

An Abstract Case Study on Energy Management System Marriott Hotel Melbourne



1.0 Introduction

The Marriott hotel is an upmarket, luxury appointed hotel situated in the heart of the Melbourne CBD. As part of the “Savings in the City – Green Hotels Program” run by the City of Melbourne Council in late 2007, the program was initiated to assist accommodation service providers to reduce their environmental footprint, energy consumption and improve energy efficiency. As a result, not only does this program make the hotel business more profitable, but illustrates the company’s environmental commitment as well.

An energy audit and efficiency study on the Marriott hotel was carried out by Enman Pty Ltd in 2007. From this initial audit report, opportunities were identified to implement a unique energy management system with advanced optimal control strategies which has been specifically designed for hotel applications and environment. Enman Pty Ltd assisted the Marriott hotel to apply to The Department of Innovation, Industry and Regional Development (DIIRD) for a substantial government grant to assist in implementing this unique energy management project.

2.0 The Energy Management System (EMS)

The Marriott hotel had an existing building management system (BMS) controlling the chiller and Heating Ventilating and Air Conditioning (HVAC) system with Direct Digital Control (DDC). The BMS was also used to provide front-end monitoring, reporting and control function of the equipment. Enman's energy management system integrates with the BMS and utilises variable speed drives to optimise energy usage in the HVAC system, where a major amount of energy is consumed. Unlike any other control system, the speed of all the hotel's utilities such as supply air fans, kitchen exhaust fan, car park fan, cooling tower fans, chilled water pumps, condenser water pumps and hot water pumps are optimally controlled by variable speed drives based upon weather conditions and building guest occupancy status.

There are three chillers which are controlled to minimise energy consumption whilst still providing the required comfort levels for the hotel's guests. Electricity demand and usage are monitored online and controlled through a sophisticated chilled water temperature reset technology.



Figure 1: Chiller Plant

3.0 Achieved Energy and Demand Savings

Testing has been carried out to evaluate the achieved savings from various control functions implemented in the hotel energy management system.

In brief, the savings achieved are:

- **Fan Speed Optimal Control** (energy reduction of fan load)
 - AHU for Residential (60 to 70%)
 - AHU for Non-Residential (50 to 60%)
 - Kitchen Exhaust (55 to 60%)

- **Pump Speed Optimal Control** (energy reduction of pump load)
 - Condenser Pumps (35 to 40%)
 - Chilled Water Pumps (Primary) (40 to 45%)
 - Hot Water Pumps (30 to 35%)

- **Chiller Optimal Control** (energy reduction of chiller load)
 - Chiller Load Cycling (during cooler weather) (40 to 50%)
 - Chilled Water Temperature Reset (6 to 10%)
 - Condenser Water Temperature Reset (4 to 6%)

Demand reduction is about **20%** of the original contract demand.

The total greenhouse gas emission of the hotel is reduced by **21%**.

From the initial testing and brief trial period, the results to date have been very significant and are on track to achieve tremendous results for the hotel's operation, maintenance and environmental credentials.

Figure 2 shows a comparison between December 2007 prior to the EMS being installed and December 2008 after the EMS project was implemented. The overall energy reduction was found to be approximately **25%** of the whole hotel electricity bill.

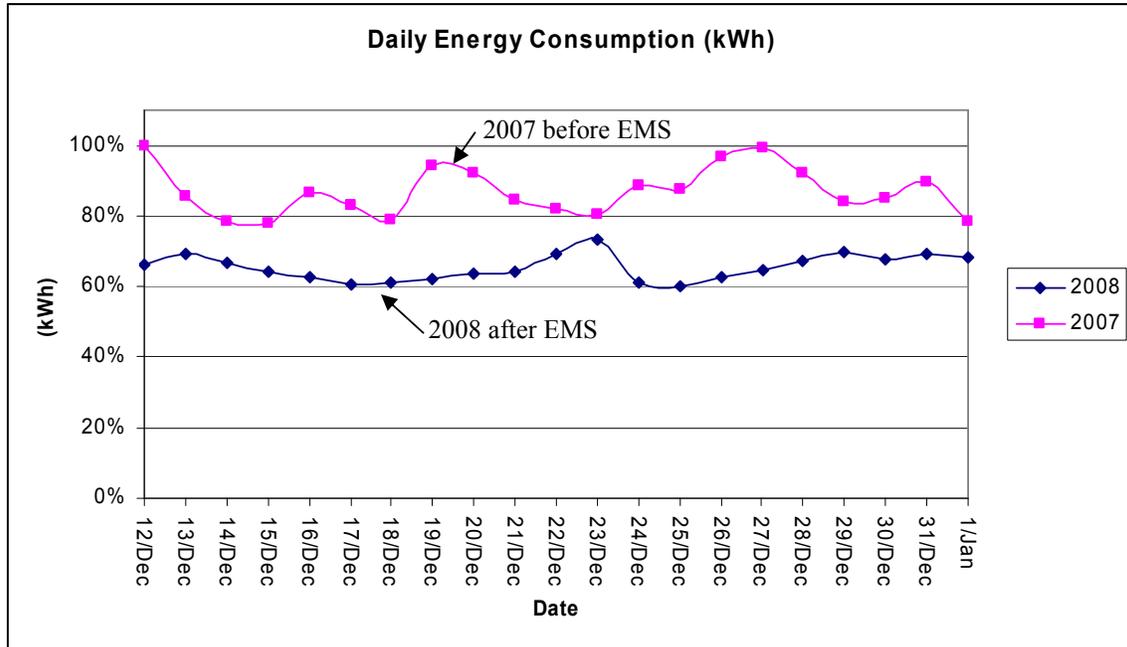


Figure 2: Daily Energy Consumption Comparison

4.0 Conclusion

This project clearly demonstrates the benefits of implementing an energy management system for medium to larger hotels. The initial results not only prove that this technology reduces the hotel’s electricity and maintenance costs, but also reduces greenhouse gas emissions which is crucial for our environment.

Upon success of this unique energy management technology, Enman has developed a package called the “Hotel Energy Management System”. This system is an evolutionary development of Enman’s energy management technology and can be interfaced with any BMS. Enman is currently working on the market transformation with this technology which can substantially reduce carbon emissions with a good economic incentive.

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