SUMMARY

All building need to be upgraded sooner or later as they age, subject to wear and tear and with time, functional need and people’s aspiration change. If a building is not periodically upgraded, it will soon become obsolete. The mechanical and electrical (M & E) systems in a building have definite useful life-span, beyond which frequent breakdown and excessive maintenance will adversely affect the economic and commercial values of the building. The upgrading or replacement of these systems is thus inevitable when a building has reached certain age. For some buildings, the errors in original design or over-designing could lead to excessive malfunction and inefficient operation of the M & E systems. The overall operation and maintenance cost of the building would thus become excessively high.

For a building to succeed commercially, it must be able to present comparative advantages in terms of physical attractiveness, efficient layout and management, as well as rental and financial benefits to the occupants. It would be the building owner’s objective to upgrade the image of the building in its totality and hence maximizing his return on investment.

Energy saving measures of mechanical and electrical services in building on a large scale has become prominent only in very recent years. The rapid advancement of technology, greater demand for improved environment and working conditions and the need to conserve electrical energy have escalated the scope of retrofitting building with modern mechanical and electrical
services. In Singapore, the improved economic conditions in 1987 prompted more building owners to upgrade their buildings to become more energy efficient in operation.

Electricity, the main source of energy, is required to maintain the comfort level of interior spaces and drive the various M & E systems within a building. Energy consuming equipment such as chillers, fans, pumps and lights are sized to meet demands dictated by the building function. In particular, air-conditioning equipment must be capable of meeting the building peak cooling load.

Air-conditioning system is the largest single consumer of electrical energy. Office buildings and shopping complexes have a similar electricity consumption pattern; both have about 50% electricity consumption for air-conditioning system. Lighting and office equipment accounted for about 34% of which some 30% is consumed in tenants’ premises. (Public Utility Board, Oct 1990). For hotels, air-conditioning accounts for about two thirds of total electricity consumption, (PWD, 1990). This high percentage is due mainly to continuous operation delivering of air-conditioning both day and night. Among the various components of the air-conditioning system, water chillers alone account for more than half of the total air-conditioning consumption. A quarter of the energy is consumed by the air handling and fan coil units.
This dissertation explores the energy saving potential and benefits of retrofitting the fan-coil unit in a guest room of an old hotel building. The case study is used to demonstrate the economic aspects of air-conditioning services for hotel buildings in Singapore. Beside reducing running costs and providing improved working conditions, the public image of the building is further enhanced.