

Orchid Garden Hotel

Energy Conservation Measures
2004-2007





General Overview

- ❑ 10 Storey Hotel (including Basement)
- ❑ Operating 24 hours a day, 365 days a year
- ❑ Operating since August 1999
- ❑ Energy management System: Building Automation System (BAS)
- ❑ 3 units of (205kW) Chillers
- ❑ 7 units of Air Handling units



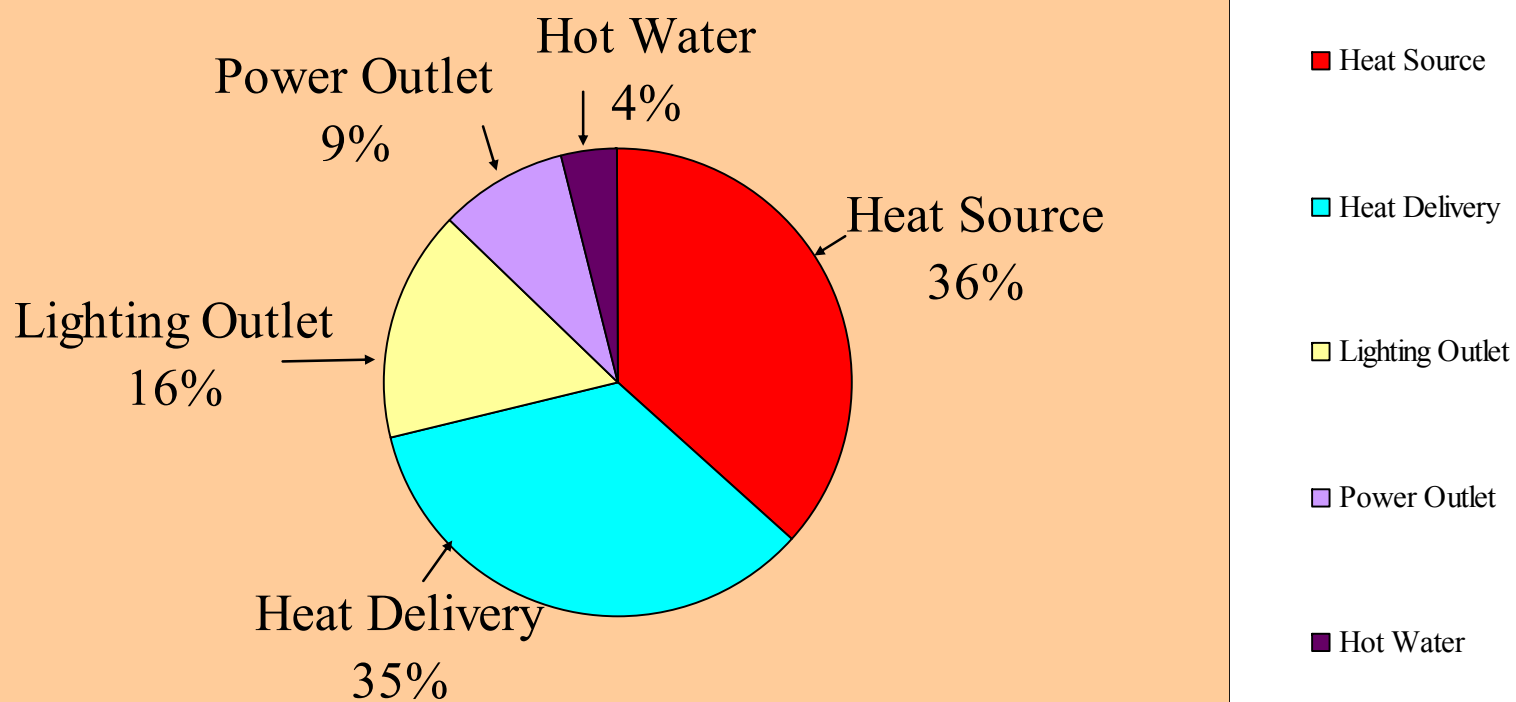
General Overview

- ❑ 207 units of Fan coil units
- ❑ 3 units of (14kW) elevators
- ❑ 2 units of Transformers (1,000kVA)
- ❑ 1 Backup Generator (800kVA)
- ❑ 12 units of Hot Water heaters (46kW)
- ❑ 2 units of Storage pump (4kW)
- ❑ 3 units of Booster pump (3kW)
- ❑ Water Tank & Receiving Water Tank



Summary of Consumption

Energy Chart at Orchid Garden Hotel





EE&C Measures

- Repair the Building Automation System (BAS)
 - BAS is currently not operating
 - Immediate repair will result in significant potential savings

- Optimization of Air Handling Unit (AHU) operating time
 - AHU is running 24 hours even if function rooms are not used. Intermittent use is recommended.
 - Stop the in-take of fresh air volume completely





EE&C Measures

- Intermittent use of Fan Coil Units (FCU)
 - FCU in all guestrooms is operating 24 hours

- In-door Setting of temperature
 - Decrease electric power of chiller by raising in-door temperature setting by 2°C

- Thermal Insulation of hot water pipes
 - Hot water pipe is currently not insulated
 - Recommend to insulate the supply pipe



EE&C Measures

- ❑ Optimization of the Receiving Transformer
 - To use one (1) transformer instead of two (2)

- ❑ Reduction of swimming pool filter pump operation time
 - Currently operating 24 hours
 - Cut operating time to 8 hours a day





Changes & Improvements

- Shutting down of Basement exhaust fan at midnight
- Switch off AHU's on level 8 at all times except for when there are functions
- Switch off AHU in Vanda Chinese Restaurant at midnight
- Swimming pool filter pump operation only 6 hours daily
- Increase Elevator internal temperature from 20°C to 24°C
- Shut down heaters at the Lobby, Back Office and Restaurants



Approximate cost of changes

Details	Amount
Modification of AHU control unit on level 8	B\$ 1,980.00
Complete set of 150 pieces PLC down-light holder with 13 Watt bulb	B\$ 2,250.00
Change of operation times for AHU's, FCU's, exhaust fans and water filter pump	No cost
TOTAL COST	B\$ 4,230.00



Summary

Average consumption

2003	374878 Kwh		
2004	339250 Kwh	9.5%	down
2005-2006	342713 Kwh	8.5%	down
Jan-Jul 2007	352519 Kwh	6.0%	down



Summary

Year	Month Average (B\$)	Variance
2000-2003	23,765.65	
2004	18,520.27	22.1%
2005	21,212.62	10.7%
2006	21,190.67	10.8%

- Figures show that our average monthly bills have reduced since undertaking the EE&C measures.
- Table shows the average electricity bills for the property.