19 July 2012  
L124N_R01_P1  

Dynamic Property Services Pty Ltd  
Level 5,  
162 Goulburn St,  
SYDNEY NSW 2010  

Attention: Helen Wells  

Regatta Wharf – Jacksons Landing  
Lighting Energy Audit  

We have been asked to perform an assessment of the lighting to common areas at Regatta Wharf and offer recommendations on strategies to reduce the energy consumption to the complex.  

We carried the site inspection Thursday 5th July accompanied by Graeme Robens. Below are our findings from this visit.  

Observations – Fittings and control devices  

Car park  
The lighting in the car park consists of twin 36W T8 fittings along the aisles/driveway and single 36W T8 fittings within the parking bays.  
The lighting throughout the car park is in operation 24 hours a day, 365 days a year.  
The supply for the car park lights originates in the Main Switch room adjacent the main entrance via Refinery Drive.  
Each of the lighting circuits have been modified to be supplied via ‘Ilum-a-lite, LightECO plus’ voltage regulating devices. These devices indicated a running cost saving of 25% at the time of the inspection.  

We would like to note that on the design/as installed drawings, the carpark lighting was to be switched off between the hours of 11pm and 5am and to be activated in the ‘off’ time via access signals from each of the lifts in the complex.  
The contactors and allowance for this facility has not been provisioned for in the final installation.  

Landscape, exterior lighting  
Exterior lighting consists mostly of low wattage compact fluorescent lighting controlled via a time clock located at the main switch board.  

Pool and Gym area  
The lighting consists of a combination low wattage compact fluorescent downlights and wall lights.  
The lighting in these areas is controlled via local switch panels. The amenity areas are controlled via occupancy sensors located in the toilets and showers.
Main Entry Lobby – Refinery Drive
The lighting in the main lobby has recently been refitted with 25W and 16W LED downlights, replacing the original 2x13W (total 30W) compact fluorescent downlights.
The lights are controlled via occupancy sensors, whilst supplementary lights on art works and features remain on 24 hours a day, 365 days a year.

Typical Floor Lift Lobbies
The lighting in the common area lift lobbies consists of 2x13W compact fluorescent downlights, which operate 24 hours a day, 365 days a year. The light fittings have a connected load of 30W, the output of the fittings is generically rated at 30 lumens per watt, producing approximately 900 lumens total. The power is supplied via centrally located house boards. The boards are typically located on level 4 of each tower.

Plant and garbage rooms (including switch rooms)
These areas consist of a combination of surface mount 2x18W or 36W fluorescent fittings controlled via local switch plates.

Fire Stairs
The fire stair lighting consists of twin 36W T8 surface mount fluorescent fittings, the fittings incorporate emergency gear in each. The Fire Stair lights operate 24 hours a day, 365 days a year.

Recommended Actions
Carpark
We propose the installation of new Microwave occupancy sensors to the carpark areas, accompanied with Ultrasonic sensors in each of the carpark lift lobbies and to disconnect voltage regulating devices. With the reduced operating times of the light fittings in the basement, the voltage regulation devices would have little effect and become redundant. A new enclosure should be installed in place of the voltage reduction devices. This enclosure would house contactors linked to occupancy sensors distributed throughout the carpark and operate the carpark lighting only whilst the carpark has activity. Occupancy sensors would be placed in a manner to activate the lighting on entry to the carpark via any pedestrian and vehicle access points to the space. The anticipated payback period for the installation of the sensors would be approximately 2½ years*

Landscape, exterior lighting
We do not see improvements that can be made to current arrangement, with the exception of replacing the self-ballasted compact fluorescent lamps with LED lamps as they fail.

Pool and Gym area
We propose the introduction of passive infrared sensors to the gym and microwave sensors to the pool area to avoid the likelihood of the light fittings being left on for extended periods of time whilst no one is using these facilities.
Main Entry – Refinery drive
The main entry has recently been upgraded with regard to the lighting and controls. The improvements are in line with our recommendations.

Typical Floor Lift Lobbies
We suggest the installation of occupancy sensors as a first stage approach to reducing energy consumption in the lobby areas. We see there would be an approximate 75% energy and cost saving with a pay back period of 2.4 years.*

The second stage would be to consider the replacement of existing downlights with 14W LED downlights. The lights we propose have half the connected load of the existing lighting and would produce slightly more light than that of the existing fittings. The capital costs of installing new fittings to all of the lobby areas would not break even before 9½ years. We would suggest the replacement of the existing fittings as they fail with the LED alternate to provide further energy saving. We anticipate the energy and cost saving to be in the vicinity of 90% over the current installation.

Plant and garbage rooms (including switch rooms)
We suggest the installation of passive infrared detectors within these utility spaces to ensure the lights are not inadvertently left on for longer than is necessary.

Fire Stairs
As the fire stair lighting is quite a substantial portion of the lighting power consumption across the site, we would suggest installing enclosed twin 14W T5 luminaires. Due to the complexity involved in provided an occupancy sensor system to the fair stairs, it would be less expensive and more practical to replace each fitting. This solution would not require re-wiring the stairs. These fittings would incorporate individual occupancy sensors operating one lamp only, this would ensure there is a portion of lighting available in the stairs. The current installation has an integrated emergency fitting at every landing throughout the stairs, AS 2293.1-2005 only stipulates the requirement for an emergency at every second landing, provided the correct levels in an emergency scenario are achieved. This would reduce the expense of providing an emergency luminaire to each level and provide only a non-emergency luminaire at alternate stair landings.

*All cost estimates are based on an average shown on the most current energy assessment by ‘Energy Action’ at $0.1614 kWh.
## Indicative Costs

<table>
<thead>
<tr>
<th>Option</th>
<th>Capital cost</th>
<th>Energy Saving per annum based on $0.1614 kWh</th>
<th>Payback period in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupancy sensors installed in the basement</td>
<td>$32,115.00</td>
<td>$13,865.76</td>
<td>2.3</td>
</tr>
<tr>
<td>Occupancy sensors only installed in lobby areas</td>
<td>$27,200.00</td>
<td>$9,925.33</td>
<td>2.4</td>
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<tr>
<td>LED lights installed in lobby areas including occupancy sensors</td>
<td>$90,830.00</td>
<td>$9,925.33</td>
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<tr>
<td>Electronic controlled fluorescent fittings to fire stair, incorporating occupancy sensors</td>
<td>$38,350.00</td>
<td>$11,578.53</td>
<td>3.3</td>
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</tbody>
</table>

We have utilised the 'As Installed' drawings to assess quantities of fittings. Energy bills for the past 12 months have been used to average the kWh electricity costs. We have not calculated maintenance costs associated with lamp and control gear replacement to the existing fittings over this time.

## Conclusion

Our recommendations:
- Occupancy sensors to be installed within the carpark, sensors to control lighting at all times. To avoid the complete darkness if the sensors fail to be triggered, a handful of fittings across the carparks should be rewired and remain on 24 hours;
- Occupancy sensors installed to the lift lobby at each floor and
- Occupancy sensors installed in utility areas to ensure accidental continuous operation is avoided.
- LED downlights installed to Lift Lobbies at each floor
- Electronic ballasted fluorescent fittings within fire stairs with one lamp on motion sensor control

As a new installation, it would be ideal to install surface mount enclosed fluorescent fittings with electronic control gear to the carparks, LED fittings to the lobbies and other internal common areas. All this accompanied by occupancy sensors, the cost of the energy consumption could easily be 20% of the current levels.

This being said, the most economical approach in our opinion is to tackle the biggest energy consumers across the complex, ie. Carpark and fire stair lighting.

Should you require clarification on any of the above matters, please contact our office.

Yours faithfully,

Lighting, Art & Science Pty Ltd

Colin Barker