

## **Bharat Sanchar Nigam Ernakulam Kerala**

Digital Tax building is an important Telecommunication Building owned by BSNL in Ernakulam in Kerala state. It houses Telecom equipments for 60,000 TAX lines, 80,000 optical fiber circuits, a broad band exchange and a 4000 line local exchange. 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 than 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 5 Nos 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 plants 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. [Work executed during July-September 2005 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. (The work was completed in July 2005).

### **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. [Work completed In first week of November]

## **ANNEXURE-I**

### 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	=	<b>12,314 Litres</b>
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)	=	<b>11885 Litres</b>
Actual diesel consumed	=	<b>8101 Litres</b>
<b>Savings in diesel = 11,885-8801</b>	=	<b>3784 Litres (Within 11 Months)</b>

**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.

**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 : 630.32 kW**

**ANNEXURE-II****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)

ANNEXURE-III

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	=	$\frac{\text{Rs126764} \times 12}{\text{Rs 65000} \times 11}$
		=	<b><u>212.75 %</u></b>
2	Cost incurred for reduction of electrical power consumption	=	2535000
	Savings made within 6 months (From Mar-05 To Sep-05)	=	336364
	% savings on energy conservation cost on annualized basis	=	$\frac{\text{Rs 336364} \times 12 \text{ Months} \times 100}{\text{Rs 2535000} \times 6 \text{ Months}}$
		=	<b>26.54%</b>
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]	=	$\frac{111534 \times 12 \text{ Months} \times 100}{831822 \times 6 \text{ Months}}$
		=	<b>26.82 %</b>
4	Specific energy consumption (SEC) reduction (Annual kWh consumption / kW of connected load) during the period Oct -02 To Sept-05		
	Specific Energy Consumption for Oct - 02 To Sept -03	=	$\frac{17.80 \text{ Lakh kWh}}{616.4 \text{ kW}}$
		=	<b>2887.74 kWh / kW</b>
	Specific Energy Consumption for Oct - 04 To Sept -05	=	$\frac{16.43 \text{ Lakh kWh}}{636.9 \text{ kW}}$
		=	<b>2579.68 kWh /kW</b>
	Reduction in specific energy consumption	=	2887.74 - 2579.68
		=	<b>308.06 kWh / kW</b>