

Case Study – Stamford Plaza:

How will a plant upgrade benefit Stamford Plaza Melbourne?

ENERGY IS ONE OF THE MAJOR COSTS IN OPERATING A HOTEL AND SUBSTANTIALLY IMPACTS ON PROFITABILITY.

Reducing energy, water and waste is one of the primary goals of hotels; this in turn reduces the carbon footprint of a hotel and so improving its green image. The Stamford Plaza is a 17-storey hotel located at 111 Little Collins Street, Melbourne. There are 283 guest rooms and the hotel is a self-rated five-star property. The hotel, after lengthy but fruitful discourse, has decided to refurbish its mechanical services. Such a major capital project began with a simple cost-free and obligation-free desktop study carried out by Enman P/L, an energy and consulting engineers company.

Some justifications for this capital intensive project include:

- Having been in operation for over 25 years, the chillers are towards the end of their life cycle
- The chiller refrigerant R22 is being phased out in 2016, having been deemed environmentally unfriendly
- The replacement chillers will provide efficiency at 250 percent greater than the current chillers
- Plans to extend the hotel with additional rooms will escalate cooling and heating loads



The current hot water boilers are atmospheric and being past their life cycle, the current maintenance cost is high and efficiency is very low. These boilers are to be replaced by state of the art modular condensing boilers with very high efficiency. The new design incorporates a common hot water boiler for both building heating and domestic hot water, resulting in redundancy and very high availability across both hot water systems.

The hotel BMS is overdue for an upgrade. Proposed is a modern BMS with remote monitoring and control facilities, implementing variable speed drives in pumps will allow for optimisation of the chillers and boiler operation. The hotel has decided to upgrade the existing BMS with a non-proprietary BMS using Enman's well proven energy management control system.

A guarantee of energy savings is one of the key factors in the approval of the project. It is provided by Enman as the turnkey supplier of the entire project, enhancing confidence in the investment.



Enman is an energy and engineering company specialising in commercial building projects, including hotel retrofits to improve energy efficiency and performance of the building.

Enman's services encompass everything from feasibility studies to project implementation, delivering guaranteed energy savings. These services include:

- ◆ Project Engineering and Management for major projects including the turnkey supply of:
 - Energy Management Control Systems
 - Building Management Systems
 - Variable speed drives, control and optimisation
 - Room control systems
 - Chiller system upgrades
 - Boiler system upgrades
 - HVAC upgrades
 - Co-generation systems
- ◆ Assistance with Government Subsidies and Funding
- ◆ Assistance with Carbon Trading

Enman's BMS is a non-proprietary web-based system which can monitor and control from anywhere. This is a 'Niagara' BMS which is a Tridium based system and uses Easy IO (another non-proprietary controller).

Enman's energy management control system 'ENERTROL' is a well proven system that has been operating for over two decades. Its features are:

- ✓ Chiller optimal control and performance monitoring
- ✓ Advanced optimal control with variable speed drives for pumps, fans, etc.
- ✓ Advanced HVAC control
- ✓ Demand management and control
- ✓ Energy performance monitoring

Enman also offers obligation free Desktop studies to ascertain the economic and technical viability of your project.

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◀ The project is registered for the Emission Reduction Fund, which provides further incentive for such capital investment. The Nabers energy rating of the hotel is expected to be increased by one star.

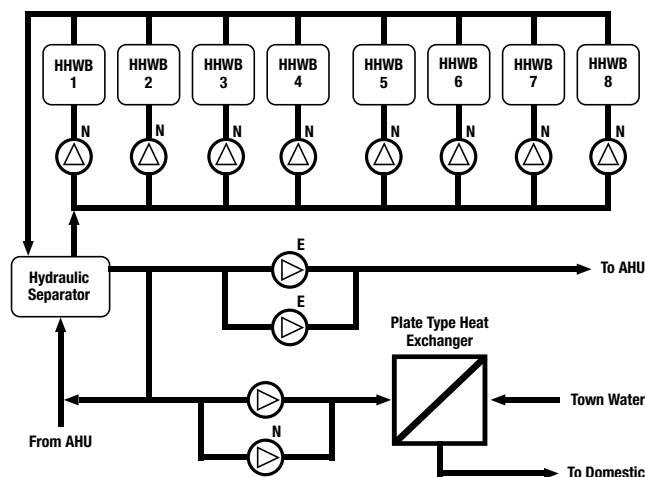
Project:

The hotel has two towers, the east and west towers. These two towers are identical and have identical utility systems. These systems include chillers, boilers, cooling towers and air handling units. All these utilities are currently controlled by the antiquated BMS.

Chiller upgrade:

There are two chillers with four reciprocating compressors per wing of the hotel. Although past their life cycle they still operate satisfactorily. They are water cooled liquid chillers and the cooling capacity is 500 kW. The compressors are old and environmentally un-friendly and the refrigerant of these chillers is R22, which has already been phased out. These old chillers are being replaced with state-of-the-art Powerpax chillers that utilise variable speed drives and have slightly more capacity to cater for the prospective increased load in the building with the hotel's planned expansion program. These chillers provide a 250 percent increase in the chiller efficiency with environmentally friendly zero ODP HFC R134a refrigerants providing another 25 years of life.

Boiler upgrade:



There are three boilers in each tower, two – for the building heating and the other for domestic hot water generation. These are gas-fired conventional atmospheric boilers and are very old and inefficient. The domestic hot water system has standby electric heaters for emergency heating.

These boilers are being replaced by a set of modular gas fired condensing boilers with a common hot water supply for both building heating and domestic utilisation. Domestic hot water is generated by a plate type double plated heat exchanger with standby pumps. The capacity of the old boilers in each tower are – two x 500 KWth for heating and – one 600 KWth for domestic hot water supply. Each tower will be replaced by eight 150 KWth modular gas-fired condensing boilers. These boilers are very efficient, with efficiency rated at approximately 97 percent

Project description	Electricity saving kWh/year	Gas saving GJ/Year	Energy cost saving \$/Year	Emission reduction Tonnes of CO ₂ -eq/year
Energy management control system with upgrade of BMS	444,000		48,840	559
Chiller upgrade	470,767		51,000	593
Boiler upgrade		3,411	23,877	189
Variable speed drives of pumps	118,000		13,000	148
Variable speed drives for fans	Not Available			
Replacement of heating and cooling valves	Not Available			
Replacement of damper actuator	Not Available			
Economy cycle	Not Available			
Total savings	1,032,767	3411	136,717	1489

The benefits of the boiler upgrade are:

- Increased boiler efficiency by 25 percent
- Improved boiler redundancy for greater reliability of hot water supply
- Reduced maintenance costs
- Provision for another 25 years of life

Control system upgrade:

The control system upgrade consists of:

- BMS upgrade with a state of art non-proprietary Niagara BMS with remote web-based monitoring, control system and superior trending facility, which assists with diagnosis and tuning of control for efficient operation of the HVAC system
- Energy management control system, the functions of which are: optimising chiller plant operation, optimising boiler plant operation, optimising VSD operation for pumps and fans, demand management and control system to reduce electricity demand cost, and extensive reporting function for chiller KPI and electricity consumption and demand.
- Variable speed drives for chilled water, condenser water and hot water pumps.

Energy efficiency:

The unofficial Nabers rating of the hotel is three-star, which could be regarded as average. However, this upgrade project is expected to lift the rating to four stars. In turn, further efficiency stands to be gained with other proposed energy efficiency options outside the scope of this development.

Conclusion:

The current refurbishing project upgrade with major capital intensive equipment is at the heart of energy efficiency improvement of the hotel. The mechanical service upgrade is not limited to this development. The hotel is also considering ongoing future upgrades, including refurbishment of cooling towers, some of the field equipment such as heating and cooling valves, and damper actuators. This capital-intensive nature of this project holds justification in increased profitability of the hotel operation; increased value of the property; and meeting environmental commitment of the hotel. ■

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