILDINGS

UDYOG BHAWAN
Central Public Works Department
New Delhi

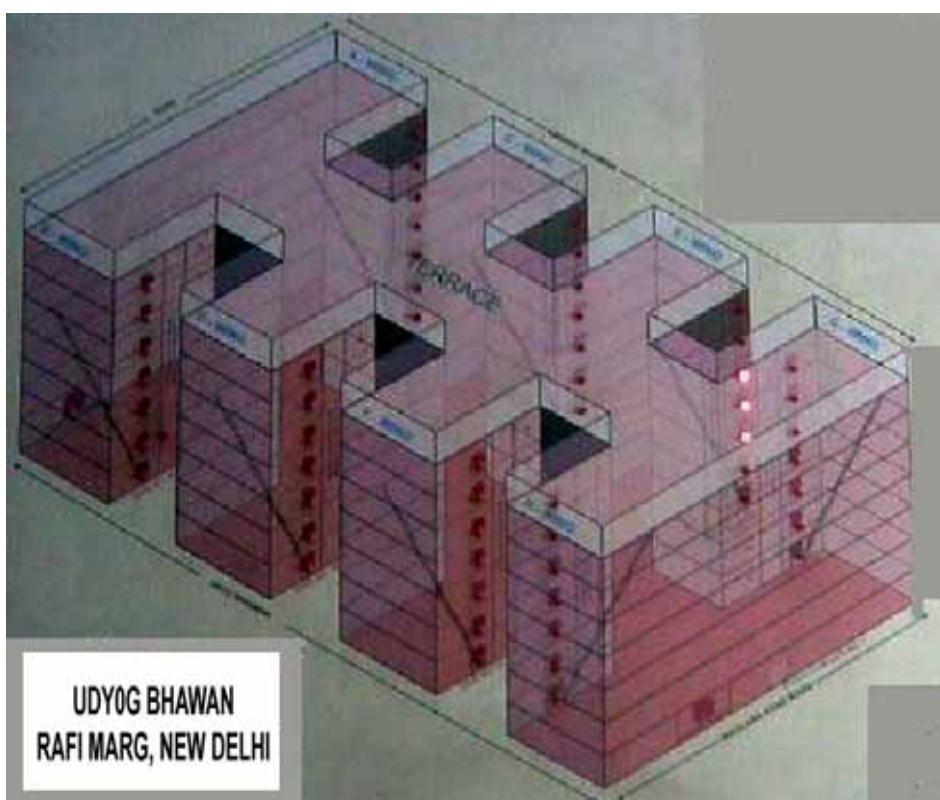
Building Profile

Udyog Bhawan is a central government building maintained by Central Public Works Department. It is located in Central Vista on the southern side of Rajpath at Rafi Marg in between Vayu Bhawan and Nirman Bhawan. Various central governments ministries such as Ministries of Commerce & Industry, Heavy Industry, Micro Small and Medium industries, Textiles and steel, etc. are located in this building. There are other attached offices like Directorate General of Foreign Trade, Department of Industrial Promotion and Policy, Banks, Post Office also housed in this building.

The building is multi storeyed constructed during post independence era. This building comprised of basement, ground and five floors. The building has thick walls. The building is divided into eight wings with cross wings internally joined.

The complex is fed by 11KV, 3 phase electric supply from NDMC Sub station at Nirman Bhawan through 3X 1600 KVA dry type indoor transformers along with microprocessor based vacuum type HT breakers and LT switch gears. Fully automatic microprocessor based power factor corrector panels have been installed. Two nos 500 KVA DG Sets have been installed as stand by power supply to cater the essential load of light and fans of offices in case of power failure.

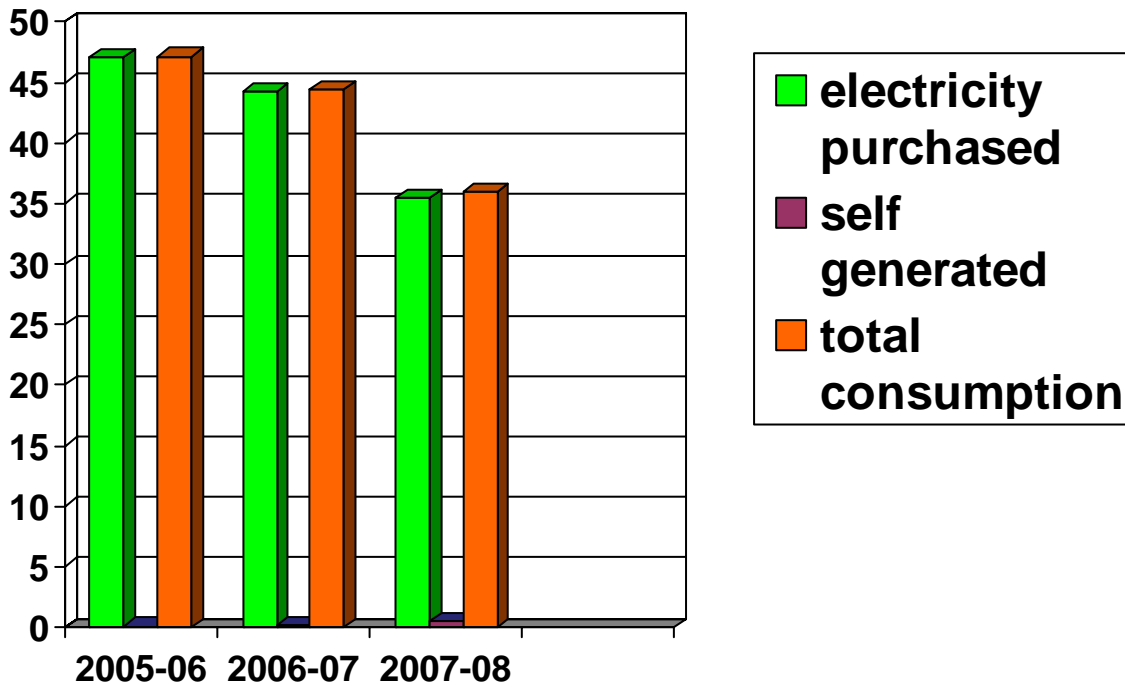
This building has been provided with automatic fire alarm, public address and fire fighting system. 10X8 passengers lifts have been provided in the building for the officials and visitors. All these systems are being maintained by Central Public Works Department.



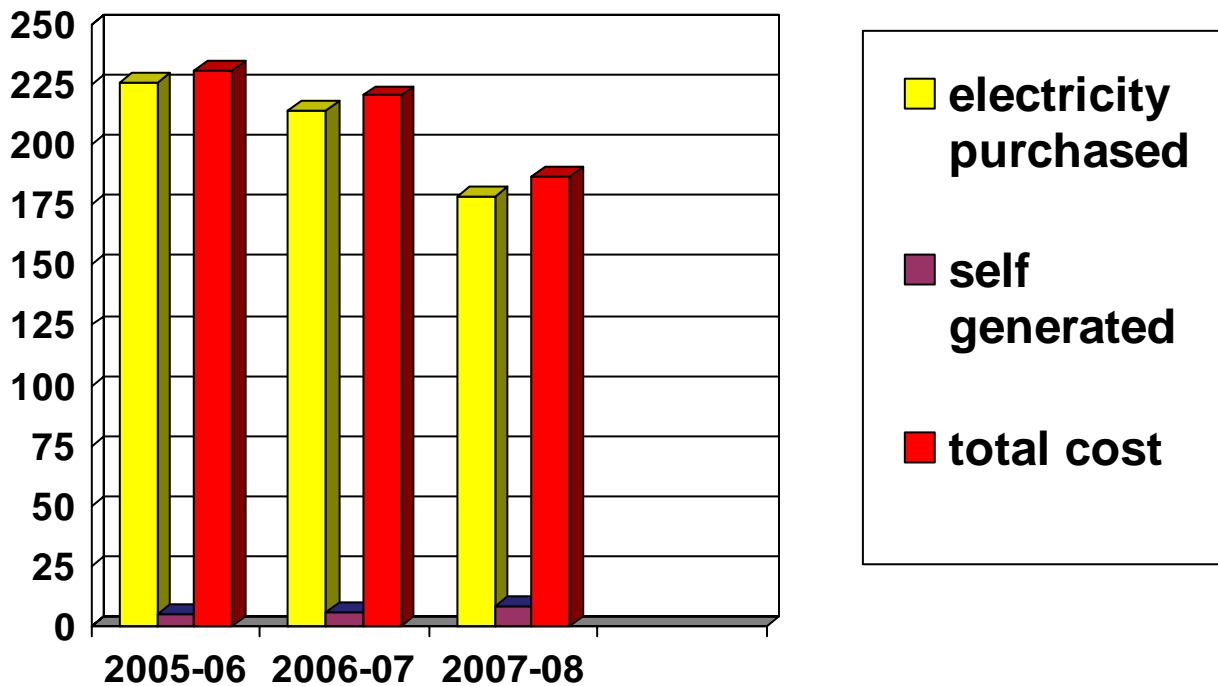
Energy Conservation Achievements

The measures which were adopted by the department during 2007-08 with their corresponding savings are enumerated below

ELECTRICAL ENERGY CONSUMPTION IN LAKHS kWh



ELECTRICITY COST IN Rs. LAKHS



| S.No. | Action Suggested | Annual Energy Saving (kWh) | Annual Savings (Rs/annum) | Approx. Investment (Rs.) | Payback period |
|-------|--|----------------------------|---------------------------|--------------------------|----------------|
| 01 | Installation of automatic power factor controller to improve power factor from 0.85 to optimal value of 0.99 | 2,14,940 | 8.73 lakhs | Rs. 9 lakhs | 1.03 years |
| 02 | Replacement of existing old oil cooled Transformer with new cast resin dry type Transformer to improve the efficiency and reliability. | 29760 | 1.22 Lakhs | 25 Lakhs | Not applicable |
| 03 | Replacement of existing 4x10 HP pumping sets by 4x7.5 HP energy efficient pumps. | 32675 | Rs.1,33,966 | Rs.2,00,000 | 1.49 years |
| 04 | Replacement of conventional FTLs having copper ballast with energy efficient T5 series lamps with electronic ballast. | 13200 | Rs.54120 | 2.99 | 5.51 years |
| 05 | Replacement of existing electric boilers to heat water in canteen by solar heaters. | 15360 | 62976 | Rs.60,000 | 0.95 years. |

VIEW OF MODERNISED AND AUGMENTED 11KV ELECTRIC SUB STATION





The details of Energy saving measures are given below

1. Automatic Power Control Panels

3X 300 KVAR capacity power corrector panels have been installed to improve the power factor from 0.85 to 0.99 the total investment on these panels was Rs 9.0 lakhs. The energy consumption before was 37.61 lakhs KWh which reduced to 35.49 lakhs resulting in the first year energy savings of 212940 KWh. Total saving work out to Rs 8.73 Lakhs/year.

NEW PROVISION



2. Replacement of oil type transformers

Old 3X 750 KVA and 1X 1000 KVA capacity oil type transformers have been replaced with 3X 1600 KVA capacity dry type transformers. This has also enhanced the total capacity of the sub station keeping the view of the increasing demand of electricity due to modernization of the offices. Total saving work out to Rs 1.22 Lakhs per year.

BEFORE

AFTER



3. Replacement of pumps

The existing four nos 10 HP drinking water pump sets were replaced by energy saving pumps of 7.5 HP. This gives a saving of 32675 kWh per year or Rs 1.33 lakhs per year.



4. Replacements of Conventional FTLs

The conventional 40 watt fl. Tube fittings have been replaced with energy saving 28 watts T-5 fittings under modernization programme in phased manner. This saving of approx. 5256 kWh per year work out to Rs 21,550/-.



5. Replacement of electric boilers with solar water heaters

The conventional electric water heaters used in canteen have been replaced by solar water heaters this gives a saving of 15360 kWh per year of worth Rs 62976/- per year.



Safety Provisions in Building

AFA & PA SYSTEM



FIRE EXTINGUISHERS



FIRE HYDRANT



Second Prize

Office Buildings

BHARAT SANCHAR NIGAM LIMITED Regional Telecom Training Centre Thiruvananthapuram (Kerala)

Building Profile

Regional Telecom Training Centre, Thiruvananthapuram is the second oldest training Centre of the erstwhile P&T Department and the present BSNL in the country. It was founded on 6th April 1962.

Being one of the premier institutes in Telecom Training and an ISO 2000-9001 Certified institution, RTTC Thiruvananthapuram, has been attracting officers of BSNL from all over the country. The institute is committed to impart high quality training in modern Telecommunication technology. The trainings offered include induction training to JTOs, JAOs and In-service/Refresher Training to serving officers. The institution also organizes Seminars and workshops so as to improve quality of service.



Total plinth area constitutes only 24.75% of the campus, the rest being gardens, luxuriant flora and water bodies. Green cover constituting 45% of the campus acts as natural carbon sink, thereby ensuring pure air quality. Two water bodies, one small and the other large, occupying 8% of the campus area help in retaining the water table and enhancing the overall environment

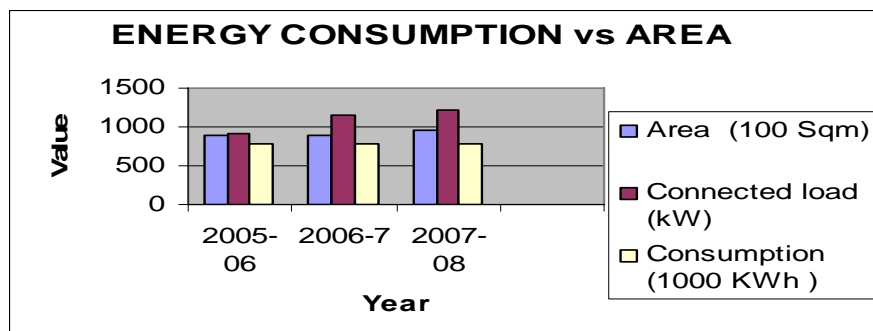
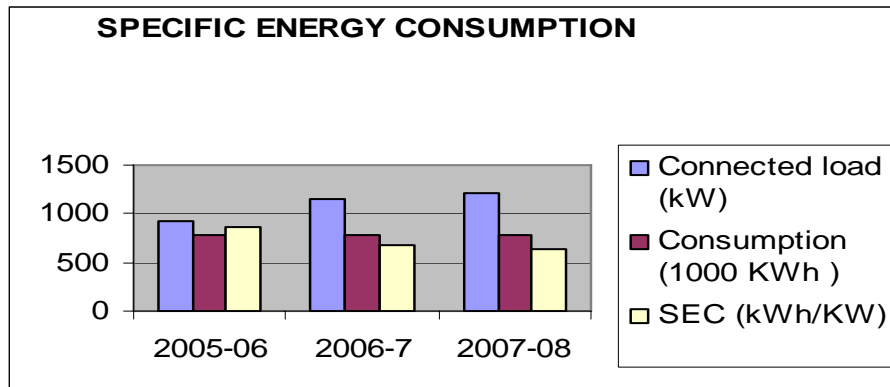
Building Block

The training centre functions in 3 main blocks namely Administrative Block (3 storeys) Institutional Block (4 storeys) and Laboratory Block (5 Storeys), all aligned one behind the other with connecting pathways. The Institutional Block has 14 well-equipped classrooms with the latest audio visual aids. Various labs of latest Telecom Technology are spread over the five floors of Lab Block. A spacious and modern

auditorium is available in the campus.4 hostels capable of catering to more than 300 trainees at a time and 68 quarters are also there. The Circle Telecom Training Centre(CTTC), was moved in to its own building inside the RTTC Campus on 4th July, 2005.The total floor area of various blocks adds to 96417Sq. Mtrs. A state of the art telephone exchange by name Kaimanam T.E. is also co-located in the campus.

Energy Parameters over the year

| Year | Consumption (KWH) | Connected load (KW) | SEC (KWH/KW) | AREA (100SQM) |
|---------|-------------------|---------------------|--------------|---------------|
| 2005-06 | 788 | 919 | 857 | 897 |
| 2006-07 | 788 | 1157 | 681 | 900 |
| 2007-08 | 777 | 1214 | 640 | 964 |



Energy Conservation methods Adopted in the Building

1. **Replacement of Power Plant:** The main power plant of the switching equipments was found to be inefficient during energy audit and was replaced by a modern SMPS type power plant.
Annual savings: Rs. 39,000
2. **Replacement of Inefficient and life expired AC unit:** AC units that were found inefficient and unproductive during the energy audit were replaced by modern and energy efficient units.
Annual Savings: Rs. 2.68 lakhs
3. **Solar water heater in CTTC hostel:** The newly built CTTC hostel has been provided with One no 500 ltr capacity and two No 300 ltr capacity solar water heater.
Annual Savings: Rs. 1.09 lakhs

4. **Repalcement of Fl. Lamp fittings with CFL:** In Sequel to the energy audit conducted, more number of Florescent tube fittings at offices and hostels were replaced with CFL fittings.
Annual Savings : Rs. 50,000

Environment Protection

Much as its tradition of imparting knowledge and skill of the latest in the Telecom field was gaining strength on one side, this institute has been zealously guarding the heritage, values and traditions as expected in the God's own country. Environmental protection has been the virtue closest to the institution's heart, and every step we made towards growth and expansion had a built in green tag, long before the green concept of the present day has set in.

Situated in a sprawling 28.45 Acres land of thickly wooded lush green settings on NH-47, 4 KM from Thiruvananthapuram on the way to Kanyakumari, the institute and its campus are not only a learning ground for Telecom Technology but also of environmental protection and energy conservation. Concurrent with the commencement of roads and buildings in 1980, a well laid out run off rainwater grid was formed in the campus, in line with the topography of the land, connecting it to two mean level natural ponds already available. This had ensured recharge of the earth with all the rain water the nature had bestowed on the campus and the sustenance of existing water bodies. Thus the campus was able to maintain and improve the water table and the greenery all around, over the quarter century of its existence, despite the large plinth area of 28000 Sq. metres built in the shape of various blocks, causing shrinkage in open land.

| Area of the Campus | 28.45 Acres * 4048 Sq Mtrs | 1,15,108 | 100% |
|--------------------|----------------------------|----------|------|
| Green area | Sq Mtrs | 51,799 | 45% |
| Water body area | Sq Mtrs | 9210 | 8% |
| Garden Area | Sq Mtrs | 6906 | 6% |

The design of the building blocks and the material selection for construction, coupled with the natural settings all around had contributed greatly in reducing the energy demand. Not content with that, the institution had moved forward and established many innovative energy conservation measures so as to make minimum demand on energy and least dependence on outside agencies. Construction materials used for majority of buildings, like natural stones for walls, and tiles for roof supplemented by design aimed at enhanced ventilation help to reduce ingress of heat .All buildings are more airy with ample scope of natural light and free air flow

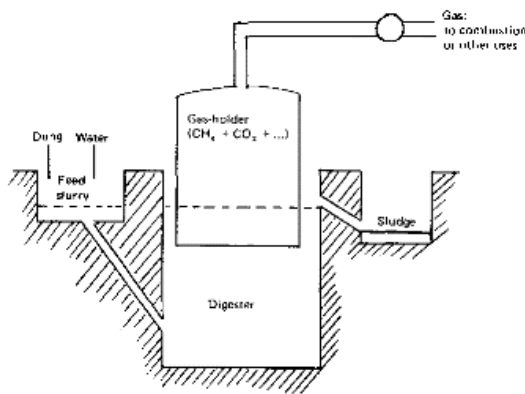
Rain Water Harvesting

Extensive rain water harvesting system in the campus ensures that the entire run off water are utilised most effectively for cleaning and miscellaneous purposes, allowing the rest to collect and recharge the whole campus. A trough like shape of the campus with two isolated mini lakes absorb all the excess rain water, always.



ECO Friendly Energy

Two Bio-gas plants, one at RTTC hostel and the other at CTTC hostel, render the waste disposal in a very eco friendly way, avoiding visits of municipal squad to the campus. Two derivatives of the anaerobic digestion process, non polluting bio-gas and enriched organic mineral, help us in supplementing the cooking gas and acting as feed to the plants. While healthier and cleaner surroundings are always maintained across the campus, realisation of cooking gas and manure in the process are bonus. Thus, service of municipal authorities is totally dispensed with (Three lorry trips per week), which contribute to a saving of Rs 4,40000/- per year for RTTC and an indirect savings of 1300 ltrs annually for running lorries to the municipality dumping ground.



Energy Conservation Culture

While imparting training, every individual trainee is made aware of the need for energy conservation and environmental protection. With the institute's fairly large rain water harvesting system, solar water heating system and Biogas plants in active condition, the message gets deeply registered in the trainees during induction and on job. Thus, the culture of the institute is made to go far and wide for a sustainable existence, when the shadows of climate change and environmental degradation are looming large over the globe.

BHARAT SANCHAR NIGAM LIMITED – CTO COMPOUND
Madurai (Tamil Nadu)

Building Profile

CTO compound, Tallakulam Madurai is one of the few buildings identified for this unique study and it is one of the key unit housing various equipments & Administrative offices. This building is situated in the heart of the city. The Telecom complex comprises 3 major Blocks namely CTO, CTMX, Lev-4 bldg which includes various Exchanges, Administrative offices and conference hall.

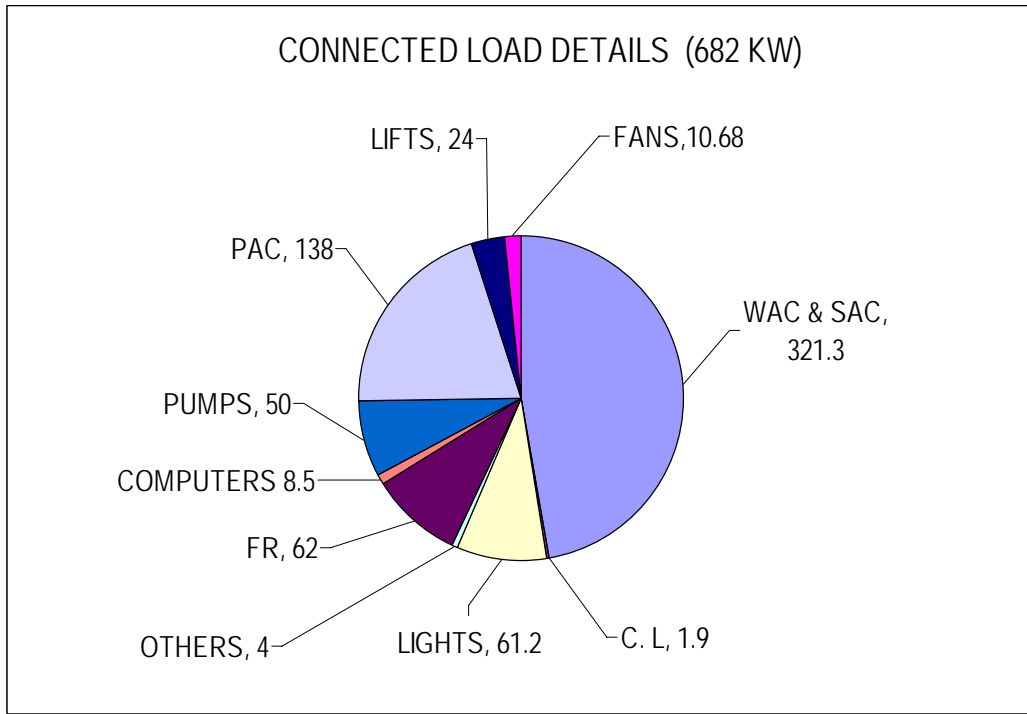
Also there are 21 Staff Qtrs in this compound. The floor wise details are given below. The entire electrical operation and maintenance of all utilities in the complex is taken care by Madurai SSA.

The campus is fed by 11 KV 3 phase supply form the State Electricity board through (2+1) 630 KVA Indoor transformer along with automatic power factor correction panel. 1 No. 500KVA, 3 nos.250 KVA, (Of this 1 No Derated to 140 KVA) and 1 no.160 KVA . EA sets are used as stand-by source.

Energy Consumption

| Year | Units (EB) | EB Bill (Rs.) | Units (EA) | Diesel Bill (Rs.) | Total Cost (Rs.) | Average P.F. |
|---------|------------|---------------|------------|-------------------|------------------|--------------|
| 2005-06 | 2156064 | 13142313 | 41000 | 221000 | 13363313 | .99 |
| 2006-07 | 1999780 | 12035713 | 43000 | 238000 | 12273713 | .99 |
| 2007-08 | 2080692 | 12275393 | 48000 | 259200 | 12534593 | .99 |

The below given chart shows the connected load pattern of main utilities.

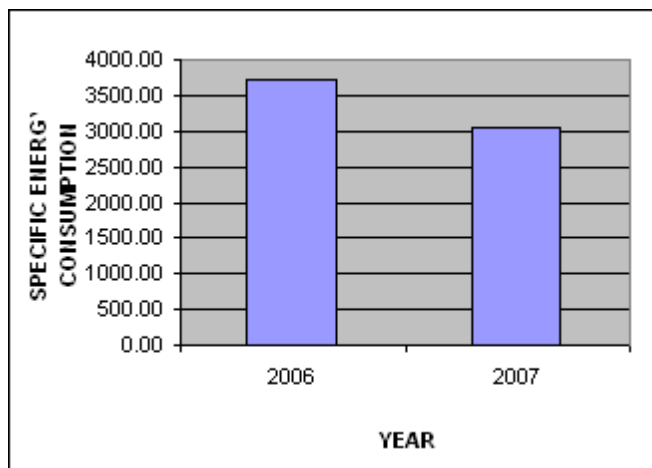
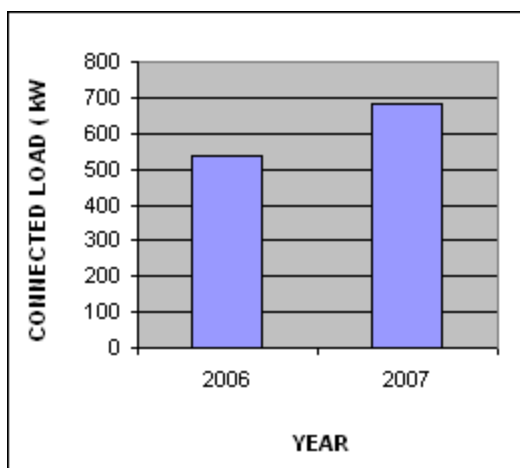


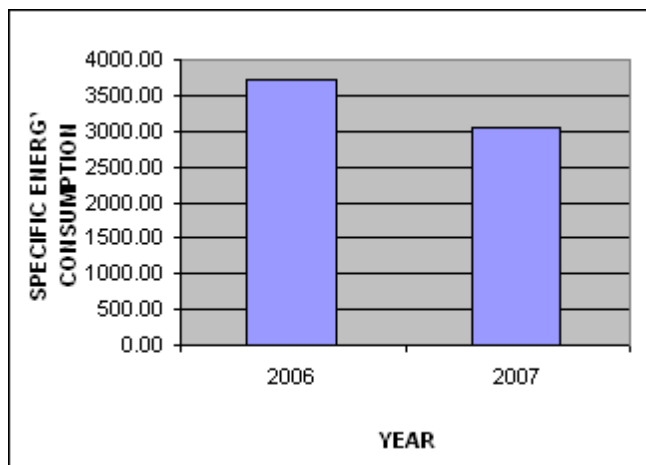
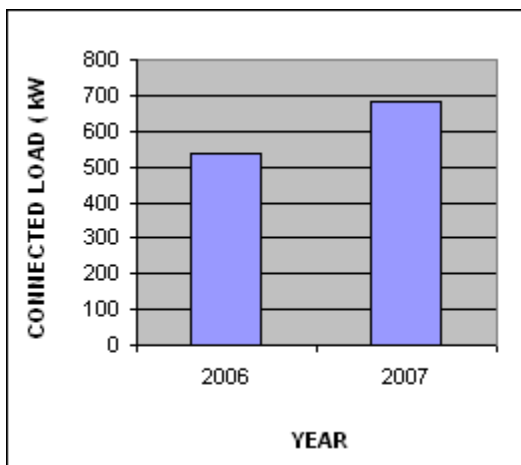
Specific Energy Consumption

The details of connected load and energy consumption during the year 2006 and 2007 are as follows;

| S.No. | Year | Energy consumption/ Year (kwh) | Connected load (kw) | Specific Energy consumption (kwh/kw) |
|-------|------|--------------------------------|---------------------|--------------------------------------|
| 1 | 2006 | 1999780 | 538 | 3717.06 |
| 2 | 2007 | 2080692 | 682 | 3050.87 |

Due to various energy consumption measures adopted, the specific energy consumption in the year 2007 is 17.92% less than that of the year 2006.





Energy Conservation Achievements

1. REPLACEMENT OF PACKAGE AC UNITS IN IInd FLOOR OF CTMX BUILDING

7TR Package AC units 6 nos. (4+2) were available in CTMX bldg. By optimizing the design and by using high sensible energy efficient AC units 4nos. (3+1) PAC units were provided in 2006-07.

Annual Savings: Rs. 6.70 lakhs

2. REPLACEMENT OF THYRISTER CONTROLLED POWER PLANT BY SMPS POWER PLANT

Existing conventional Thyristor controlled power plant (which is an efficiency of less than 80%) is replaced by High efficient(95%) SMPS type power plant in 2006-07

Annual Savings : Rs 2.37 lakhs

3. POWER FACTOR IMPROVEMENT

All the inefficient power factor improvement capacitors were replaced and additional capacitors were provided to improve the Power factor in 2006-07

Annual Savings : Rs 30,799

4. REPLACEMENT OF PACKAGE AC UNITS IN CTO BUILDING

In the single window customer service centre the existing life expired (4+2) x 7 TR package AC units were replaced by (3+1) x 7 TR package AC units in 2007-2008

Annual Savings : Rs. 2.75 lakhs

5. REPLACEMENT OF FAULTY PUMP

The faulty 5 HP pump has been replaced with 3 HP mono black pump in 2007-2008

Annual Savings : Rs. Rs. 10,731

6. PROVIDING ENERGY EFFICIENT FITTINGS

In the first floor of CTMX bldg existing 40 Nos 2x20 W fl fitting are replaced by 2x28W Energy efficient fittings while doing the modification work in 2007-2008

Annual Savings : Rs. 32,120

7. PROVIDING CFL FITTINGS

In the single window customer service centre in the life expired 49 Nos twin type light fitting were replaced by 2x36 W energy efficient CFL fittings while doing the modification works in 2007-2008

Annual Savings : Rs. 30,047

8. PROVIDING ENERGY EFFICIENT TUBES

In the compound 30 Nos of 2x 40 W fittings are replaced by 2x28 W energy efficient fitting with "T5" tubes in 2007-2008

Annual Savings : Rs. 24,090

9. REPLACEMENT OF PACKAGE AC UNITS IN 1st FLOOR OF CTMX BUILDING

In the 1st floor of CTMX bldg the life expired 20 Nos 1.5 Split / Window AC units & 2+1) x 7 TR package unit were replaced by (5 +1) x 7 TR package AC units in 2007-2008

Annual Savings: Rs. 3.54 lakhs

Rain Water Harvesting

Concerned with the depletion of water sources and to abide the ordinance of State government Rain water harvesting has carried out in this building.

Organization Set up

Tamilnadu circle is responsible for maintaining and providing Telecom services in the entire state of Tamilnadu headed by Chief General Manager (HAG level officer) , Tamil Nadu circle , Chennai with 16 Secondary Switching Area located at district level are headed by General Managers (SAG level officer). The energy conservation programme has been given a major thrust in Tamil Nadu as can seen from the following setup available for implementing monitoring and review of various energy conservation measures.

At State level – Energy core group consisting of following members

| | | |
|--|---|----------|
| Chief General Manager (Telecom) Tamilnadu Circle | - | Chairman |
| Principle Chief Engineer (E) Tamilnadu Zone | - | Member |
| Principle General Manager (O) Tamilnadu Circle | - | Member |
| General Manager (Finance) Tamilnadu Circle | - | Member |

At SSA/ District Level - Energy core group consisting of following members

| | | |
|-------------------------|---|----------|
| PGM/GM in charge of SSA | - | Chairman |
| SE (E)/EE (E) | - | Member |
| IFA of SSA | - | Member |

In order to create adequate awareness among the executives slogans are displayed at various places in the buildings and energy conservation seminars/presentations are conducted at district level.

Energy Policy

BSNL Electrical Wing, Tamil Nadu is committed to conserve energy in all its operations. We shall transform energy conservation into a strategic business goal and make it as a way of life.

Energy Objectives

Energy auditing of:

1. All buildings once in a year having connected load of 500 KW or more.
2. One building per quarter per sub division with sub station or AC plant of 30 Ton and above.
3. 6 buildings per quarter per sub division not covered in the above category.
4. Core Energy management group meeting for each SSA in a year
5. Maintaining the Power factor above 0.95

The Electrical wing placed under CGM TN circle, headed by Principal Chief Engineer (E) responsible for implementing the energy conservation measures in Tamil Nadu. The Electrical Wing is an ISO:9001-2000 Certified unit and has 2 Superintending Engineers located at Chennai and Madurai and 6 Executive Engineers at Chennai, Salem, Trichy, Coimbatore, Madurai and Tirunelveli with field Sub-Divisional Engineers located with each SSA's. Following Certified Energy Auditors are available in Tamilnadu Telecom Circle.

1. V.P. Gupta, Principal Chief Engineer (E)
2. V.Jeyapal, Chief Engineer (E)
3. S.P. Singh Nimrana , Superintending Engineer (E)
4. S.S. Jain, Superintending Engineer (E)
5. S. Sathyanarayanan, Sub Divisional Engineer (E)

Following Certified Energy Manager are available in Tamil Nadu Telecom Circle.

1. R. Venkatesh Junior Telecom Officer (E)

All the buildings having connected load of more than 500 KW in Tamil Nadu have been energy audited in the year 2006-07 and out of 2010 buildings having connected load less than 500 KW, 1108 buildings have been energy audited by electrical wing engineers.