

## GREEN MARK FOR EXISTING BUILDINGS

Project Name: Fuji Xerox Towers  
 Developer/ Building Owner: Hong Leong Properties Pte Ltd  
 Green Mark Assessors: Wong Ngian Chung / Chris Tay  
 Date of assessment: 4 & 5 Mar 2008

### Scores breakdown

S/No	Category	No. of Points	Points Scored	% Achievement
1	Energy Efficiency	25	20.5	82.0%
2	Water Efficiency	15	10.2	68.0%
3	Building Management & Operation	25	23.3	93.2%
4	Indoor Environmental Quality & Environmental Protection	15	12.5	83.3%
5	Innovation	20	6	30.0%
<b>Total</b>		<b>100</b>	<b>72.5</b>	<b>GOLD</b>

### Summary of Green Features

Category	Green Features
1. Energy Efficiency	<ul style="list-style-type: none"> <li>▪ EEI of 167.27 KWh/m<sup>2</sup>/yr</li> <li>▪ Awarded NEA's Energy Smart Office</li> <li>▪ Conducted energy audit on chilled water plant room</li> <li>▪ Major upgrading of air-con system (i.e. replacing with more efficient chillers &amp; fan coil units)</li> <li>▪ Energy consumption well monitored and energy saving target well established and continual improvement plans and actions implemented.</li> <li>▪ Provision of electrical sub-metering for tenants and key building services such as chiller plant.</li> <li>▪ Use of ultrasonic sensors to control lighting at toilets</li> <li>▪ Use of motions sensors to control lighting at staircases</li> <li>▪ Extensive usage of energy saving light (i.e. EcoLight T5 attached with electronic ballast) for carpark, common areas and landlord's offices.</li> <li>▪ LED exit signs</li> <li>▪ Use of natural ventilation at lower core area and day lighting at atrium.</li> </ul>
2. Water Efficiency	<ul style="list-style-type: none"> <li>▪ Water consumption well monitored and water saving target well established and continual improvement plans and action implemented</li> <li>▪ NEWater is used for cooling towers and sprinkler system</li> <li>▪ Sub-meters installed to monitor NEWater usage in cooling</li> </ul>

	<p>towers and toilets/pantries.</p> <ul style="list-style-type: none"> <li>▪ All basin taps are using presto tap</li> <li>▪ Upgraded toilets are having automatic flushing system</li> <li>▪ Water efficient WCs</li> </ul>
3. Building Management & Operation	<ul style="list-style-type: none"> <li>▪ Building well maintained. Maintenance schedule well established and implemented</li> <li>▪ Building owner is ISO 14000 certified</li> <li>▪ Environment policy and environment strategies well disseminated to all tenants</li> <li>▪ Occupants survey and feedback well maintained and follow up actions taken</li> <li>▪ Building owner has put in place a hot line to better manage the feedback by the tenants.</li> <li>▪ Extensive building user guide for tenants</li> <li>▪ Use of compost recycled from horticulture waste</li> <li>▪ Near bus-stop and Tanjong Pagar MRT station.</li> <li>▪ Extensive recycling programme among staff and tenants and programme also well coordinated</li> <li>▪ Established and implemented procedures to ensure occupant health</li> </ul>
4. Indoor Environmental Quality & Environmental Protection	<ul style="list-style-type: none"> <li>▪ CO sensor monitoring system for basement carpark area</li> <li>▪ Installed fluorescent luminaries with ECO T5 lighting combined with electronic ballast for carpark, common areas and building owner's offices.</li> <li>▪ Complied with stated luminance level, thermal comfort and noise level</li> <li>▪ Indoor air quality audit conducted</li> </ul>
5. Innovation	<ul style="list-style-type: none"> <li>▪ Ultrasensor for toilets</li> <li>▪ Lux sensor at carpark entrance/exit to control lightings around the area</li> <li>▪ Motion sensors for staircases</li> <li>▪ NEWater for cooling tower usage</li> <li>▪ LED EXIT light</li> <li>▪ Collection of condensate from AHU (Dec 08)</li> <li>▪ Heat pipe to improve RH level</li> <li>▪ Cooling tower optimization (P)</li> </ul>

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	Points allocated
<b>Part 1: Energy Efficiency</b>	
1. Energy Efficiency Index	5
2. Continual Improvement for Energy Efficiency	7
3. Electrical Sub-metering	2
4. Energy Efficient Systems & Features	5.5
5. Roof Top Gardens & Landscaping	1
<b>Sub-total</b>	<b>20.5</b>
<b>Part 2: Water Efficiency</b>	
1. Continual Improvement for Water Efficiency	5
2. Water Efficient Fittings	4.12
3. Water Efficient Irrigation and Landscaping	1
<b>Sub-total</b>	<b>10.2</b>
<b>Part 3: Building Management &amp; Operation</b>	
1. Building Maintenance	NA
2. Environmental Management System	8
3. Building Maintenance and Operation Guidelines	4
4. Preservation & Enhancement of Landscaping	2.5
5. Public Transport Accessibility	1
6. Recycling	3
7. Occupant Health	2
<b>Sub-total</b>	<b>23.30 (Pro-rated)</b>
<b>Part 4: Indoor Environmental Quality and Environmental Protection</b>	
1. Effective Ventilation	1
2. High Frequency Ballasts	2
3. Luminance Level	2
4. Thermal Comfort	2
5. Noise Level	2
6. Indoor Air Quality Audit	2
7. Refrigerants	1.5
<b>Sub-total</b>	<b>12.5</b>
<b>Part 5: Innovation</b>	
1. Innovation	6
<b>Sub-total</b>	<b>6</b>
<b>Total</b>	<b>72.5</b>

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### Part 1: Energy Efficiency

	Item	Assessment Evidence/ Comments	Scores
1	Energy Efficiency Index	<ul style="list-style-type: none"> <li>• EEI of 167.27 KWh/m<sup>2</sup>/yr (5)</li> <li>• Awarded NEA's Energy Smart Office</li> <li>• Attached EEI calculation and electricity bills</li> </ul>	5
2	Continual Improvement for Energy Efficiency	<ul style="list-style-type: none"> <li>• Conducted monthly energy monitoring of electricity use by main building services equipment. (2)</li> <li>• Energy targets was set and monitored (2)</li> <li>• Numbers of continual improvement plans and actions taken such as (3)                             <ul style="list-style-type: none"> <li>○ Major upgrade of ACMV system (\$2.75M)</li> <li>○ Upgrading of all fan coil unit</li> </ul> </li> </ul>	7
3	Electrical Sub-metering	<ul style="list-style-type: none"> <li>▪ Provision of electrical sub-metering for tenants and key building services such as chiller plant. (2)</li> </ul>	2
4	Energy Efficient Systems & Features	<ul style="list-style-type: none"> <li>• Energy efficient lightings features (1.5)                             <ul style="list-style-type: none"> <li>○ Use of ultrasonic sensors to control lighting at toilets</li> <li>○ Use of motions sensors to control lighting at staircases</li> <li>○ Extensive usage of energy saving light (i.e. EcoLight T5 attached with electronic ballast) for carpark, common areas and landlord's offices.</li> <li>○ LED exit signs</li> </ul> </li> <li>• Energy efficient air-conditioning system (1)                             <ul style="list-style-type: none"> <li>○ Existing chiller efficiency 1.32 KW/ton. Upgraded would achieve 0.67kw/ton.</li> <li>○ VSD for chilled water pumps and condenser water pumps</li> <li>○ VSD for cooling towers</li> </ul> </li> <li>• Day lighting (1.5)                             <ul style="list-style-type: none"> <li>○ Extensive use of day lighting at atrium &amp; carpark entrance / exit</li> </ul> </li> <li>• Natural ventilation (1.5)</li> </ul>	5.5

		o Extensive use of natural ventilation at lower core area	
5	Roof Top Gardens & Landscaping	<ul style="list-style-type: none"> <li>• Landscape area 426m<sup>2</sup></li> <li>• Site area 9,167m<sup>2</sup></li> <li>• Total ratio: 5%</li> <li>• Green Plot Ratio of 1.69</li> </ul> (See attached report for detailed calculation)	1

**Part 2: Water Efficiency**

	<b>Item</b>	<b>Assessment Evidence/ Comments</b>	<b>Scores</b>
1	Continual Improvement for Water Efficiency	<ul style="list-style-type: none"> <li>• Conducted monthly water usage monitoring at major water consumption services (2)</li> <li>• Set water conservation targets and quantified water savings (1)</li> <li>• Established water conservation improvement plans: (2)                             <ul style="list-style-type: none"> <li>○ Condensate water collection for cooling tower</li> <li>○ Replacement of automatic tap for pantry areas</li> <li>○ Water sub-meters to monitor landscape watering.</li> <li>○ Sub-metering for NEWater usage</li> </ul> </li> </ul>	5
2	Water Efficient Fittings	<ul style="list-style-type: none"> <li>• All toilets' basin taps are using automatic water taps. 5 out of 8 pantry areas installed with automatic presto tap. Total 59 out of 62 installed with automatic water taps.</li> <li>• DualFlow watering saving devices for all taps ((Score prorated : 1.9)</li> <li>• Upgraded toilets with automatic flushing system (score pro-rate: 11% of 2 points = 0.22)</li> <li>• Water efficient WCs used. (2)</li> </ul>	4.12
3	Water Efficient Irrigation and Landscaping	<ul style="list-style-type: none"> <li>• NEWater for cooling towers &amp; sprinkler system</li> </ul>	1

**Part 3: Building Management & Operation**

	Item	Assessment Evidence/ Comments	Scores
1	Building Maintenance	<ul style="list-style-type: none"> <li>• NA</li> </ul>	NA
2	Environmental Management System	<ul style="list-style-type: none"> <li>• Records of environmental policy, and publicity to tenants (2)</li> <li>• ISO 14000 certificate and building management &amp; operation plan (3)</li> <li>• Occupant survey report and corrective action taken (2)</li> <li>• Appropriate corrective actions taken on occupant's feedback Building owner has put in place a hot line to better manage the feedback by the tenants. (1)</li> </ul>	8
3	Building Maintenance and Operation Guidelines	<ul style="list-style-type: none"> <li>• Building user guide (2) <i>The guide cover: energy &amp; environmental strategy, monitoring &amp; targeting, building services overview, transport facilities, materials &amp; waste policy and guidelines for refurbishment and renovations.</i></li> <li>• Tenants surveillance report and monitoring reports (2)</li> </ul>	4
4	Preservation & Enhancement of Landscaping	<ul style="list-style-type: none"> <li>• Engage landscape contractor to maintain existing landscape and plants (1.5)</li> <li>• Use of recycled compost for landscaping (1)</li> </ul>	2.5
5	Public Transport Accessibility	<ul style="list-style-type: none"> <li>• Near bus-stop and Tanjong Pagar MRT station (1)</li> </ul>	1
6	Recycling	<ul style="list-style-type: none"> <li>• Recycling bins provided at ground foyer (1)</li> <li>• Implement recycling programme among staff and tenants on collection of paper (1)</li> <li>• Monthly monitoring of recycled material collect (1)</li> </ul>	3
7.	Occupant Health	<ul style="list-style-type: none"> <li>• On-site verification of refuse disposal and collection practices and disinfection of toilets and common facilities (1)</li> <li>• Corporate SOPs and prevention measures for infectious diseases e.g. SARS (1)</li> </ul>	2

**Part 4: Indoor Environmental Quality and Environmental Protection**

	Item	Assessment Evidence/ Comments	Scores
1	Effective Ventilation	<ul style="list-style-type: none"><li>• Installation of CO for car park ventilation (1)</li></ul>	1
2	High Frequency Ballasts	<ul style="list-style-type: none"><li>• Installed fluorescent luminaries with ECO T5 lighting combined with electronic ballast for carpark, common areas and building owner's offices over 95% of the areas</li></ul>	2
3	Luminance Level	<ul style="list-style-type: none"><li>• Checked &amp; complied (2)<ul style="list-style-type: none"><li>○ Corridors: 80 lux</li><li>○ Lift lobby: 75 lux</li><li>○ Office desk: 500 lux</li><li>○ Office corridors: 300 lux</li></ul></li></ul>	2
4	Thermal Comfort	<ul style="list-style-type: none"><li>• Checked and complied (2)</li><li>• Temperature and RH readings taken from 2 samples<ul style="list-style-type: none"><li>○ lift lobby: 24.9°C</li><li>○ office: 24.8°C,</li></ul></li></ul>	2
5	Noise Level	<ul style="list-style-type: none"><li>• Acoustic consultant report (2)</li><li>• Measurement taken and within limits<ul style="list-style-type: none"><li>○ Near AHU at tenant (Fuji-Xerox): 48 dB</li></ul></li></ul>	2
6	Indoor Air Quality Audit	<ul style="list-style-type: none"><li>• IAQ audit report (2)</li></ul>	2
7	Refrigerants	<ul style="list-style-type: none"><li>• Refrigerant specification – using R123 and R407C (1)</li><li>• Automatic refrigerant pump down provided by maintenance agent (0.5)</li></ul>	1.5

**Part 5: Innovation**

	<b>Item</b>	<b>Assessment Evidence/ Comments</b>	<b>Scores</b>
1	Innovation	<ul style="list-style-type: none"><li>▪ Ultrasensor for toilets (0.5)</li><li>▪ Light sensor at carpark entrance/exit to control lightings around the area (0.5)</li><li>▪ Motion sensors for staircases (0.5)</li><li>▪ LED EXIT light (0.5)</li><li>▪ Use of NEWater for cooling tower and sprinkler usages (1)</li><li>▪ Collection of condensate from AHU as make-up water for cooling tower (1) (On-going)</li><li>▪ Heat pipe to improve RH level (1)</li><li>▪ Cooling tower optimization modeling to reduce power consumption (from 75kW to 43kW) (1)</li></ul>	6