

1993~2003 - Energy Project in Malaysia



University Teknologi Malaysia



MAIN RESULTS:

- Saving of 318.00 kW or 39%
- Lighting intensity Watt/m² reduced from 24.7 to 7.5 - reduction of 70%
- kWh per annum /area (kWh/m²) from 169 to 99 - reduction of 58%
- Improvement in comfort condition of the library
- Savings worth RM 340,000 per annum



The electronic ballast was selected based on this criteria:

- Total Harmonic Distortion (THD) of less than 20% or 10% depending on the model of the ballast.
- Power factor > 95%
- Lamp current Crest Factor less than 1.7
- Minimum starting temperature of -20°F to 50°F
- Minimum detectable flicker – high frequency

The retrofit works undertaken to improve the efficiency were:

- Replaced old oversized motor with new Super-E type
- Replace old fan and motor pulleys with optimally designed size
- Alignment of pulleys to reduce transmission losses
- Electrical connection to motor and necessary adjustment of over load relay setting.
- Control and Monitoring



Total Savings Calculation for Phase I, II and III

Power (kW) Savings

The total savings from Phase 1, Phase II and Phase III > Total Savings = [5] + [8] + [11] + [13] kW = 318 kW [15]
With the cost of electricity at:-

kWh Cost = 0.19 RM/kWh [16]

Peak kW Cost = 17.30 RM/kW/month [17]

calculation of savings per month can be expressed as follows:-

Savings = kWh savings + Max. demand savings = (318 kW x N x 0.19 RM/kWh) + (318 x 17.3 RM/kW) [18]

where N is the number of operating hours per month.

To calculate average savings per month, we will use 20 weekdays @ 15.5 working hours, 4 Saturdays @ 9 working hours, and 4 Sundays @ 8 working hours, which makes:-

$N = (20 \times 15.5) + (4 \times 9) + (4 \times 8) = 378$ hours per month [19]

Average monthly kWh savings and max. demand savings, therefore : kWh Savings = RM 22,839.50 per month
Max. demand Savings = RM 5501.57 per month

Total Monthly Savings : RM 28,341.07

Annual Savings = RM 340,092.84 [20]