Sustainability Implementation & Green Leases



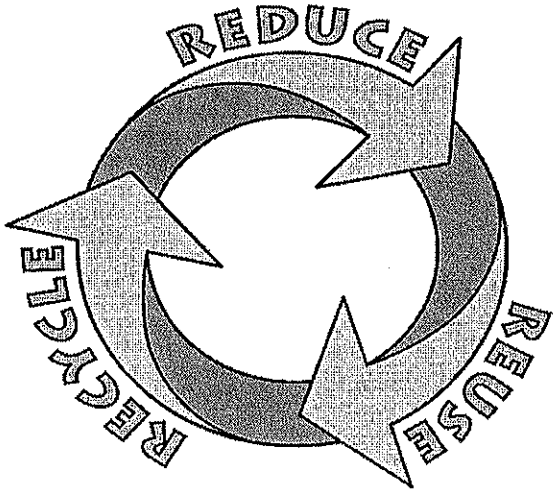
By GOO Chuen Cheng (GMP) Mobile: +65 9652 5188 Email: goocc@yahoo.com.sg

Version Dec 2013

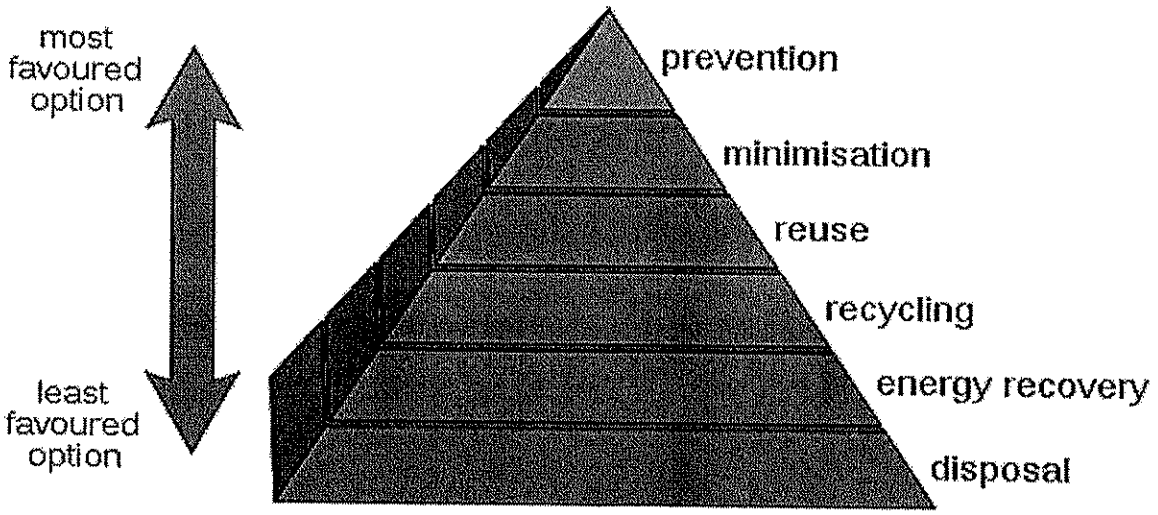
Introduction

- What is Sustainability
- Why Sustainability
- Singapore Government's Green Building Initiatives
- Sustainability Framework for a Green Development
- Green Lease
- Case Study

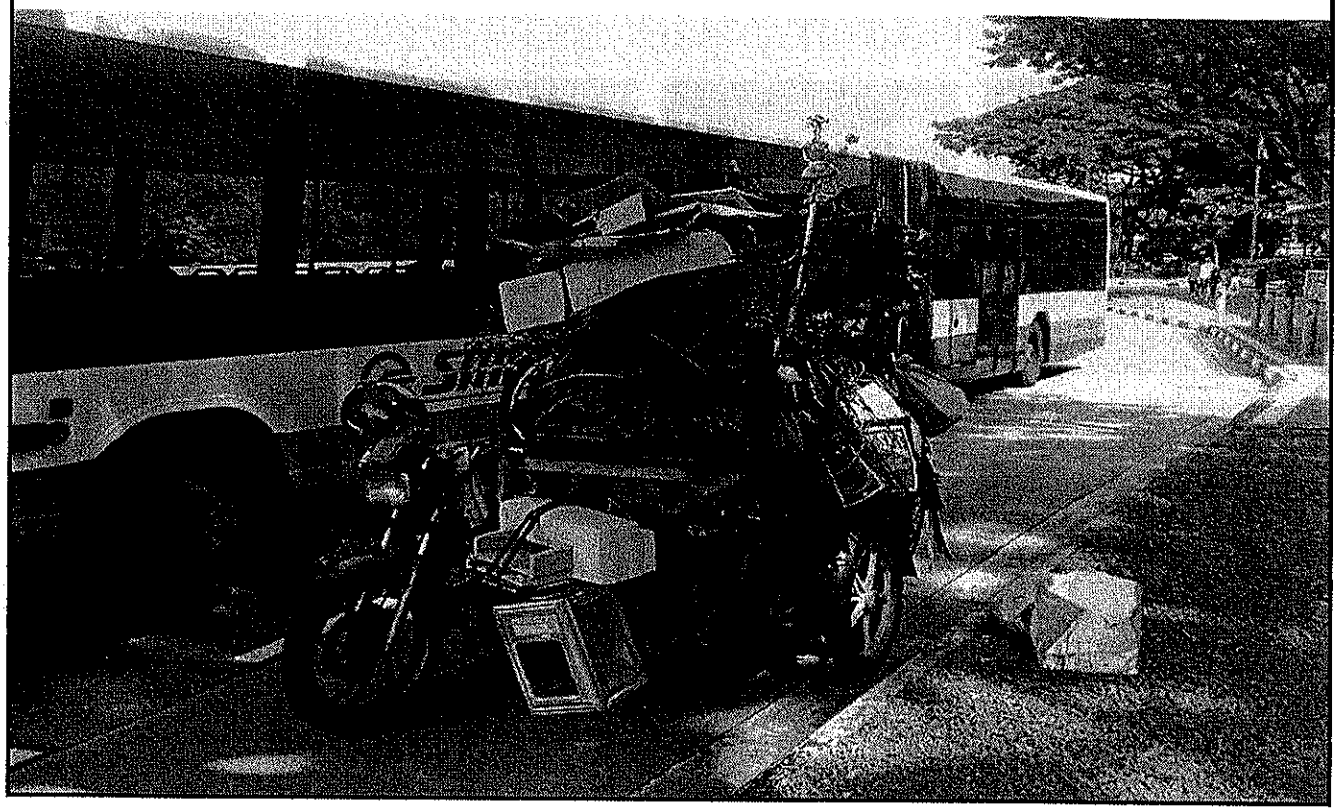
What is Sustainability?
- The 3 Rs



What is Sustainability?
- More than 3 Rs

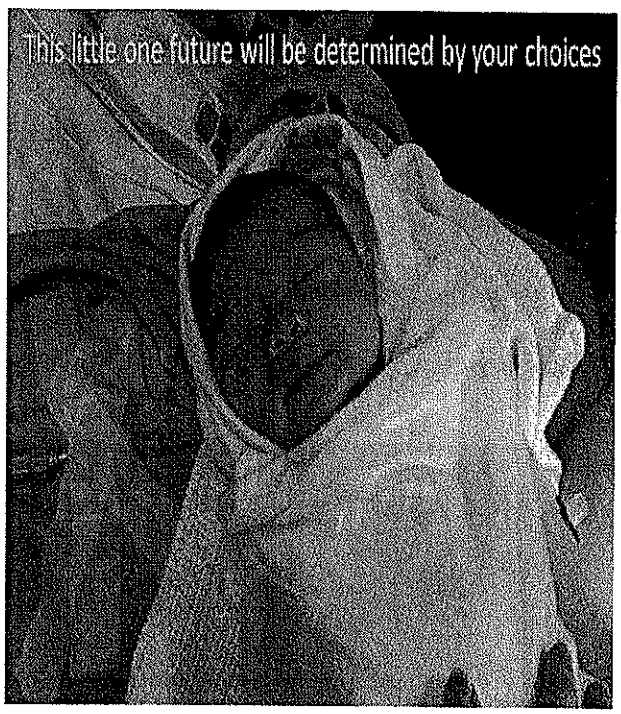


Sustainability in Singapore

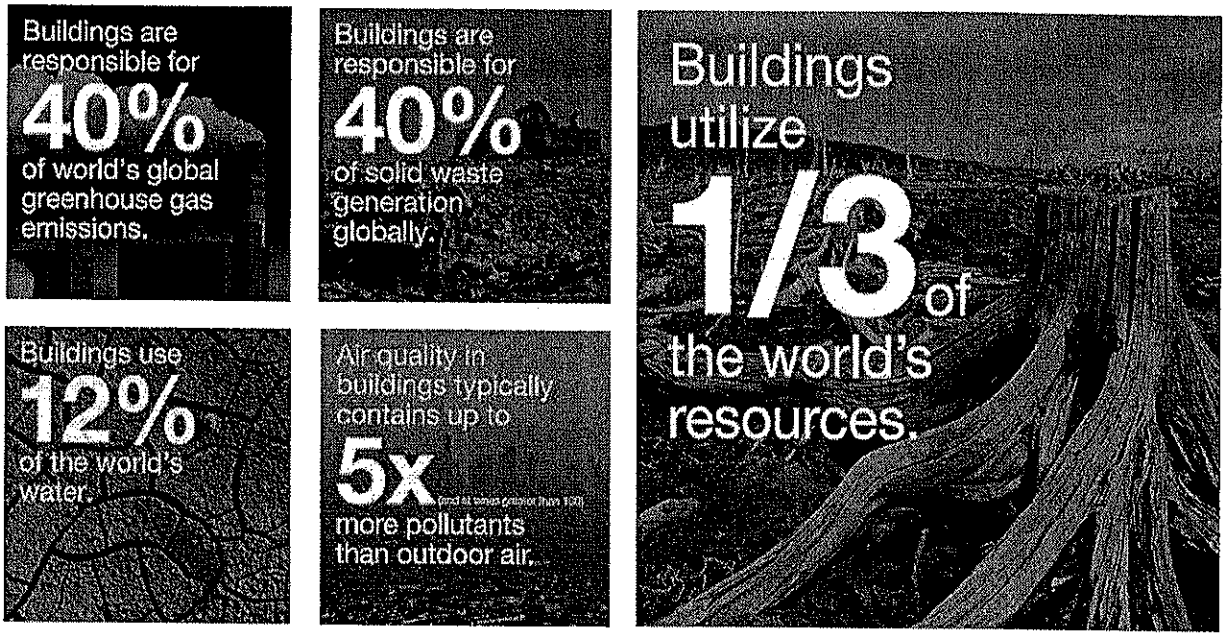


Sustainability Drivers & motivations - Why?

- For our next generation
- Legislation requirement
- Play a role in the Sustainability Journey
- Reduce the rate of emissions and global warming
- Reduce the building operational costs
- Safeguard against future energy price increases
- Operate in a healthy and safe environment
- Generate long term value for investors and partners
- Offering a superior customer experience to all stakeholders and boosting future business opportunities

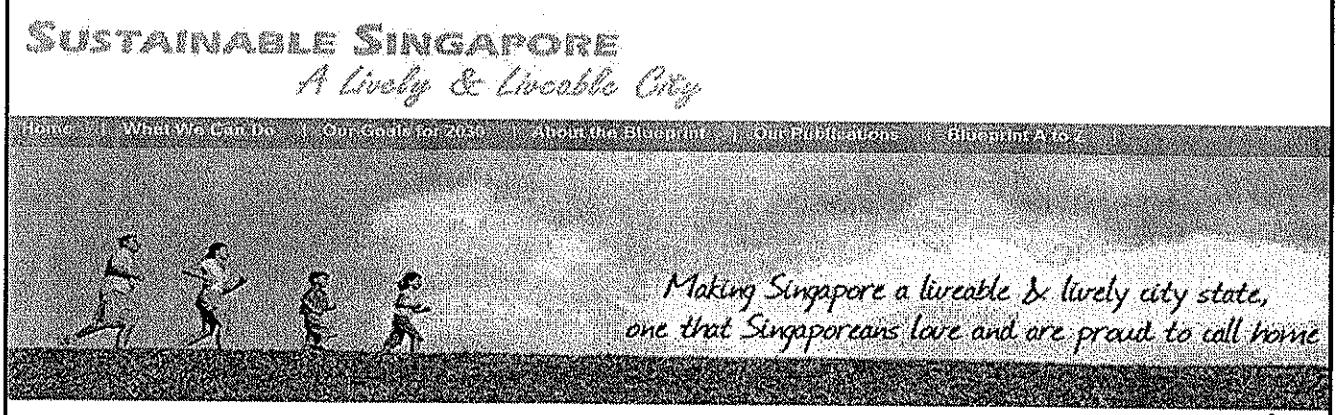


Property Sector – Global Environmental Impacts



Singapore Sustainability Development Blueprint – Strategy to achieve Goals for 2030

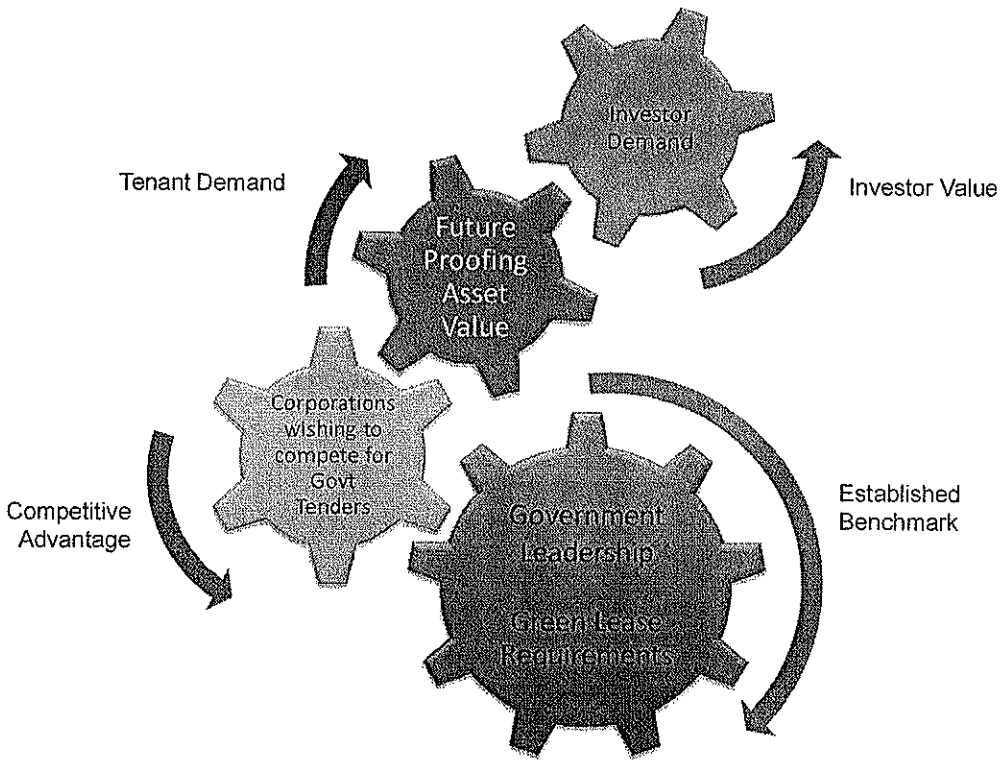
- Boosting Our Resource Efficiency
- Enhancing Our Urban Environment
- Building Our Capabilities
- Fostering Community Action



Green Buildings – Key Challenges

- Owners of New and Existing Building stock
  - ➢ Supply & Demand versus Government Green Building aspirations
  - ➢ Currently a small percentage of Green Buildings available
  - ➢ No clear consensus that a Green Building can yield higher rents, have lower vacancies and higher valuation
  - ➢ Limited "Green" knowledge of Property / Operations Manager who drives Green Refurbishment
  - ➢ Owner's control over sustainability during the design, construction and operations of an asset
- Tenants
  - ➢ Short term financial mentality - focusing on survival and short term cost minimization rather than investment in sustainability
  - ➢ Low exposure to sustainable practices
- Consumers not demanding change
  - ➢ No incentive
- Strata titled building stock
  - ➢ Multi-owner format – hard to reach consensus

Green Buildings - Key Drivers in the Market



Singapore - Existing Building Challenge

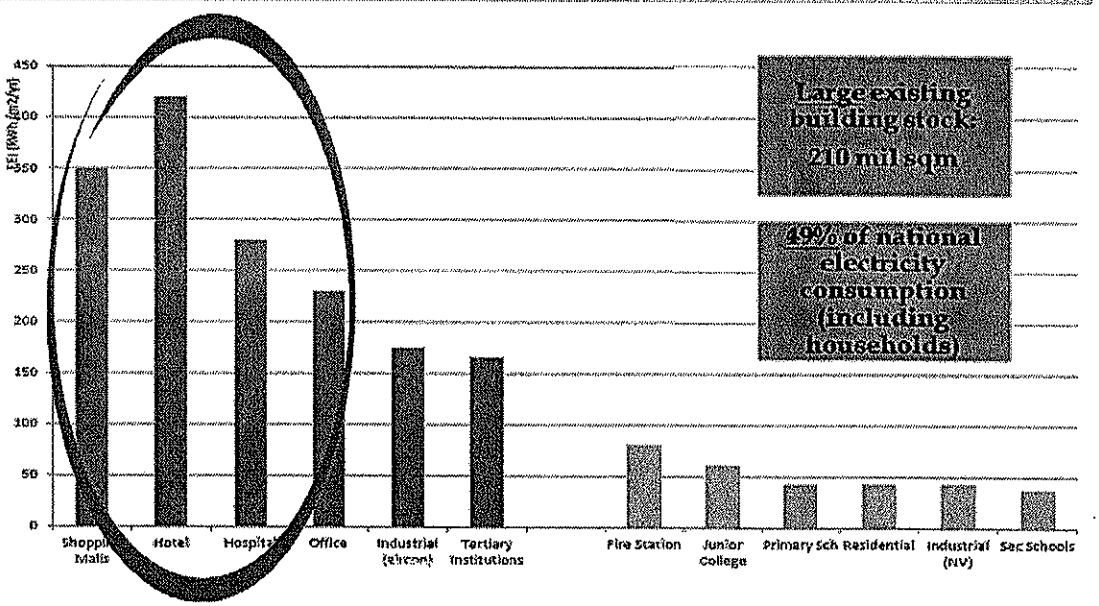
IMCSD'S TARGET FOR OUR BUILT ENVIRONMENT

80% OF EXISTING BUILDINGS 'GREEN'

by 2030

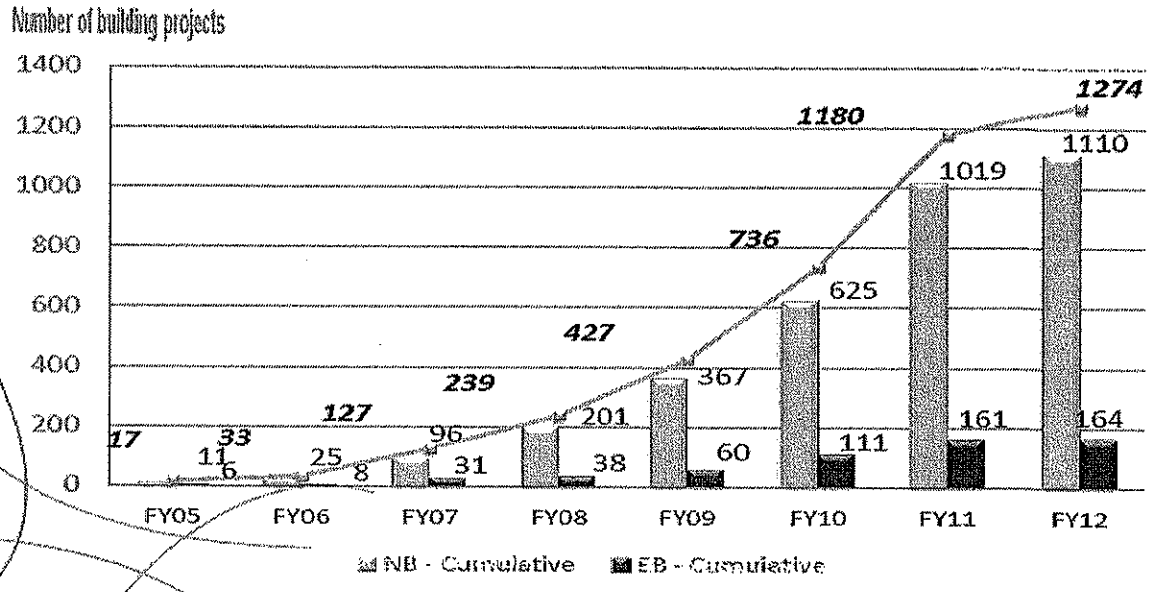
Singapore - Existing Building Challenge

OVERVIEW OF EXISTING BUILDING STOCK



Singapore - Existing Building Challenge

Green Mark Building Projects in Singapore



Source: BCA

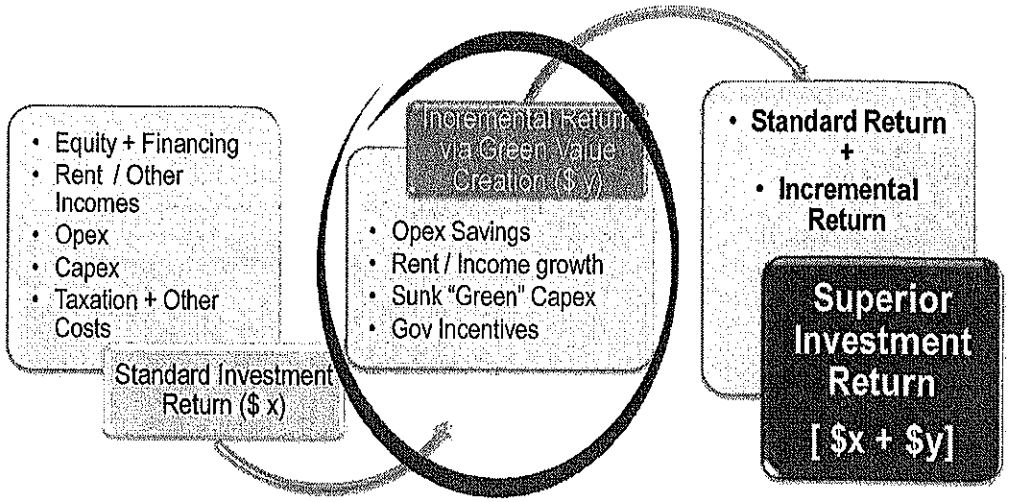
Investor Value

Tangible Valuation Benefits for the Owner / Landlord:

$$\text{Building Valuation} = \frac{\text{*Net Operating Income}}{\text{Cap Rate}}$$

*Net Operating Income = Gross Rent – Operational Costs

Investor Value



"Every Action Adds Up"... 1:20 Value Factor

[$100k Opex savings = $2M Value Accretion]

Investor Value – Rental Growth



Reveal:

Green buildings demonstrate higher rental rates than the general market

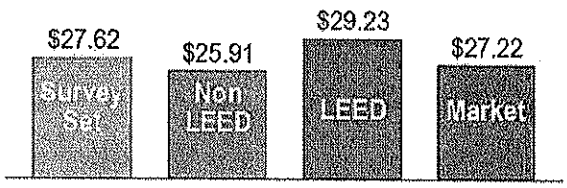
UP SHOT

on the bottom line...

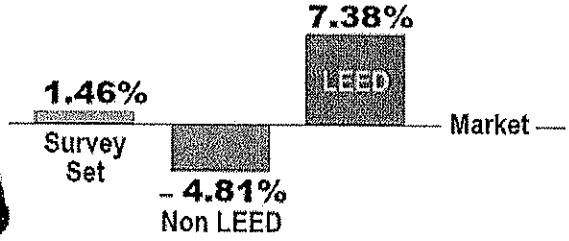


Average Rental Rates

David L. Pogue



Higher Rental Rates on Average (Q1-3)



Source: CBRE Global Research – Do Green Buildings Make Dollars & Sense (31 Jan 2011)

Investment Logic – Green Initiatives

Institutional Investors Group on Climate Change (IIGCC) has recently published a 24 page guide entitled Climate Impact Reporting For Property Investment Portfolios: A Guide for Pension Funds and their Trustees and Fund Managers (Dec 2010).

The investment implications of increasing interest in environmental issues

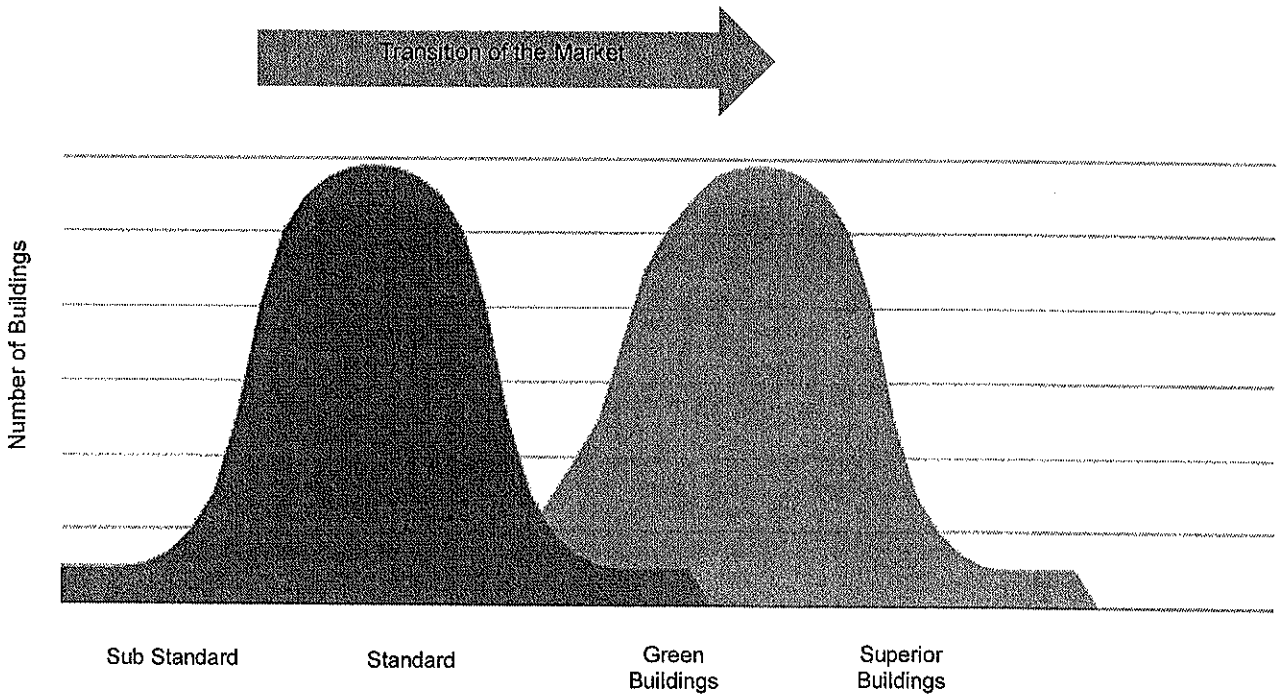
If...	Investment implications	Underlying effects on 'green' assets
Tenants prefer to occupy green buildings	Rental differentials should emerge between green and non-green buildings	Either rental growth higher or asset depreciation lower
Tenants prefer to occupy green buildings	Green assets re-let more quickly	Shorter interruptions to cash-flow should attract lower risk premium
Green buildings are cheaper to run	More tenant money is available for rent	Rental growth should be higher for 'green' buildings
Impending government regulation and legislation	Greener assets become de-risked because they are more attractive to and retain tenants better	Risk premium is lower than for 'brown' buildings
Investors prefer 'green' buildings	Green properties prove quicker to transact	Green properties are more liquid and should, therefore, attract a lower risk premium

Investment Logic – Green Initiatives

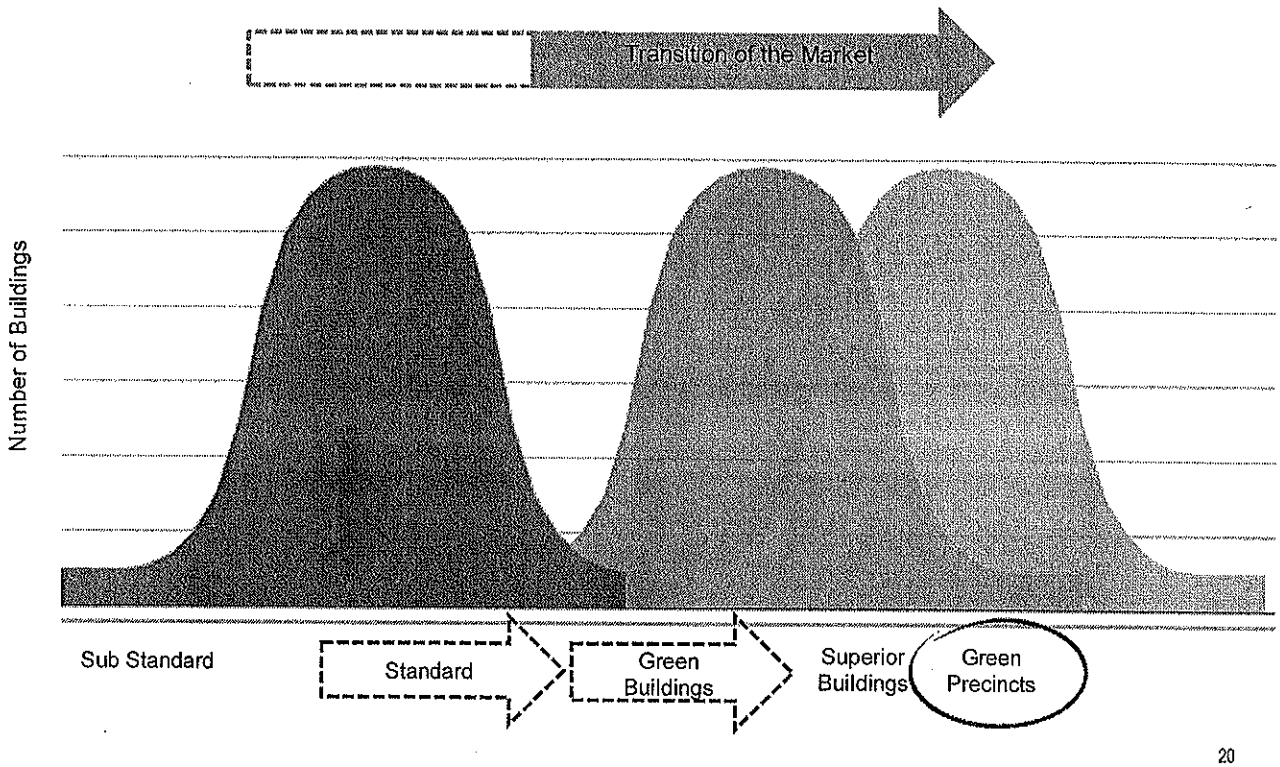
Table The investment logic behind common areas for "sustainability" reporting and labelling frameworks

General area	Typical sub-areas	Investment logic
Energy usage, management and generation	electricity used; gas used; other fuels used; existence of energy management systems; the sources of energy used; the presence of on site energy generation	If energy costs rise above the rate of inflation, the increased 'cost of carbon' will be passed on to property owners and occupiers, depressing their ability to pay rent. Knowing about the energy efficiency of properties in a portfolio provides insight into future rental growth prospects.
Carbon dioxide emissions	carbon dioxide emissions	In the UK, this is the basis for national and regional carbon trading schemes and could form the basis for local and national property taxes in the future.
Water usage	existence of water management systems; the presence of on site water harvesting	In a world of hotter drier summers, the importance of the availability and cost of water will rise. A property that can provide some of its own water needs, will keep costs down and prove a lower risk.
Waste production and recycling	level of waste generated; proportion of waste recycled; existence of waste management systems	Waste can be defined as the inefficient use of resources and the carbon related to its production and transport. A property which generates less waste is probably running more efficiently and incurring lower costs.
Property accessibility	proximity to public transport systems and nodes; dependence on petrol/diesel powered vehicles; cycling related facilities	If the cost of private travel rises above the rate of inflation, then the users of properties more distant from public transport will experience greater costs which will ultimately depress tenants' ability to pay rent.
Property situational risks	flood risk; coastal erosion risk	Clearly, the risk of flood or coastal erosion will grossly affect the value of an asset, especially if insurance cover is withdrawn.

Investor Value – Mindset Transition



Investor Value – Mindset Transition



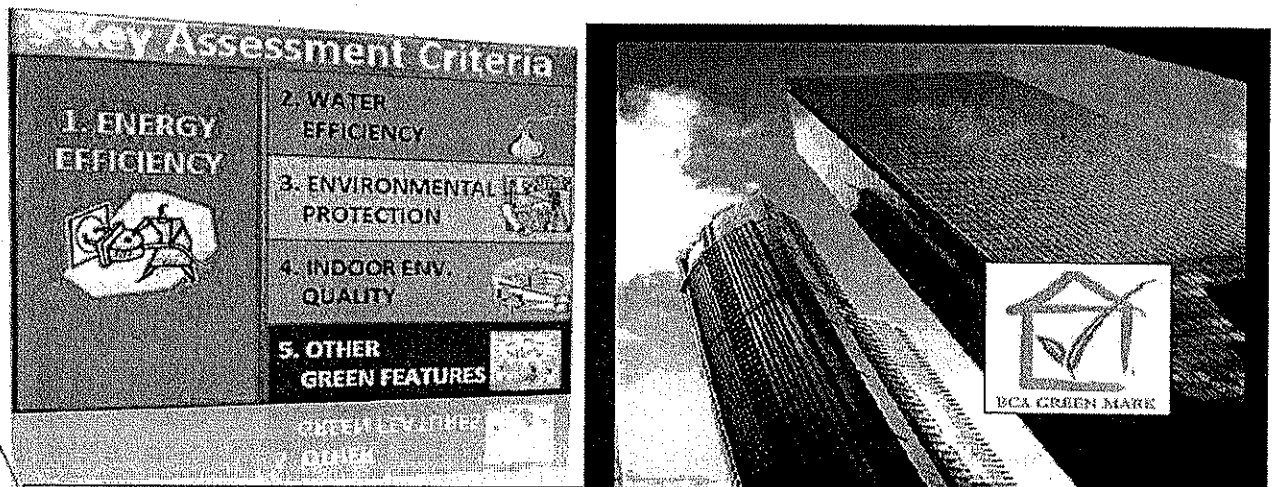
Singapore Government Green Building Initiatives

Key Facts

- Led by the Singapore Government - Building and Construction Authority (BCA)
- BCA's Green Mark Scheme launched in Jan 2005
- Government's target is 80% of buildings to be "green" by 2030
- Existing Government Buildings with more than 10,000m^2 air conditioned space to achieve Green Mark Gold Plus rating by 2020
- 2009 Launch of Green Mark Bonus GFA Incentive Scheme for new and existing buildings. This equates to 1-2% of GFA and $100mil private sector incentives respectively
- Singapore Government is taking the lead for incentivising the private sector towards Green Buildings and practices. In the future this may become mandatory
- Others - BCA Green Research Grants, EDB Solar Grants, etc.

Singapore Government Green Building Initiatives

BCA Green Mark Scheme



Green Mark	Try Again		Certified		Gold		Gold^{PLUS}		Platinum	
Score	0	49	50	74	75	84	85	89	90	100
Estimated Energy Savings			10% to 15%		15% to 25%		25% to 30%		> 30%	

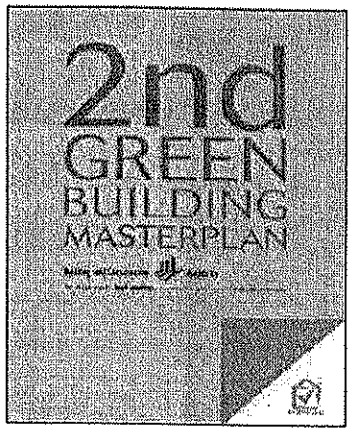
Source: BCA

Singapore Government Green Building Initiatives









80's – 2005 (Energy conservation) Energy Efficient Building Awards (Oct 2001 to 2005)	2005 (green buildings)	2006 - 2007	2009
		Offered $20 million cash incentives	Offered $100million cash incentives
		$20 million R&D funds	Govt to take stronger leadership
		Govt to take lead in green buildings	Offered bonus Gross Floor Area
		Legislation (for new and MR bldgs)	Higher energy standard
		Comprehensive industry training	Singapore – Green hub in region
		Public outreach	

Source: BCA

Singapore Government Green Building Initiatives



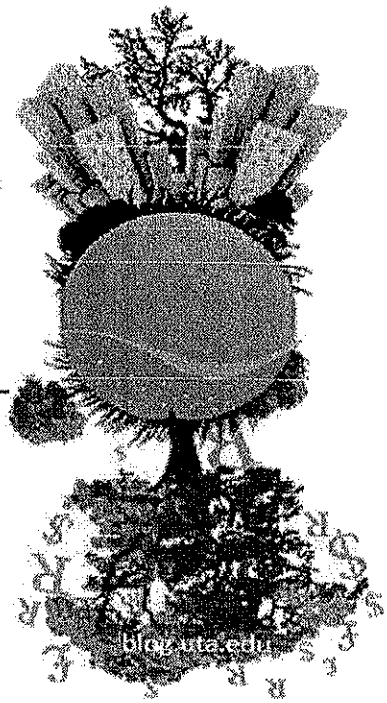
1st submission date for URA planning permission	Compliance Standard
From 15 Apr 2008 to 30 Nov 2010	Code for Environmental Sustainability for Buildings, **1st Edition, Apr 2008 issue**
From 1 Dec 2010 to 14 Jan 2013	Code for Environmental Sustainability for Buildings, **2nd Edition, Aug 2010 issue**
From 15 Jan 2013 and onwards	Code for Environmental Sustainability for Buildings, **3rd Edition, Oct 2012 issue**

Source: BCA

Singapore Government Green Building Initiatives

CREATING THE NEXT GREEN WAVE

DEVELOPING THE 3RD GREEN BUILDING MASTERPLAN

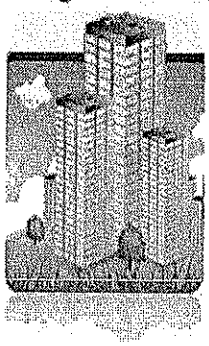


Source: BCA

Singapore Government Green Building Initiatives

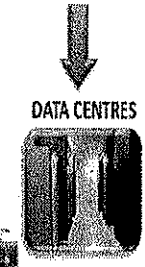
EVOLUTION OF GREEN MARK SCHEMES

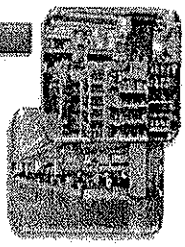
Moving Towards Occupant-Centric

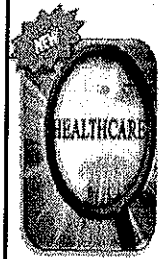








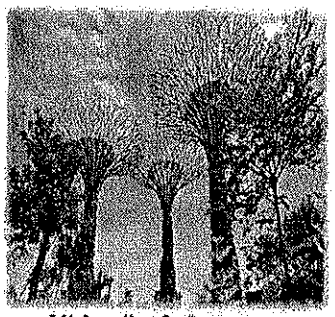




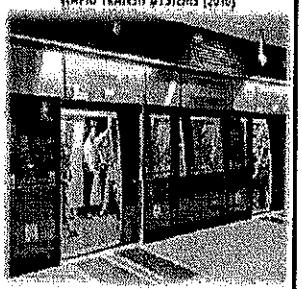


BCA GREEN MARK

BCA-NPARKS GREEN MARK FOR NEW PARKS (2008)



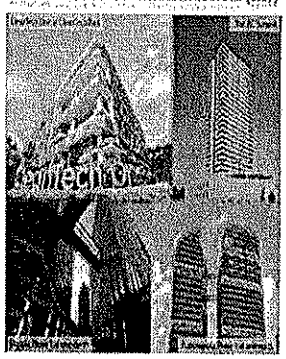
BCA-LTA GREEN MARK FOR RAPID TRANSIT SYSTEMS (2010)



BCA GREEN MARK FOR DISTRICTS (2009)



BCA GREEN MARK FOR INFRASTRUCTURE (2009)



Source: BCA

Singapore Government Green Building Initiatives

Incentive Scheme (April 09)

GMIS (Existing Buildings) scheme co-fund upgrading for energy improvement.

Energy Data Submission (July 13)

Yearly submission on building information and energy consumption data via BESS.

Legislation – Existing Buildings

Minimum EE standards for Existing Buildings and meet GM Certified

New and retrofitted existing buildings

3 yearly energy audit on cooling system and compliance of design system efficiency

RAISING THE CAPABILITY OF FACILITIES MANAGER



Source: BCA

Singapore Government Green Building Initiatives

Certification Courses at Different Functional Level

Target Audience: FMs of major building owners of private commercial offices

Rationale: advanced knowledge needed to manage and upkeep energy efficiency and green features in higher-tier GM buildings

Target Audience: Managing Agents and Service Contractors managing Strata-titled properties

Rationale: basic knowledge in sustainable to upkeep energy efficiency and basic green features

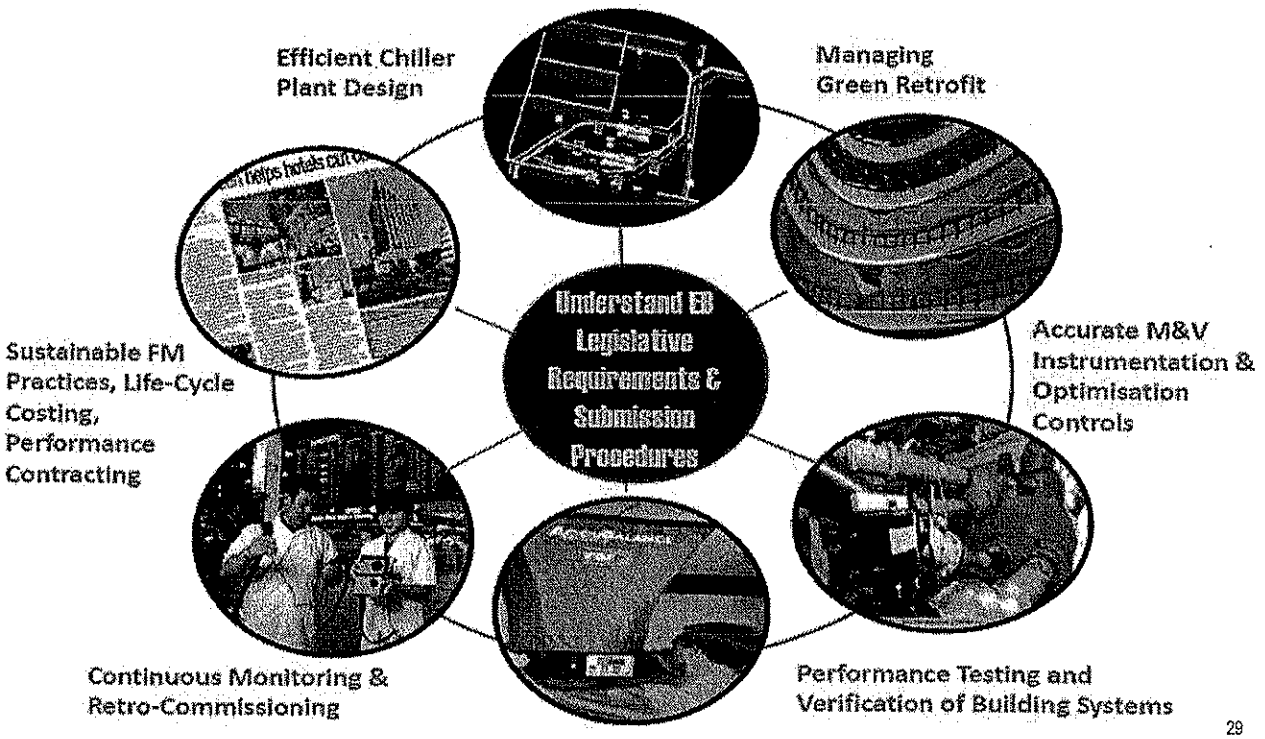
Green Mark Professional (Existing Building) (Developing) — NEW

Green Mark Facilities Manager (5-days) — Existing

Green Mark Facilities Manager (Associate) (Developing) — NEW

Source: BCA

Singapore Government Green Building Initiatives



Source: BCA

Sustainability Development Framework

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Stages	Goals & Application	Analysis	Engineering	Assessment & Implementation	Operation, Monitoring & Verification
Indicative Timeframes	2 days	1 month	2 month	4 - 8 months	On-going
Tasks	•Blue Sky Workshops •Goal Setting •Aspirations	•Understand existing operational pattern •Perform Energy Audit •Audit Water Meter, Consumption Pattern •Establish Baselines •Review Drawings •Conduct/Monitor Indoor Air Quality Test •Initial Assessment	•Energy Modelling •Solar Studies •CFD Simulations •Engagement with BCA •Value Engineering •Green Improvement List •Pay-back / Yield Analysis	•Agreement on the solutions •Procurement. •Work Schedule •Job Execution •Testing and Commissioning •Green Mark Assessment	•Monitoring of Energy Consumption •Monitoring of Water Consumption
Key Resources	•All key Stakeholders •Development •Management •Centre Management	•Project Management •External Consultant, eg. ESCO, IAQ •Centre Management	•Project Management •External Consultant, eg. CFD, Energy Modeling Specialist, etc •Centre Management	•Project Management •Out-fitting Site Management •Appointed Sub-contractors •Centre Management	•Centre Management •Verification Team

Stage 1 - Goals & Aspiration

Task

- Blue Sky Workshop with key Stakeholders in the Project including building / centre operations team.

Description

- To set the Goals and Aspiration in each development.
- To set the path and time-line
- To assign relevant task to the relevant party

Stage 1 - Goals & Aspiration

Sustainability Goals for the Project Development

- From Sustainability Workshops, the Sustainability Goals of the development are defined
- Entire Team, comprising of Marketing, Development, Leasing, Project Management, and Operations, along with the consultants are aligned to achieve the sustainability goals for the project
- The document specifically notes down the key team action items in order to achieve the goals

Stage 1 - Goals & Aspiration

Example of an Aspiration

"To be the most sustainable Development in Asia"

Sustainability Goals 1 - 11

GOALS	DEFINITION
1. Energy and Carbon Management	To Achieve Net Zero Carbon in the management of our assets, embodied carbon of our buildings and during construction of our developments. (Measure, reduce, offset)
2. Water Management	To become water neutral where the overall water used in construction and operation is returned to the system for consumption.
3. Waste	To become waste neutral or zero waste to landfill.
4. Local employment and training	Create employment initiatives and new local jobs.
5. Local Sensitivity	To give each development a distinctive character that identifies it strongly with the local area.
6. Biodiversity	Achieve a net increase in the ecological value of our development sites and asset, e.g. increase in species of flora or fauna.
7. Consultation and Engagement	Formalize the consultation and engagement process and to deliver against it consistently.
8. Engaging with Business	Actively consider and promote opportunities for local business in the areas where we operate.
9. Transport	Reduce the net impact of employee travel.
10. Materials	Develop and implement a sustainable materials management plan.
11. Our People	Operate safely, and help our people grow personally and professionally.

Project Team Action Items

- **1. Benchmarking to shopping centres and construction companies** - We want to know that we are the best in Asia by completion of the development.
- **2. Energy and Systems** - To achieve a 50% reduction in CO2 to 3000tonnes (est.) through air conditioning, lighting bio-diesel and water management.
- **3. Renewables** - Achieve 10% on-site renewables through solar, water and wind energy.
- **4. Façade and Roof** - To address solar gain, food court lighting, rain collection, double skin, glass angle and reflective index, carpark lighting, daylighting, angle of the façade.
- **5. Comfort** - Customer journey (ISO7730), the Percentage People Dissatisfied (PPD), thermal, visual, acoustic, smell, and natural ventilation opportunities including the brief for the Interior Designer.
- **6. Carbon Management Strategy** - Measurement of the buildings carbon footprint including embodied energy.
- **7. Community Engagement** - Developing a presence in the community through our sustainability values.
- **8. Retail Engagement** - Our sustainability management and influence on retailers.
- **9. Singapore Government and Government Agencies** - Understanding and leveraging sustainability policies and commitments.
- **10. Construction and the Supply chain** - Understanding our construction practices and suppliers.
- **11. Material Database** - Compiling and ranking a list of materials based on sustainability.
- **12. Experience, Education and Communication** - Consistency in our sustainability message.

Formulation of Objective Statement

For illustration only

Challenge faced in writing when first landed in the Outer Space

Problem focus

- Cannot write with a ball point pen in Outer Space

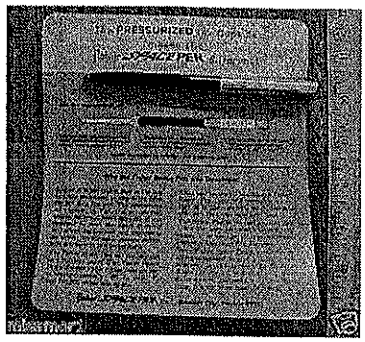
Solution focus

- Need to write in Outer Space

Formulation of Objective Statement

For illustration only

Challenge faced in writing when first landed in the Outer Space



Problem focus - Outcome

- Invented a space pen costs $$$

Solution focus - Outcome

- Used a pencil and completed mission



Stage 2 - Analysis

Task

- Meeting with Centre Operations
- Discussion of any effect on operation and maintenance procedures
- On-site Survey
- Review Existing Drawings
- Perform Energy Audit
- Audit Water Meter, Consumption Pattern
- Establish Baselines – Operational Expenditure, Energy Consumption and Water Consumption
- Conduct / Monitor Indoor Air Quality Test
- Initial Green Mark Assessment by Project Team

Stage 2 - Analysis

Description

- Required to develop a thorough understanding of how energy / water is used and conduct a planned and comprehensive cause analysis to identify all practical opportunities for energy / water conservation that meets owner's operational constraints.
- An assessment of the mall's current design and operating standards against recognized references such as BCA's Green Mark for Existing Buildings and will involve a review against the following criteria.
  - Energy Efficiency
  - Water Efficiency
  - Building Management and Operation
  - Indoor Environmental Quality and Environmental Protection
  - Innovation

Stage 2 - Analysis

Remark

Services by external consultants required:

- Project Management
- Qualified ESCO (NEA grant available to support 50% of the fees)
- IAQ Verification Specialist

▪ The Purpose (Goal) of Project Management

➢ **To achieve project goal with Quality by delivering quality professional service with <u>manageable</u> Risk, Time and Cost**

➢ **The meaning of MANAGEABLE:**

- ✓ Minimum
- ✓ Optimum
- ✓ To meet or exceed Expectations of Stakeholders

▪ Expectations of Stakeholders

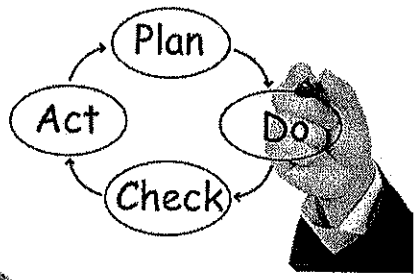
➢ **Understanding of Emotional Cycle, the 5-A stages:**

Astonishment	» to avoid unless it is a good surprise
Agitation	» to avoid negative energy generation
Accept	» to "Adjust" expectation
Adjust	» to "Accept" reality
Adapt	» to "Adapt" change

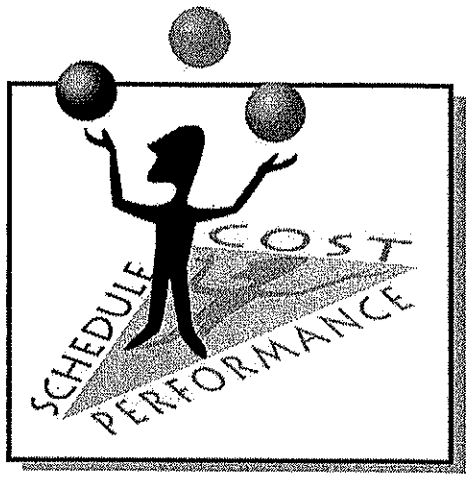
➢ **Nothing is impossible except change which is a constant**

➢ **UNDER PROMISE, OVER DELIVER**

Stage 2 – Analysis
Project Management Tools



- **The RTC approach:**
  - **R**isk Management
    - Principles and Techniques
  - **T**ime Management
    - Activities / Tasks prioritization
  - **C**ost Management
    - Life Cycle Cost analysis



Stage 2 – Analysis
Project Management on Risk Management

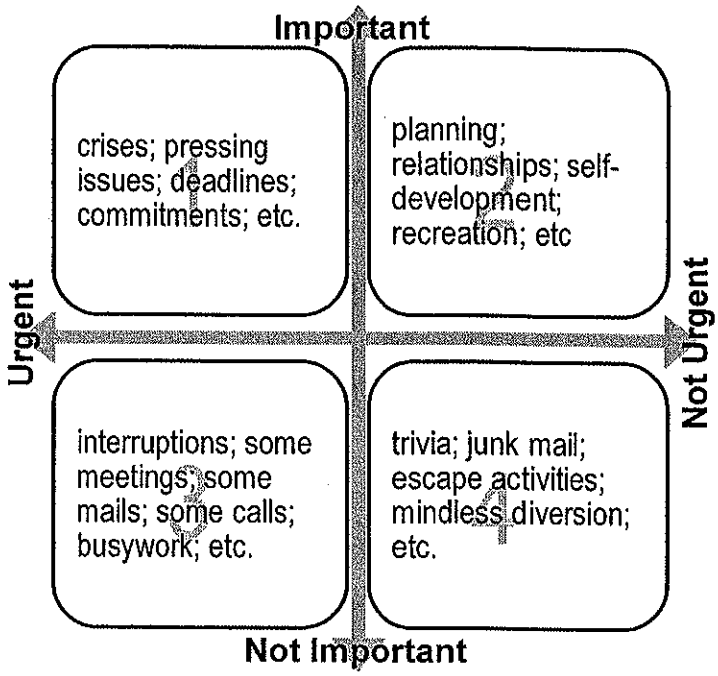
- **Principles**
  (DDC)
  1) **Don't lose more than you can afford**
  2) **Don't lose a lot for a little**
  3) **Consider Alternatives**

- **Techniques**
  (STARR)
  1) **S**hare
  2) **T**ransfer
  3) **A**void
  4) **R**educe
  5) **R**etain

Stage 2 – Analysis
Project Management on Time Management

- **Important**
  - consequential outcome
- **Urgent**
  - immediate action

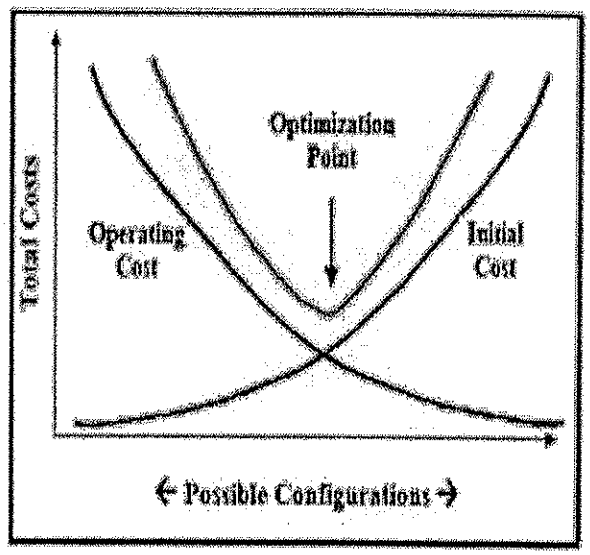
- **Priority 1**
  - ➢ Do
- **Priority 2**
  - ➢ Decide when to do
- **Priority 3**
  - ➢ Delegate
- **Priority 4**
  - ➢ Dump



Stage 2 – Analysis
Project Management on Cost Management

- **Life Cycle Costs**
  - ➢ Capital Investment
  - ➢ Service and Maintenance cost
  - ➢ Operating cost
  - ➢ Disposal cost

- **Analysis methods**
  - ➢ Payback Period / ROI
  - ➢ Net Present Value
  - ➢ Annual Worth / Cost
  - ➢ Etc.



Stage 3 - Engineering

Task

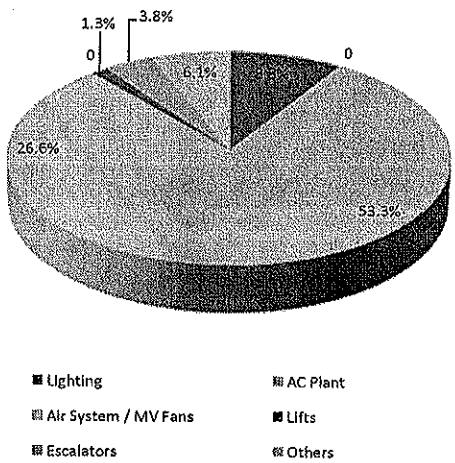
- Pre-assessment with BCA
- Breakdown of energy consumption
- List possible improvement and associated cost to achieve the best possible Green Mark Score
- Innovation Brainstorm
- Value Engineering
- Economic Analysis for pay-back period

Options

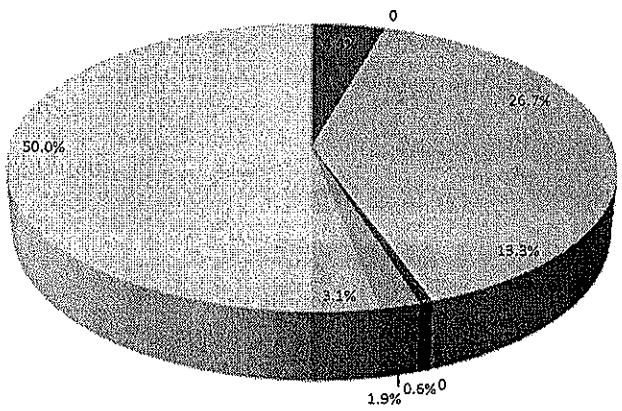
- Energy Modeling Simulation
- Sun-path / Day-lighting / Solar Studies
- Computational Fluid Dynamics Simulations for key areas

Stage 3 - Engineering - Typical Retail Energy Consumption

Landlord Energy Consumption



Whole Building Energy Consumption



Stage 3 - Engineering
- Holistic Energy Saving Approach

"You can't manage what you don't measure."

Stage 3 - Engineering
- Holistic Energy Saving Approach

What should you measure to help manage your energy bills?

Stage 3 - Engineering
- Holistic Energy Saving Approach

$$kWh\ Charge\ S\$ = \underbrace{kWh}\ x\ \underbrace{S\$ / kWh}_{\text{Tariff}}$$

$$kW\ x\ Hours\ of\ Operation$$

$$\underbrace{Cooling\ Load\ RT}\ x\ \underbrace{kW/RT}$$

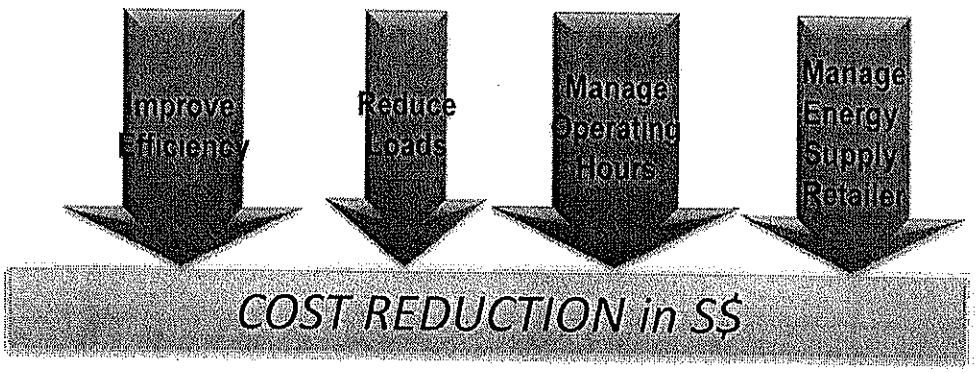
Building Size/Envelope, Usage, and Weather

Chiller System Efficiency

Stage 3 - Engineering
- Holistic Energy Saving Approach

kWh Charge = Efficiency x Usage x Tariff (S$ / kWh)

kWh Charge = kW / RT x RT x Hours x Tariff (S$ / kWh)



Stage 3 - Engineering
- Holistic Energy Saving Approach

kWh Charge	=	kW / RT	x	RT x Hours	x	Tariff (S$ /kWh)

Key Energy Parameters

1. Chiller Plant System

- *Cooling Loads, RT = function (flow, delta T)*
- *Power Consumption, kW*
- *Chiller Plant Efficiency, kW/RT*

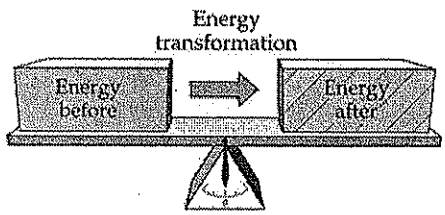
2. Lighting System

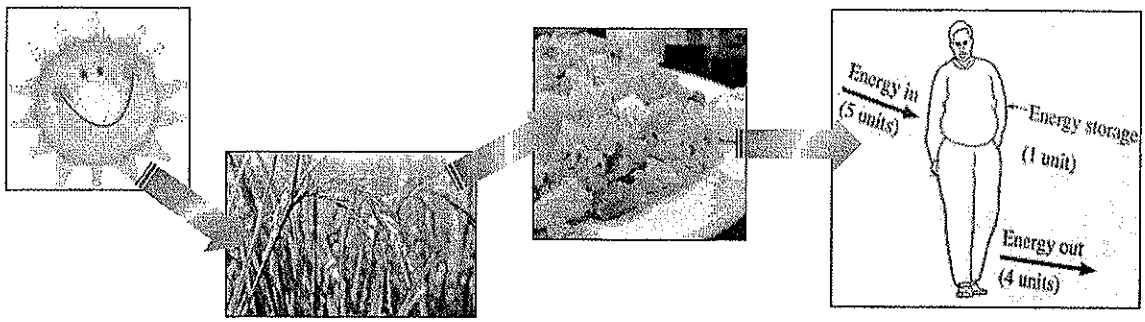
- *Light intensity per unit area, Lux (Lumens per m^2)*
- *Lighting Efficacy, Lumen per Watt*

3. Other Systems

- *Fan efficiency, Watt per CMH*
- *Etc.*

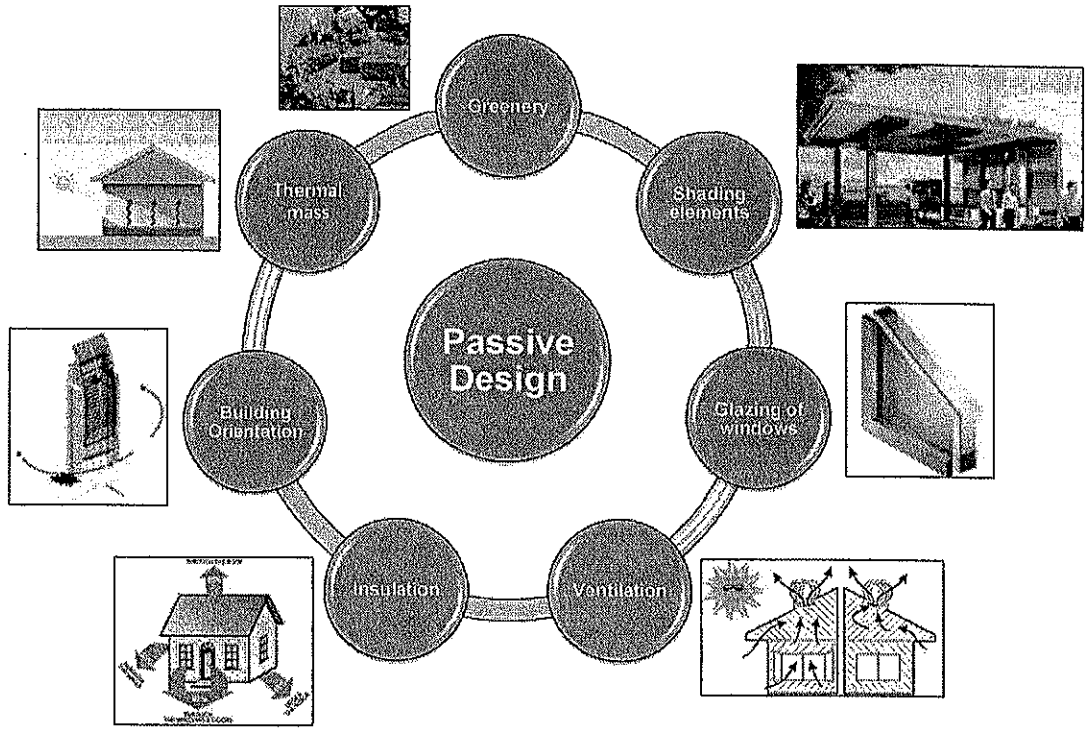
Stage 3 - Engineering
- Energy by Law of Nature



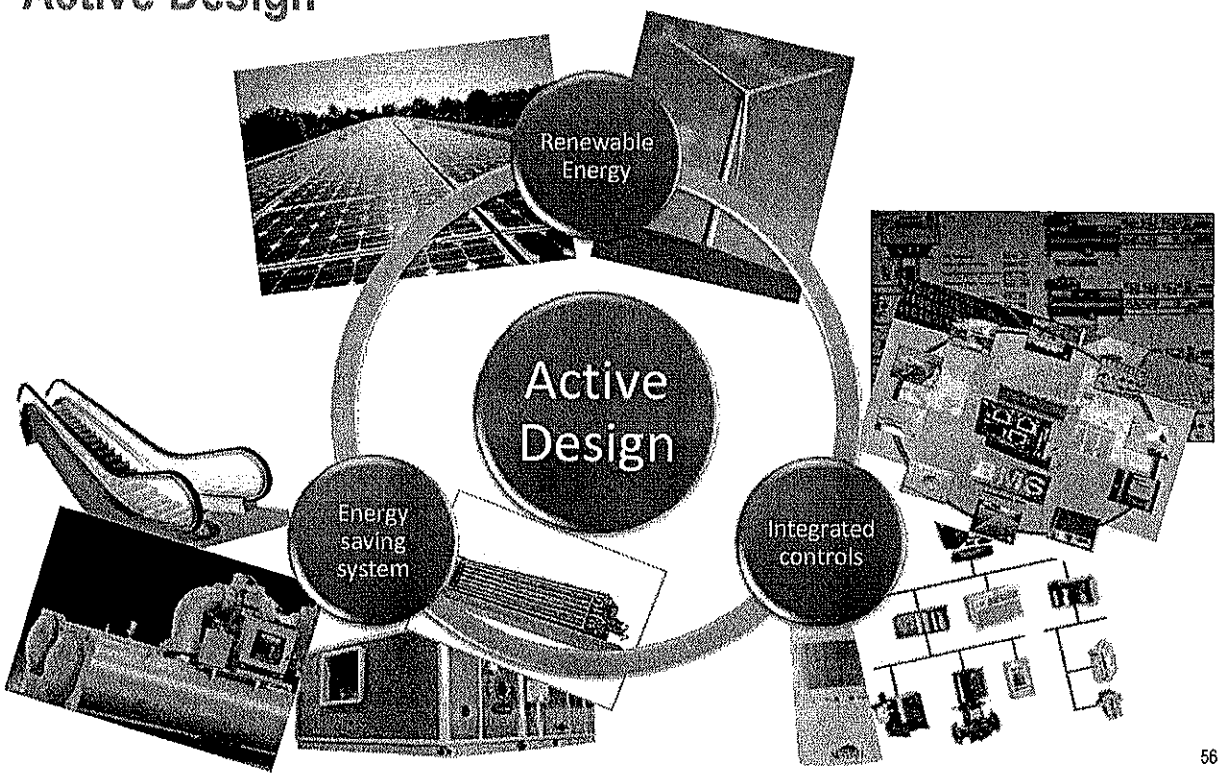


Energy Conservation Principle

Stage 3 - Engineering - Passive Design



Stage 3 - Engineering - Active Design



Stage 3 - Engineering

Description

- One of the main purposes of having Passive Design for a building is to reduce the energy usage in term of the energy consumption of the whole building.
- The key focus of Active Design for a building is to design the best possible system efficiency in term of the energy consumption of the whole building.
- The breakdown of the current energy consumption will form the baseline and energy modeling simulates the improvement to the existing premises.
- During this stage, all possible green initiatives with value-engineered solutions will be listed and the associated cost will be advised.
- Other additional studies such as sun-path or CFD will reveal potential improvements to the comfort of the areas.
- Pre-assessment will be conducted with BCA to verify if level of award is achievable.
- Economic Analysis will also be performed to provide supporting documents for funding paper. With the technical supporting documents, funding paper can then be formulated by Development Manager. Once the funding is approved, it will proceed to the next stage.

Stage 3 - Engineering

Remark

Services by external consultant required:

- Green Mark Submission
- ESCOs
- Energy Modeling/Thermal Comfort analysis
- (CFD and solar modeling)

Authorities Fee

- BCA Green Mark Assessment Fee

Stage 4 - Assessment & Implementation

Task

- Agreement on the solutions
- Procurement
- Work Schedule
- Job Execution
- Testing and Commissioning
- Green Mark Assessment

Stage 4 - Assessment & Implementation

Description

- In this stage, the valued engineered solutions for procurement are to be agreed among all stakeholders.
- Expected savings will start from the date of completion.
- Green Mark Assessment conducted by BCA will be managed by the PM, supported by ESCO.
- Procurement within budget will cap investment cost.

Remark

- After the assessment stage, turn-key contractor to carry on the vision for the desired outcome.

Stage 5 - Operation, Monitoring and Verification

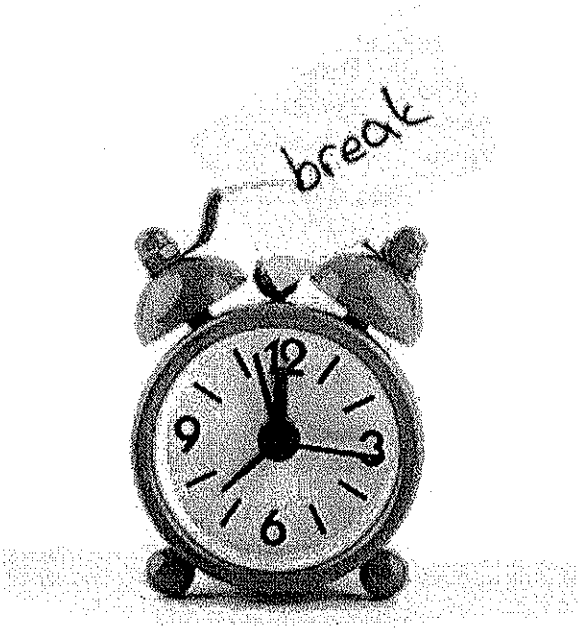
Task

- Monitoring of Energy Performance, i.e. International Performance Measurement and Verification Protocol (IPMVP)
- Tracking of energy and water savings
- Handing over to Centre Management for continuous operations

Description

- Continual monitoring of the energy and water consumption by the Center Management to validate the achievement of economic returns.
- Any irregularities will be highlighted and all necessary rectifications will be performed to the systems implemented.
- Upon successful verification of systems performance, sustainability development is considered completed for the project.

Break Time



20 mins!!!

Sustainability Implementation – Case Study

Green Initiatives Analysis (For illustration only)

Part	Green Mark Criteria	Cost of Going Green (S$)		Annual Energy Cost Savings (S$)		Simple Payback (Yrs)		Net Present Value (S$)	
		Green Mark Gold^{Plus}	Green Mark Platinum	Green Mark Gold^{Plus}	Green Mark Platinum	Green Mark Gold^{Plus}	Green Mark Platinum	Green Mark Gold^{Plus}	Green Mark Platinum
1-1	ETTV								
	Plaster Board (Retail)	$ 846,000	$ 846,000	$ 362,000	$ 362,000	2.34	2.34	$ 3,323,303	$ 3,323,303
	Higher Grade Double Glazed Window, External Sun Shading (Office)		$ 4,000,000		$ 150,000		26.67	$ -	$ (2,272,388)
1-2	Air-Conditioning System Efficiency							$ -	$ -
	Chiller Plant Efficiency 0.65 kW/RT	$ 350,000	$ 350,000	$ 262,800	$ 262,800	1.33	1.33	$ 2,676,776	$ 2,676,776
	Chiller Plant Efficiency 0.60 kW/RT							$ -	$ -
	Chiller Plant Efficiency <0.60 kW/RT + Other Technologies		$ 3,500,000		$ 600,000		5.83	$ -	$ 3,410,447
1-5	Daylighting							$ -	$ -
1-6	Artificial Lighting							$ -	$ -
	Intelligent Lighting Controls		$ 730,000		$ 238,000		3.07	$ -	$ 2,011,144
1-7 to 1-9	Ventilations, Lifts and Escalators	$ 564,000	$ 564,000	$ 62,000	$ 62,000	9.10	9.10	$ 160,079	$ 160,079
1-10	*Energy Efficient Features		$ 5,430,400		$ 1,027,200		5.29	$ -	$ 6,480,284
1-11	*Renewable Energy							$ -	$ -
2	Water Efficiency	$ 250,000	$ 250,000			Measures on Sustainability Criteria not related to Energy Efficiency		$ (250,000)	$ (250,000)
3	Environmental Protection	$ 750,000	$ 1,500,000					$ (750,000)	$ (1,500,000)
4	Indoor Environment Quality	$ 250,000	$ 500,000					$ (250,000)	$ (500,000)
6	Green Features	$ 250,000	$ 500,000					$ (250,000)	$ (500,000)
	Total	$ 3,260,000	$ 18,170,400	$ 686,800	$ 2,702,000	4.75	6.72	$ 4,650,158	$ 12,949,644

* Refer details.

Sustainability Implementation – Case Study

Green Initiatives Analysis (For illustration only)

Energy Efficient Initiatives

S/N	Additional Energy Efficient Features	Cost of Investment (S$)	Energy Savings (GWh / Yr)	Energy Cost Savings (S$ / Yr)	Energy Savings Contribution (%)	Simple Payback (Yrs)	Net Present Value (S$)
1	Innovative Highly Inductive Air Diffusers	$ 2,060,000	0.99	$ 237,600	1.80%	8.63	$ 686,537
2	CO Monitoring Carpark MV System	$ 300,000	0.89	$ 213,600	1.62%	1.40	$ 2,160,119
3	VSD-driven Kitchen MV Fans	$ 500,000	0.81	$ 194,400	1.48%	2.57	$ 1,738,985
4	CO2 Demand Controlled Ventilation	$ 950,400	0.60	$ 144,000	1.09%	6.60	$ 708,107
5	High Temp Chiller Plant (15 C)	$ 900,000	0.45	$ 108,000	0.82%	13.89	$ 343,880
6	VSD controlled escalators	$ 120,000	0.25	$ 60,000	0.45%	2.00	$ 571,045
7	Solar PV System	$ 1,890,000	0.24	$ 57,600	0.44%	32.81	$ (1,226,597)
8	Heat Recovery Wheel	$ 290,000	0.16	$ 38,400	0.28%	7.55	$ 152,269
9	Intelligent Lighting Controls	$ 320,000	0.13	$ 31,200	0.24%	10.26	$ 39,343
10	Heat Recovery Hot Water System	$ 360,000	0.09	$ 21,600	0.16%	16.67	$ (111,224)
11	Thermal Energy Storage	$ 750,000	0.07	$ 16,800	0.13%	44.64	$ (666,507)
	Total	**$ 8,430,400**	**4.68**	**$ 1,123,200**	**8.51%**	**7.51**	**$ 4,505,956**

Sustainability Implementation – Case Study

Green Initiatives Analysis (For illustration only)

Energy Efficient Initiatives Selected							
S/N	Additional Energy Efficient Features	Cost of Investment (S$)	Energy Savings (GWh / Yr)	Energy Cost Savings (S$ / Yr)	Energy Savings Contribution (%)	Simple Payback (Yrs)	Net Present Value (S$)
1	Innovalive Highly Inductive Air Diffusers	$ 2,050,000	0.99	$ 237,600	1.80%	8.63	$ 686,537
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8	Intelligent Lighting Controls	$ 320,000	0.13	$ 31,200	0.24%	10.26	$ 39,343
	Total	$ 5,430,400	4.28	$ 1,027,200	7.78%	5.29	$ 6,400,284

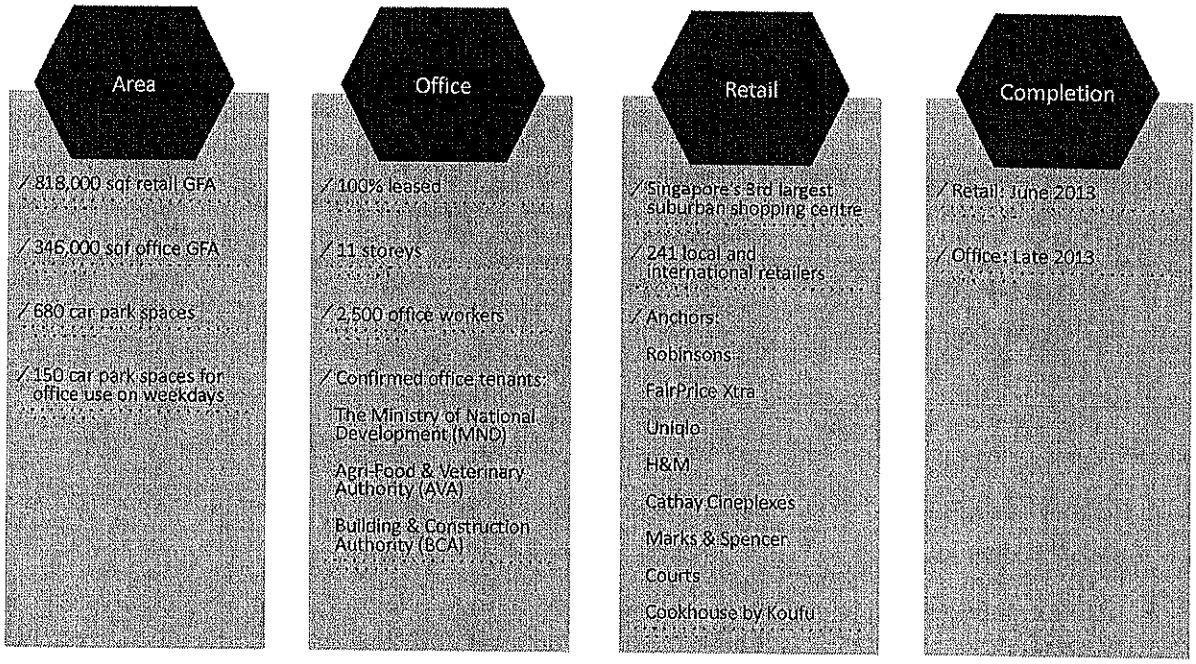
Sustainability Implementation – Case Study

Green Initiatives Analysis (For illustration only)

		Cost of Going Green (S$)	
Green Mark Criteria		Green Mark Gold^{PLUS}	Green Mark Platinum
Total		**$ 3,260,000**	**$ 18,170,400**
LIFE CYCLE COSTS ANALYSIS			
Inputs			
Capital Amount	(S$)	$ 3,260,000	$ 18,170,400
Annual Saving	(S$)	$ 686,800	$ 2,702,000
MARR (Minimum Attractive Rate of Return)	(%)	3.50%	3.50%
Useful Life	(yrs)	15	15
Computation Results			
Simple Payback	(yrs)	4.75	6.72
ROI	(%)	21.07%	14.87%
Discounted Payback	(yrs)	5.28	7.80
IRR	(%)	19.64%	12.24%
NPV	(S$)	$ 4,650,158	$ 12,949,644

Sustainability Implementation – Case Study

Jem® - Project Factsheet



Source: IGBC 2013 Site Tour Factsheet

Sustainability Implementation – Case Study

Jem® - Sustainability Aspiration

""To be the first Retail / Commercial mixed use development in Singapore that will be Green Mark Platinum V4 certified"

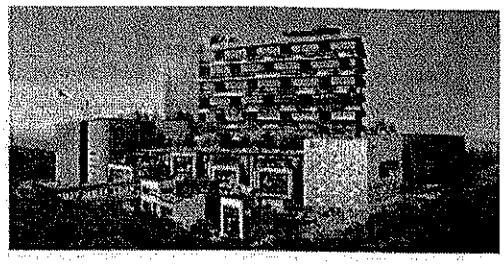
Sustainability Implementation – Case Study

Jem® - Sustainability Achievement in Design

PLATINUM

BCA
GREEN MARK FOR
BUILDINGS AWARD

jem
New Non-Residential Buildings



Clients / Developers
Lend Lease Commercial Investments Pte Ltd
Lend Lease Retail Investments 3 Pte Ltd

Project Manager
Lend Lease

Architect
SAA Architects Pte Ltd

M&E Engineer
Bescon Consulting Engineers Pte

Structural Engineer
Meinhardt Infrastructure Pte Ltd

Main Contractor
Lend Lease

Landscape Consultant
ICN Design International Pte Ltd

ESD Consultant
Cofely South East Asia Pte. Ltd.

Key Features

- Estimated energy savings: 13,016,670 kWh/yr; estimated water savings: 265,160 m^3/yr; ETTV: 37.81 W/m^2.
- More than 100% green replacement.
- High efficiency "multi-tier" chilled water plant.
- Highly responsive airside and mechanical ventilation system.
- Extensive environmental modelling.
- Green lease and Green Mark certification for retailers.
- Innovative 2-stage fresh air treatment and infiltration controls.
- Extensive use of LED lighting.

Source: BCA

Sustainability Implementation – Case Study

Jem® - Sustainability Achievement

Jem's Sustainable Initiatives

1 Passive Design
1.1 High Performance Building Envelope
1.2 Extensive Greenery with more than 100% Green Replacement
1.3 Natural Light
1.4 Naturally Ventilated Walkway, Greenery Areas and Outdoor Refreshment Areas

2 Active Design
2.1 High Efficiency Air-Conditioning System
2.1.1 Innovative High Efficiency "Multi-Tier" Chilled Water Plant
2.1.2 Highly Demand Responsive Airside and Mechanical Ventilation system
2.1.3 Innovative 2-stage Fresh Air Treatment
2.1.4 Innovative Highly Inductive Diffusers
2.2 Cool Air Heat Recovery
2.3 Intelligent lighting control
2.4 Energy Saving Lifts / Escalators / Travelators

3 Water Efficient Strategy

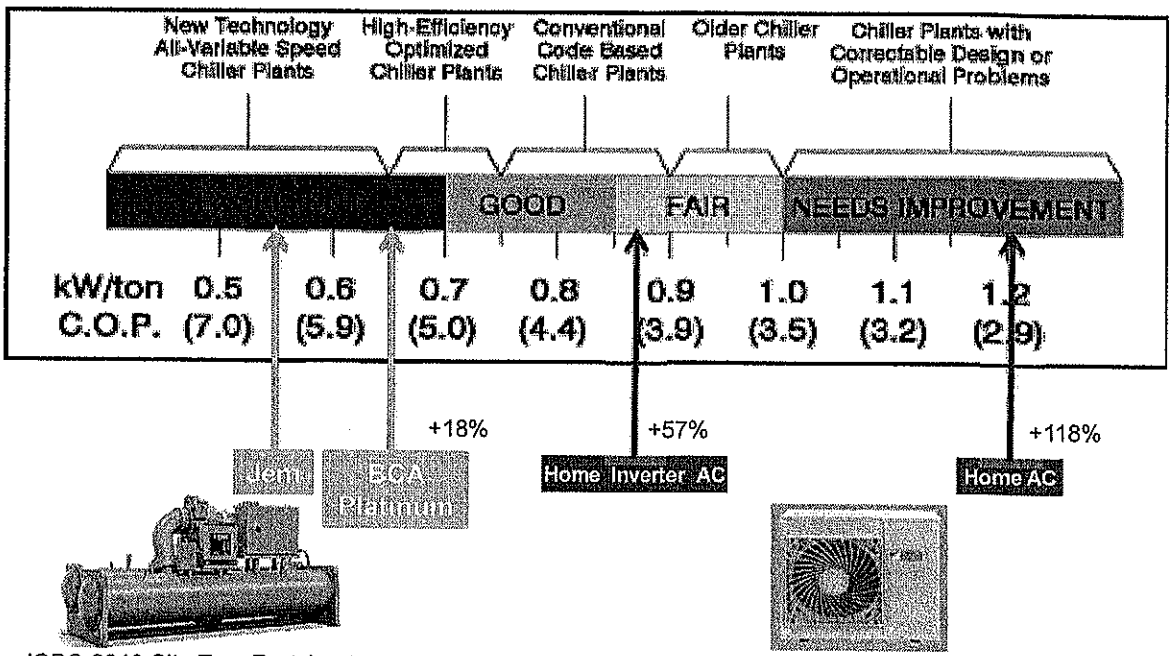
4 Operational Sustainability
4.1 Green Lease
4.2 Waste Management

Source: IGBC 2013 Site Tour Factsheet

Sustainability Implementation – Case Study

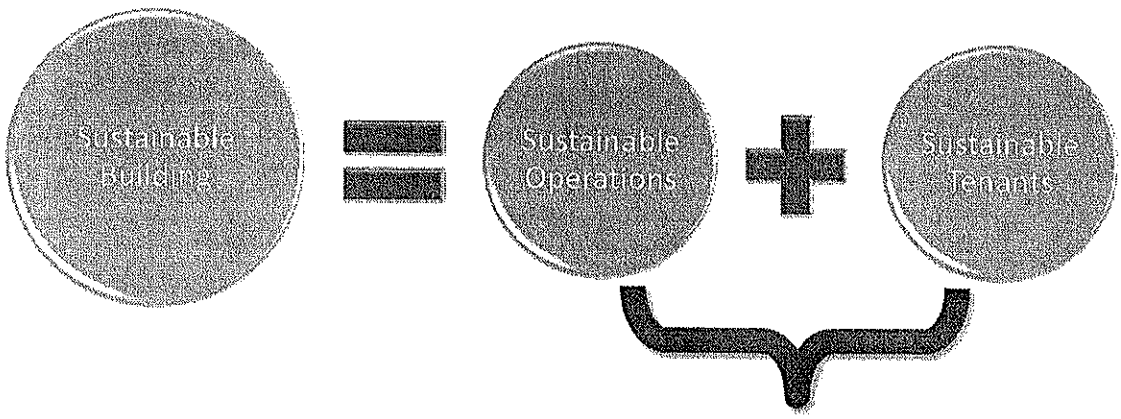
Sustainability Achievement in Design

Ashrae Benchmark for Chiller Plant System Efficiency



Source: IGBC 2013 Site Tour Factsheet

Green Lease - Why?



Green Lease

Green Lease - Objectives

- "Green Lease" to address challenges such as:

  1) improvements to the base building efficiency,

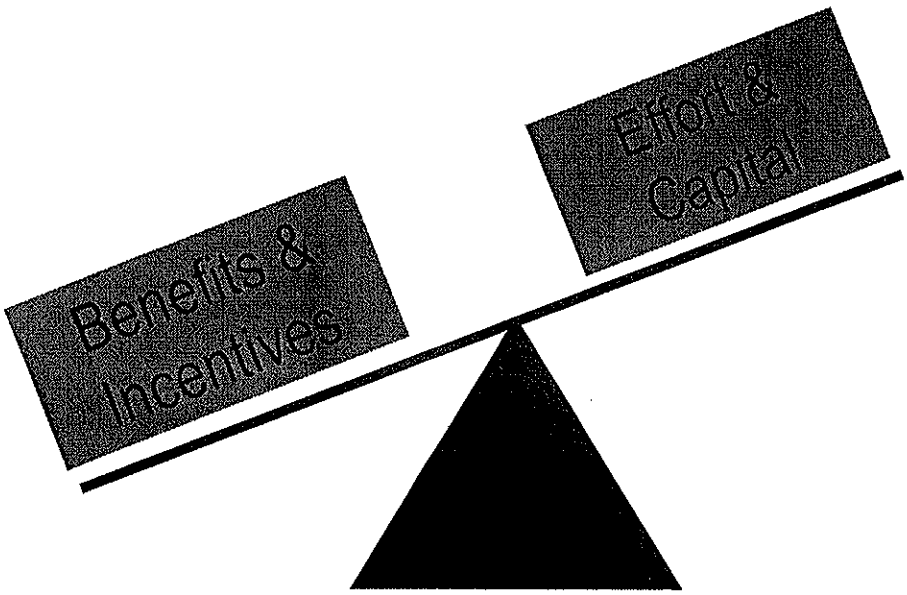
  2) incentives alignment,

  3) improvements to the tenant space,

  4) fostering resource by transparency, and

  5) clarification of the access and control of key spaces.

Green Lease – Balance Equation



Green Lease – The True Sustainable Building

- A sustainable building = sustainable retailers + sustainable operations
  - ➢ Note that Energy Consumption for a typical Retail environment is around 50% for landlord and 50% for tenants
- Binding leases with green component and obligations for both landlord and tenant
- Centre Management Operations team controlling and collaborating with the tenants during the fit-out design and construction process
- Fit-out guidelines with green component, e.g. Electronic services calculator to control energy usage (W/m^2)
- Promotion of recycling and providing the necessary facilities during the tenant fit-out and operations
- Tenant, shoppers and staff education programmes of waste management & recycling

Green Lease – Agreement Summary sample

Standard	Landlord Obligation	Tenant Obligation
Electricity Purchase Strategy	Bulk purchase of electricity for the whole centre. Discounts on electricity to sustainable tenants.	Agree to meet electricity consumption limits in order to benefit from electricity discounts.
Energy Efficiency	Provide tools to enable energy calculation, in particular lighting assessment. Meet 25w/m2 in lighting.	Comply with banned lighting, lighting control and low energy consumption equipment. Offset carbon footprint of tenancy. Future relamping to comply.
Fit-out Materials	Provide schedule of preferred and banned materials and relevant suppliers.	Demonstrate efforts to reduce: PVC based products, rare and exotic timbers, high embodied carbon materials.
Carbon Footprint	Provide carbon footprint calculator.	Complete carbon calculator as part of design submission.
Water Efficiency	Provide tools to enable water consumption calculation. Hot water purchase agreements.	Comply with PUB excellent rating if appropriate. Participate in hot water purchasing.
Waste	Provide centralised waste management service and waste collection. Provide recycling facilities.	Support centre waste management and carry out stream waste separation and disposal incl. waste cooking oil

Green Lease – Agreement Summary sample

Standard	Lanlord Obligation	Tenant Obligation
Transport	Establish travel schemes and carpark management plan.	Staff participation in centre travel schemes.
Community	Develop community plans and partnerships.	Participate in community partnership programs.
Learning	Provide support to tenants to maintain sustainable performance.	Participate in learning programs and customer engagement and award schemes.
Management and Reporting	Publish annual report on centre sustainable performance. Provide proforma for reporting.	Provide energy consumption information. Make good where performance has not been achieved.
Use and operation of operating systems	Provide support in the 1st year of operation to reduce water and energy consumption.	Operate tenancy with goal of achieving targets. If targets not achieved work with management to achieve or understand and implement reasonable recommendations. No unauthorized addition of equipment during operation.

Green Lease - Sustainability Framework

As Landlord

- Senior Management commitment
- Resources - technical, educational
- Operational budget allocated
- Upfront commitment on Day 1 from Centre Management Operations Team
- Tireless enforcement by Operations Team
- On-going refinement and improvement
  - ➢ understanding and proactively exploring living case study

Green Lease - Sustainability Framework

With Tenants

- Tenant information session alignment with Leasing, Base Build, and Operations Teams
- Workshops with Tenant Designer and Contractor
- Design Analysis
- Negotiations & Approval
- Interim reminders to stake holders reiterating the minimum requirements
- Fit-out site inspection
- Post fit-out inspection
  - ➢ incentives on electricity discount
  - ➢ penalties on refundable fit-out deposit for non-compliance.

Green Lease - Tenancy Management

- Tenant education programmes of waste management & recycling during fit-out
- Tenant fit-out control and guidance on
  - ➢ Efficient use and energy saving features
  - ➢ Type of materials (Recycling and Recycled)
  - ➢ Centralised waste disposal and recycling
  - ➢ Centralised power purchase for the entire building to understand landlord and tenant consumption
- Incentivising Tenants - Carrot, not Stick approach (Electricity Discounts)
- This continues through to the operations and is applicable to all new Tenants
- Minimise surprises for all levels of fit-out delivery
  - ➢ Clear explicit summaries of design parameters.
  - ➢ Clear process of assessment and auditing from design to post fit-out assessment.



Green Lease - Tenancy Management

Inform, Demonstrate & Advise:

- Influencing design parameters but not designing for tenants
- Physical Demonstrations
- Power Meter, Lux Meter

Resources:

- Samples, Prices & Technical Awareness
- Show Case, know-how sharing
- Cost recovery, give the principles necessary to calculate cost recovery of alternate designs
- Use of Process Tools
  - ➢ Retail Services Guide
  - ➢ Retail Services Calculator
  - ➢ Sustainability Materials Guide

Got To Know what works through:

- Staff Resources Available
- Manufacturer Contacts
- Supplier Contacts
- Designers and Contractors
- Latest and emerging technology
- Cost & possible discounts
- Understanding Contractor constraints

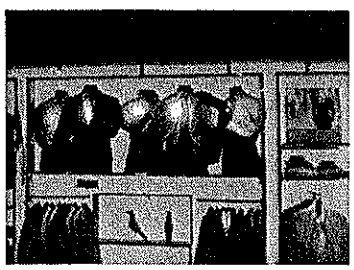
Green Lease – Case Study

- Establish requirements by engaging and giving advice



Wasted energy on excessive back lights and narrow focused spots

Shop looks dull at 55 watts per m^2





<30 watts per m^2 total, use of the right lights minimized energy use and 1200 lux average light level achieved by using 26 watt CFL lights with good reflectors

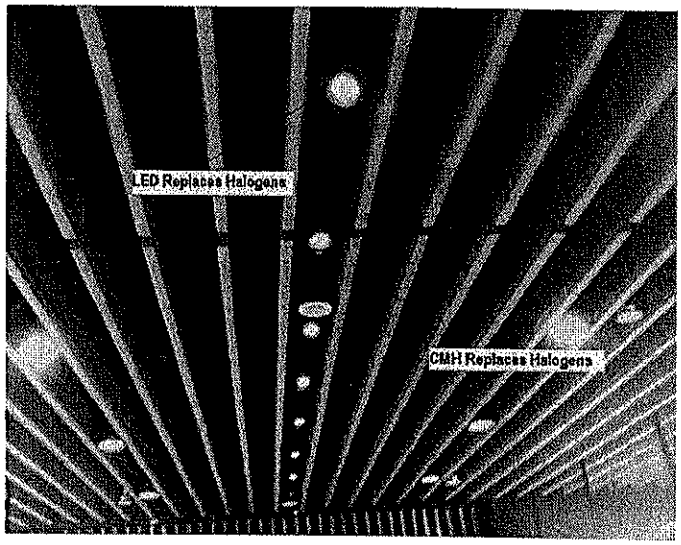
Ceiling lights at 23.3 W/m^2 by using 172 nos. 26 watts CFL lights spread over 220 m^2

Display lights at 6.5 W/m^2 using LEDs and T5 FL

Green Lease – Case Study

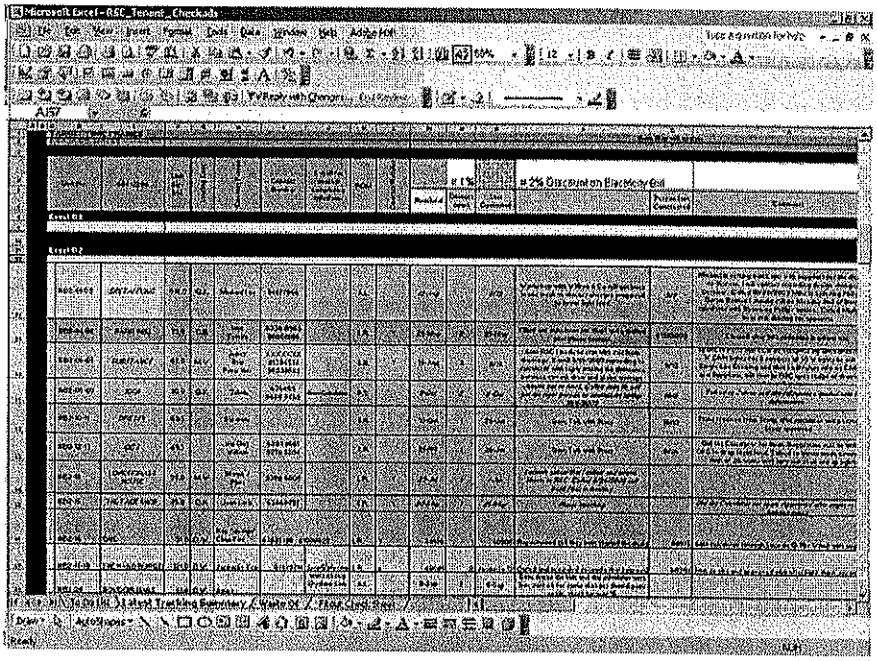
- Showcase / Demonstrate alternatives



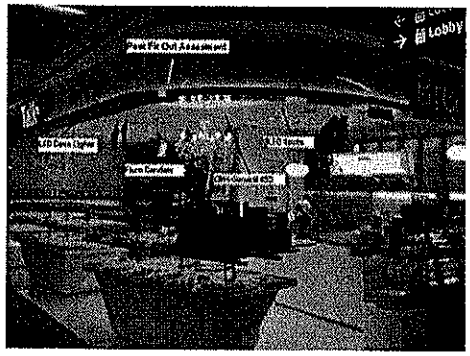


Green Lease – Case Study

- Record Progress



Green Lease – Case Study



Post Fit-out Assessment highlighted issues and gave advice on remedies.

Bread talk replaced T5 lamps with LED strips and incandescent candles with fluorescent lamps

5-watt lights replaced 40-watt lights

Ramen Play replaced 80 nos. of 40-watt incandescent globes with 5-watt CFL lights

12 nos. of 50-watt QH (Quartz Halogen) globes replaced with 5-watt LED lights

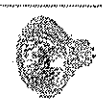
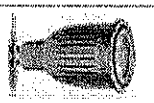
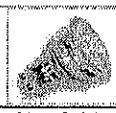
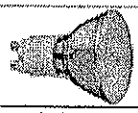
Load reduced by 50%

Maximum discount allocated

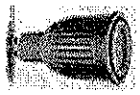


Green Lease – Case Study on Life Cycle Costing

Typical Retail Lighting Life Cycle Cost Comparison

	Unit	 Halogen Incandescent	 LED GU 10 Replacement	 CPF GU 10 Replacement	 Ceramic Metal Halide GU 10 Replacement
Per Lamp					
Lamp Rating	(W)	50	7	11	20
Daily Run Hours	(hrs)	12	12	12	12
Annual Run Hours	(hrs)	4,380	4,380	4,380	4,380
Annual Energy Consumption	(kWh)	219	31	48	88
Electricity Rate	(S$/kWh)	$ 0.25	$ 0.25	$ 0.25	$ 0.25
Annual Energy Consumption Cost	(S$)	$ 54.75	$ 7.67	$ 12.05	$ 21.90
Per Unit Area					
Useful Life	(hrs)	2,000	45,000	10,000	15,000
Years to Replacement	(yrs)	0.46	10.27	2.28	3.42
Lux at 2.5 metres	(Lux)	320	380	80	1,100
Lamp required at 720 Lux	(no.)	3.00	2.00	9.00	1.00
No. of Replacement for 3 years	(no.)	6.00	0.00	1.00	0.00
Cost per Lamp	(S$)	$ 1.50	$ 40.00	$ 8.00	$ 60.00
First Cost	(S$)	$ 4.50	$ 80.00	$ 72.00	$ 60.00
Lamp Replacement Cost for 3 years	(S$)	$ 27.00	$ -	$ 72.00	$ -
Total Energy Cost for 3 years	(S$)	$ 492.75	$ 45.99	$ 325.22	$ 65.70
Total Operations Cost for 3 years	(S$)	$ 524.25	$ 125.99	$ 469.22	$ 125.70
Total Annual Operations Cost	**(S$)**	**$ 174.75**	**$ 42.00**	**$ 156.41**	**$ 41.90**

Green Lease – Case Study on Life Cycle Costing

Typical Retail Lighting Life Cycle Cost Comparison					
					
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Per Lamp					
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Daily Run Hours	(hrs)	12	12	12	12
Annual Run Hours	(hrs)	4,380	4,380	4,380	4,380
Annual Energy Consumption	(kWh)	219	31	48	88
Electricity Rate	(S$/kWh)	$ 0.25	$ 0.25	$ 0.25	$ 0.25
Annual Energy Consumption Cost	(S$)	$ 54.75	$ 7.67	$ 12.05	$ 21.90
Per Unit Area					
Useful Life	(hrs)	2,000	45,000	10,000	15,000
Years to Replacement	(yrs)	0.46	10.27	2.28	3.42
Lux at 2.5 metres	(Lux)	320	380	80	1,100
Lamp required at 720 Lux	(no.)	3.00	2.00	9.00	1.00
No. of Replacement for 5 years	(no.)	10.00	0.00	2.00	1.00
Cost per Lamp	(S$)	$ 1.50	$ 40.00	$ 8.00	$ 60.00
First Cost	(S$)	$ 4.50	$ 80.00	$ 72.00	$ 60.00
Lamp Replacement Cost for 5 years	(S$)	$ 45.00	$ -	$ 144.00	$ 60.00
Total Energy Cost for 5 years	(S$)	$ 821.25	$ 76.65	$ 542.03	$ 109.50
Total Operations Cost for 5 years	(S$)	$ 870.75	$ 156.65	$ 758.03	$ 229.50
Total Annual Operations Cost	**(S$)**	**$ 174.15**	**$ 31.33**	**$ 151.61**	**$ 45.90**

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Green Lease – Case Study on Tangible Benefits for Lighting Outcome

- Eg. Green Lease requirements with maximum recommended lighting of 35W/m²

Type	Sum of Tenancy Area (m2)	Original Lighting (W/m2)	Lighting (W/m2)
Anchor	2,742	42.9	36.2
F&B	5,547	35.7	21.9
Food Court	2,612	32.0	16.7
Health Care	186	20.1	20.1
Hypermarket	409	26.6	26.6
Kiosk	725	41.1	29.1
Retail	14,240	46.0	40.4
Grand Total	**26,460**	**41.5**	**33.1**
		Savings	**20.2%**

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Green Lease
– Case Study on Tangible Benefits for Lighting Outcome

Lighting Benefits

Original (W/m^2)	Green Lease (W/m^2)	Saving (W/m^2)	Approx. NLA (m^2)	Total Saving (kW)
41.5	33.1	8.4	26,460	222

=> Tenants' Electricity Bill Reduction

Saving (kW)	Daily Operation (Hrs)	Annual Operation (Hrs)	Annual Saving (kWh)	Annual Saving @ S$0.25/kWh (S$)
222	13	4,745	1,054,643	$ 263,661

=> LandLord's Electricity Bill Reduction (By Law of Energy Conservation)

Saving Cooling Load (RT)	System Efficiency (kW/RT)	Annual Operation (Hrs)	Annual Saving (kWh)	Annual Saving @ S$0.25/kWh (S$)
63	0.68	4,745	203,912	$ 50,978

Valuation Effect - Tangible Benefits

Tangible Valuation Benefits for the Owner / Landlord:

$$\text{Building Valuation} = \frac{\text{*Net Operating Income}}{\text{Cap Rate}}$$

*Net Operating Income = Gross Rent – Operational Costs

- Every sustainable initiative is assessed together to establish the true operational savings

Future Sustainability in Singapore

- Legislation of Green Mark Retail?
- Holistic approach
- Mindset shift
- Operations excellence
- Not just Capital Costs but Life Cycle Costs evaluation
- Landlord and Tenants participation
  - ➢ Base Building Green Mark, Retail Green Mark as Green Lease Guide
- Performance Base Service Contract to encourage PR behaviour changed
  - ➢ Passive and Reactive to Proactive and Responsive maintenance
- Performance Base Service Contract to encourage PR behaviour changed

Natural Laws
- quoted by motivation speaker Dr. Andrew Goh

1. If we continue to do what we've always done, we shall be what we already are.

2. We cannot become what we want to become by remaining what we are.

3. Learn to let go of something down here to grasp something up there.

Natural Laws

KNOW what to do
NOT just do what you know

Tomorrow's Outcome
is the consequence of
Today's Action

Act now, every action adds up!

Questions



The End


Thank You
Gracias
謝謝
dhanyavaad
Danke
Grazie
Merci
ありがどうございます