



## Energy Conservation Measure implemented in 2007-2008

### 1. Replacement of Old Reciprocating Chiller by Screw Type

The third old reciprocating chiller of 120 TR was replaced by a new 200 TR Voltas chiller from Dunham Bush. The cost involved was Rs. 37 lakhs. It had a supplementary energy saving feature in the form of heat recovery from the de-super heater of compressor where the hot discharge gas is cooled by water. This heated water is then transferred to our hot water generator circuit.

The energy saving has been approximately 2,25,000 kWh + about 3 kL of HSD saving in hot water generators, yielding total savings of Rs. 18.62 lakhs per year.

| <b>Picture/ sketch/ drawing before modification</b><br>(if available)   | <b>Picture/ sketch/ drawing after modification</b>   |
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|  A photograph showing the old reciprocating chiller unit, which is a large, complex piece of machinery with various pipes and components. A red vertical pipe is prominent in the center. The unit is located in a room with other equipment visible in the background. |  A photograph showing the new Voltas screw-type chiller unit. The unit is a large, white, rectangular cabinet with the 'VOLTAS' logo in blue letters on the side. It is connected to a network of pipes and valves. To the right of the main unit, there are two large, white, cylindrical tanks. The unit is located in a room with other equipment visible in the background. |

### 2. Occupancy Sensors

It was found that the 6 nos. consultants' rooms were used sporadically depending on the duties of the doctors and senior staff who need to leave their rooms for meetings, rounds etc. It was found that even if they leave their rooms for a total of 2 hours a day, the investment on occupancy sensors would pay back within 1 year. The savings are estimated at 12,000 kWh per year, valued at Rs. 91,000. The investment for the sensors was only Rs. 17,000.

#### Picture/ sketch/ drawing after fitting of occupancy sensor



### **3. Controlling AC Usage**

In some installations, it was observed that AHUs were on to provide air conditioning in one or two rooms on 24x7 basis whereas most of the other rooms were in use only during the general shift i.e. 8x6 basis. By separating the ducting and installing additional FCUs, it is possible to isolate the above two types of users.

In other places, the loads can be kept off in all the rooms without deterioration in service after the general shift.

The cost savings were 2.6 lakh kWh valued at Rs. 20.28 lakhs per year. The cost of modifications is about Rs. 2 lakhs.

### **4. Providing False Ceilings**

Some rooms had very high ceilings. By providing false ceilings in these rooms, about 7,000 kWh per year was estimated to be saved, valued at Rs. 56,000 per year. The cost of the false ceilings was only Rs. 30,000.

### **5. Raising Thermostat Settings**

It was observed that air-conditioned room's thermostats were mostly set between 18 and 20 degrees centigrade. It was understood that the temperature of most rooms for comfort air-conditioning could be raised to around 22 to 24 degrees centigrade. For e.g. in non-critical areas such as OPDs, wards etc.

Further, some areas like kidney centre, x-ray department, cath lab and path lab can have reduced cooling during non-peak hours in the late evenings and at night. It was explained by the consultant that for every one degree centigrade rise in the thermostat temperature, the energy required to air-condition the space reduced by 5 to 7%. In this way, by raising thermostat settings by about 2 degree centigrade, energy saving of 85,000 kWh per year would have been achieved, valued at Rs. 6.63 lakhs per year. No investment was required for this as the settings were changed in our BMS control panel.

### **6. Improving AHUs Performance**

A number of the AHUs and treated fresh air units (TFAs) were operating at much below rated capacity as indicated in the energy audit report. The improvements carried out included:

Regular cleaning of filters

Sealing all possible sources of return air

Ensuring proper belt tensions

Insulating all cold surfaces

Allowing adequate quantity of fresh air through the air intake dampers

Cleaning the coil surfaces, inside and outside regularly

Replacing corroded, leaky trays for condensation removal

Now, most of the AHUs are operating near the rated capacity. The above has resulted in saving of over 2 lakh kWh per year valued at Rs. 15.6 lakhs per year.

## **Some other energy conservation measures using trendsetter technology/renewable energy technology\*\***

### **Insulation of autoclaves**

The autoclaves/sterilizers are invariably under-insulated in the top section and left bare at the bottom boiler/heater section. These consume high power ranging between 9 kW to 18 kW. If they are located in air-conditioned spaces, then the heat load of surface heat losses gets added to the chiller load. Owing to intricacies of insulation, they are generally left without insulation.

Typical photographs of these are shown below:



Through Econ Engineers, we were able to get the autoclaves insulated, which are estimated to save 38,000 kWh per year, valued at Rs. 1.94 lakhs per year. The cost of insulation was only Rs. 50,000.

Other benefits which accrued from providing insulation on autoclaves included:

1. Faster heating up of autoclave, resulting in shorter time cycles
2. Cooler surface temperature, which does not scald the skin during accidental contact at the time of loading and unloading the autoclave

## Solar water heating systems

We have solar water heating systems of 9,000 litres per day capacity. One of them of 3,000 LPD is shown below:



Control panel for above system



CFL street light