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### CONCLUSION AND RECOMMENDATION

Application of green building concepts for the buildings has been universally accepted phenomena since energy saving for the next generation is utmost important. This application can be easily implemented for the new constructions. But it is a challenge to introduce these concepts for the buildings which are already constructed. All most all buildings which were constructed before ten years in Sri Lanka have not been identified the importance of this concept and the awareness and the technology have not been transferred into the country to implement the same. Hence conventional technology was utilized without concerning the energy saving capabilities. In the present day context, energy costs very much than past. Also energy resources are being depleted faster than earlier.

AFHQ building is also belongs to the latter category where only basic needs were considered with the conventional technology. In this building there are several areas that could be considered for implementing green concept. But in this research only two areas are considered. As discussed in chapter 2 general lighting system and air conditioning system were considered for the application of green building concept. It was proven with the data collection and analysis there are possibilities to improve the systems avoiding present complications.

This building has been modelled using DIALux 4.11 software and Loadsoft 6.0 software for general lighting and air conditioning systems and existing systems were simulated using this model. The typical floor was modelled for general lighting for day light integration. Several floors were modelled simultaneously for air conditioning system improvements.

For the both systems illumination and AC day light radiation or solar gain is impacted positively and negatively respectively. So for the benefit of both systems

optimum selection must be done for the windows around where day light harvesting and solar heat gain are penetrated through. So the window material was selected as follows to give the optimum solar radiation into the building.

Low e double glazing  $e=0.1$  on surface 3 – ¼ thick glass Hi-P GRN W/LE

Low e double glazing  $e=0.05$  on surface 2 – ¼ thick glass GRN W/LE CLR

While recommending to use above glass material other energy saving options are recommended as follows.

Day light integration with the dimming facility is to be introduced to the general lighting system with energy saving lamp and luminaries.

Control groups of lamps were introduced to obtain the maximum benefit of the day light. Following percentages of energy could be reduced while maintaining average illumination 500Lux or more on the working plane with the integration of day light.



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Table 9.1 Percentage reduction of energy (Light)

Month	Time	0800	1000	1200	1400	1600
March		47.1%	41.8%	30.1%	26.8%	34.0%
April		27.9%	29.1%	29.1%	29.2%	43.4%

Temperature of a floor area has been set to 75.2°F (24°C) which is more comfortable than 72.5°F (22.5°C).

Carbon Dioxide sensors are recommended to be installed at the each floor to control the air flow according to the number of occupants in the floor at a particular time.

Variable air flow with controlled and preheated fresh air is recommended for the AHUs of each floor. Following are the summarized results of reduction of power consumption.

Table 9.2 Percentage reduction of energy (AC)

	4 <sup>th</sup> floor Load/KBtu/hr		3 <sup>rd</sup> floor/KBtu/hr	
	Variable air flow	Constant air flow	Variable air flow	Constant air flow
72.5°F (22.5°C) (Percentage reduction)	359.1 (8.37%)	391.9	247.8 (6.1%)	263.9
75.2°F (24°C) (Percentage reduction)	325.1 (17.1%)	357.8 (8.7%)	225.0 (14.7%)	242.1 (8.3%)

While considering the expenditure for implementing the green building concept and the energy saving gaining the Benefit to Cost ratio is more than 1 and simple payback period is 3 years. The investment is feasible and recommended to implement while considering at the time of revamping the AFHQ building.

There are other several systems in this AFHQ building to research further for the application of green building concepts such as Water conservation, Fire detection and protection, operation of elevators and security system etc.



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