Sustainability
Managing Green Buildings
Ir. Thirukumaran Jallendran – Project Manager, Lend Lease
30 June 2011
Who is Lend Lease?

Lend Lease is one of the leading fully integrated property solutions providers in the world. We can provide investors and clients with one element of the property value chain or an end-to-end solution.
Our Fully Integrated Property Approach

Through design and investment in new technologies, Lend Lease is committed to delivering the next generation of sustainable precincts with our capabilities spanning the full property value chain.

We find
Sourcing the best property opportunities

We buy
Structuring the right deal

We fund
Creating innovative and sustainable property solutions

We build
Building and project managing using our global construction team

We manage
Continually enhancing the value of our property over time

Development management
Investment management
Project management & construction
Asset & property management
We provide specialist property solutions around the world.

Remember… 1:30 impact factor
Property Sector – Global Environmental Impacts

Buildings are responsible for 40% of world’s global greenhouse gas emissions.

Buildings are responsible for 40% of solid waste generation globally.

Buildings use 12% of the world’s water.

Air quality in buildings typically contains up to 5x more pollutants than outdoor air.

Buildings utilize 1/3 of the world’s resources.
In 1973 Lend Lease founder Dick Dusseldorp said, “The time is not far off when companies will have to justify their worth to society with greater emphasis being placed on environmental and societal impact than straight economics.”

We believe that every action adds up

Sustainability has been an integral part of our culture for more than 50 years.

Lend Lease is the only Australian company to be included in all three globally recognised sustainability reputation indices:
- 2008 Dow Jones Sustainability Index
- 2008 Goldman Sachs JBWere Climate Leadership Index
- 2009 Global 100

Lend Lease’s investment management business was the first global property investment manager to become a signatory to the UN Principles for Responsible Investment.
Green Buildings – Key Drivers in the Market

- Government Leadership
- Green Lease Requirements
- Future Proofing Asset Value
- Investor Demand
- Tenant Demand
- Competitive Advantage
- Established Benchmark

Corporations wishing to compete for Govt Tenders

Investor Value
Tenant Value – Quality Built Environment

Investor Value – Superior Returns

- Equity + Financing
- Rent / Other Incomes
- Opex
- Capex
- Taxation + Other Costs

Standard Investment Return ($ x)

Incremental Return via Green Value Creation ($ y)
- Opex Savings
- Rent / Income growth
- Sunk “Green” Capex
- Govt Incentives

Superior Investment Return

• Standard Return + Incremental Return

[ $x + $y]
Green Buildings – Key Challenges

- Existing Building Stock
- Tenants & Consumer Mindset
- Alternate Financial Solutions
- Business as Usual
- Strata titled building stock
The Various Stages of a Project

1. Conceptual/Schematic Design
2. Design Development
3. Tender/Contract Documentation
4. Construction
5. Testing & Commissioning
6. Handover & Building Occupation
… Which can be simplified into

- Planning
- Pre-Construction
- Construction
- Handover
The Integrated Design Process

Integrated design process emphasizes more upfront investment
Integrated Approach

... Begin with the End in mind...
Sustainability Flow Chart

**Timelines**
- **1 month**
  - Goals & Aspirations
    - Blue Sky Workshops
    - Goal Setting
    - Aspirations
  - Analysis
    - Understand existing operational patterns
    - Audit Power/Water Meter Consumption
    - Review Drawings
    - Monitor Indoor Air Quality
    - Initial Assessment
  - Engineering
    - Solar Studies
    - CFD Simulations
    - Energy Modelling
    - Engagement with GBI
    - Value Engineering
    - Green Improvement List
    - Pay-back (ROI) Analyses
  - Assessment & Implementation
    - Agreement on the solutions
    - Procurement
    - Work Schedule
    - Job Execution
    - Testing and Commissioning
    - GBI Assessment
  - Operation & Monitoring
    - Monitoring of Energy Consumption
    - Monitoring of Water Consumption

**Tasks**
- **1 month**
  - All key Stakeholders
  - Development Management
  - Centre/Building Management
- **1 month**
  - Project Management
  - External Consultants; eg. ESD, ESCO, IAQ
  - Centre/Building Management
- **2 months**
  - Project Management
  - External Consultants; eg. ESD, CFD, Energy Modelling Specialist, etc.
  - Centre/Building Management
- **4-6 months**
  - Project Management
  - Site Management
  - Contractors
  - Sub-contractors
  - Centre/Building Management
- **ongoing**
  - Centre/Building Management
Green Project Management – Flow and Controls

1. Design, procurement and monthly feedback reviews
2. Periodic checks and audits on the stages of construction and equipment/materials used
3. Verify that materials procured and used are correct
4. Compliance audits and inspections
5. Review of changes
6. Monthly reports on waste, energy, water, etc
7. Completed project in line with Green Building Status
Menara Public Mutual, Malaysia
- Concept
Menara Public Mutual, Malaysia
- Schematic

**ROOF RAINWATER CATCHMENT**

OVERALL ROOF AREA: 1380 sqm

R.W.D.P REQUIRED = 7 @ 150 Ø mm

R.W.D.P PROVIDED = 8 @ 200 Ø mm
Menara Public Mutual, Malaysia
- Design Development
### Tender Documentation

#### III) LEED Green Building Rating Requirement:

- **Section 1**: LEED requirements
- **Section 2**: Erosion and Sedimentation Control
- **Section 3**: Construction Waste Management
- **Section 4**: Construction Indoor Air Quality Management

**LEED requirement pertaining to specifications:**
- **Division 3**: Concrete
- **Division 4**: Masonry
- **Division 5**: Steel
- **Division 6**: Wood and Plastics
- **Division 7**: Thermal and Moisture Protection
- **Division 8**: Doors and Windows
- **Division 9**: Finishes
- **Division 10**: Specialties
- **Division 11**: Equipment
- **Division 12**: Furnishings
- **Division 13**: Special Construction
- **Division 14**: Conveying Systems
- **Division 15**: Mechanical and Electrical
- **Division 16**: HVAC

#### IV) Insurance Policies Effecting By The Employer

#### V) Contractor's Design Of The Works

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### Schedule of Works No. 7

**Sunshading**

**EXTERNAL FINISHES**

**CONTRACTOR DESIGNED ALUMINIUM SUN SHADING**

**Powder coated aluminium**

Supply and fix in position the following perforated aluminium panel screwed; vertical; complete with hot dipped galvanized brackets, hollow sections, angles, plates, bolts and nuts, cast-in plates and bolts, b118 tape end all necessary accessories and supports for the complete installation; including building in or cutting and pinning lugs and fixing to masonry works or metalworks; pattern subject to architect’s approval; refer to drawings no.

3700mm wide, vertically

- Rear elevation, staircase
- Supply and fix in position the following perforated aluminium sheet sun shading; 3mm thick perforated aluminium sheet screwed to frame at 1200mm centres; curved and cantilevered; complete with brackets; hot dipped galvanized 6mm thick T-section angle support brackets, plates, bolts and nuts, cast-in plates and bolts and all necessary accessories and supports for the complete installation; fixing to soffits of slab or aluminium louvres structure; including building in or cutting and pinning lugs and fixing to brickwork; refer to drawings no.

- Wide varies approximately 600mm to 1000mm; horizontally
- Balcony

#### A

<table>
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<tr>
<th>Description</th>
<th>Qty</th>
<th>Unit</th>
<th>Rate</th>
<th>Amount RM</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>720.00</td>
<td>1,730,000.00</td>
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**C**

1. 
2. 

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**D**

To Collection
Menara Public Mutual, Malaysia
- Construction – Planning
<table>
<thead>
<tr>
<th>Date:</th>
<th>Waste Form No.:</th>
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<tbody>
<tr>
<td>Person In Charge:</td>
<td>Container Type:</td>
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<tr>
<td>No. of Trips</td>
<td>Source of Waste</td>
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</table>

- Reuse
- Recycle
- Disposal
  - Onsite
  - Offsite

### Percentage of Waste in the Container

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Concrete</td>
<td>%</td>
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<tr>
<td>Insulation</td>
<td>%</td>
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<tr>
<td>Wood</td>
<td>%</td>
</tr>
<tr>
<td>Glass</td>
<td>%</td>
</tr>
<tr>
<td>Metals</td>
<td>%</td>
</tr>
<tr>
<td>Electrical</td>
<td>%</td>
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<td>Cardboard</td>
<td>%</td>
</tr>
<tr>
<td>Gypsum</td>
<td>%</td>
</tr>
<tr>
<td>Plastic</td>
<td>%</td>
</tr>
<tr>
<td>Destination of waste</td>
<td>Waste Receipt No. / Photo No.</td>
</tr>
<tr>
<td>Sub-Contractor</td>
<td>Signature</td>
</tr>
</tbody>
</table>
Setia City Mall, Malaysia
Setia City Mall, Malaysia

- Education
- Employment
- Energy
- Water
- Waste Management
- Local Amenity
- Transport
- Community
Australian Pavilion – Shanghai Expo 2010

Designed and constructed by Lend Lease Project Management & Construction
313@somerset - Orchard Road, Singapore

Green Lot Parking

Green Sky Terrace

Solar Panel Installation

Bio Diesel Co-Gen System

PLATINUM
Green Refurbishment – Parkway Parade, Singapore

- Mix use commercial office and retail
- Strata-titled building - MCST
- Over 26 year-old building
- One of the first mix-use buildings to have achieved BCA Green Mark Platinum for existing buildings
Green Refurbishment – PoMo, Singapore

- Mix use commercial office and retail
- Over 24 year-old building
- One of the first mix-use buildings to have achieved BCA Green Mark Platinum for existing buildings
Jurong Gateway
— the next Lend Lease benchmark

The choice location for everyday and discretionary shopping and leisure in the west of Singapore.

The Jurong Gateway precinct will be the biggest commercial hub outside of Singapore’s city centre. Located in the Jurong Lakeside District, it offers a good mix of office, retail, hotel, entertainment, food and beverage and other complementary uses, yet easily accessible by both private and public transport.

Lend Lease will create and deliver a prime suburban shopping mall and commercial tower providing end-to-end property solutions services.

It is our vision that the Jurong Gateway project will serve as the benchmark for creative and sustainable mixed-use development in Singapore.
Jurong Gateway

**Water Efficiency**
- Efficient water fittings
- Rainwater harvesting & recycling
- Efficient irrigation systems
- NEWater for non-potable water consumption

**Greenery Provision**
- Strategic greenery to mitigate urban heat island effect
- Ground level greenery – social spaces
- Landscaped public spaces
- Water efficient planting
**Jurong Gateway**

**Energy Efficiency**
- Efficient and power saving M&E systems
- Regenerating Lift Drive Systems
- Efficient light fittings with light sensors
- Adaptive building controls
- Optimised chilled water production strategies
- Smart air-conditioning

**Passive Design Elements**
- Low-E double glazing
- Light Shelves

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*Rainwater harvesting on extensive roof surfaces*

*Skylight to maximise daylighting within building*

*Office atrium day-lighting*

*Light shelves for day-lighting*

*Water efficient planting*
The Asia of tomorrow?

How will the next generation of sustainable cities look?

Through design and investment in new technologies, we are committed to delivering sustainable precincts in cities across the world. Visit our www.greenbuildingconverter.com to see how.
Sustainability: *Every Action Adds Up*