Green Buildings – A Strategic Analysis of the Asia Pacific Markets

Frost & Sullivan
Green Buildings – A Strategy Analysis of the Asia Pacific Markets

Key Trends
Market Structure
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Future Market Trends
Green Building (GB) promotes sustainable environmental practices during design, construction and maintenance of buildings. GBs are designed for efficient consumption of energy, water, and raw materials, while reducing the negative impacts on human health and environment at the same time.

Government regulations and incentives have been the main drivers for marker growth. Several rating systems and associations are helping to identify GBs within Asia pacific countries.

Examples of GBs
- ACROS Fukuoka in Japan
- Sail @ Marina Bay in Singapore
- One Island East in Hong Kong

Source: Frost & Sullivan
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Development of Green Building Associations and Tools

**Green buildings Market: Historical developments of Councils and Associations**

- **2000**
  - Korean Green Building Council (KGBC) was established & Green Building Certification System (GBCS) was proposed

- **2001**
  - Japan - Comprehensive Assessment System for Building Environment Efficiency (CASBEE) was introduced

- **2002**
  - Green Building Council Australia (GBCA), a leading non-government organization and a member of World Green Building Council was formed. It introduced Green Star rating system for Green Buildings

- **2003**
  - Professional Green Building Council (PGBC) was founded in Hong Kong with a comprehensive assessment tool BEAM

- **2005**
  - Building Construction Authority initiated Green Mark rating system in Singapore;
  - GBC New Zealand was established with a proposal of Green Star assessment tool

- **2008**
  - GBC Indonesia was formed and became a member of WGBC. It designed GREENSHIP rating tool for GB

- **2009**
  - GB Index Malaysia was founded and Green Index assessment tool for GB was designed.

**Green Buildings Market: Number of Green Buildings Certified or Under Evaluation for Green Certification (Asia Pacific), 2009**

- Certified Green Buildings
- Buildings under evaluation for green certification

**Source:** Frost & Sullivan
Green Buildings Markets: Why do Green Building Markets Exist?

**Environmental issues** – Green Buildings can be solutions to problems such as global warming, high carbon emission, low air quality, and overall deterioration of the environment. Green Buildings also aim to solve several major issues such as storm water runoff and inefficient usage of energy as well as various other resources.

**Economic factors** – Though economic factors were not very strong drivers during the initial phase of the Asia Pacific Green Building market development, they gained importance in the later phase of market growth. Currently, the market is driven primarily by economic factors such as long-term efficiency in energy, water and other resource usage, low operational and maintenance costs, ease to reuse and recycle, and higher ROI while ensuring better quality of life among the residents.

**Healthy Indoor Environment** – Contrary to the common buildings that have several negative effects on indoor environment, green buildings guarantee better in-house atmosphere by utilizing natural resources to create a healthier environment. Natural lighting and air circulation, and lush green surroundings make lives more enjoyable at work and home.
Green Buildings Markets: Key Drivers and Restraints

**Drivers**
- Government regulations, incentives and initiatives
- Existing Green Building certification systems and assessment authorities
- Recognition and marketability of Green Brand
- Rising demand from end-users
- Corporate social responsibility
- Productivity and health-related benefits

**Restraints**
- Lack of education among market stakeholders
- Lack of awareness about Green Buildings
- About 2% to 14% premium cost for the Green Building
Australia, Singapore, and Hong Kong Green Buildings markets have the necessary infrastructure, growth prospect and participants’ activities that attract huge investment pool.

Main driver for the growth in these markets is the efforts taken by government bodies as well as Green Building Councils and other non government authorities.

Knowledge about Green Buildings in these markets is high among all stakeholders.

Japan and South Korea Green Building markets are more mature than other Asian markets as these markets started much earlier than the other Asian markets.

Green Buildings are seen as solutions to many problems in these two countries, especially problems regarding energy efficiency and sustainability.

Fast emerging markets such as New Zealand, Malaysia, and Indonesia have built their own Green Building certification systems in recent years and are involved actively in promoting the market, educating market participants and collaborating with Green Building organizations in different locations in the world.

Frost & Sullivan anticipates increase in participation of stakeholders in Green Buildings market.

Source: Frost & Sullivan
Market Structure
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Market Structure

Other sectors such as industry, hotel and recreation, and healthcare buildings are also expanding. One of the reasons for these sectors to lag behind is that no assessment tool was designed for buildings in these sectors. Japan and South Korea have slightly larger number of Green Buildings in Industrial sector, followed by New Zealand which recently introduced its Green rating system for industrial buildings. However, Australia, Singapore, and Hong Kong are focusing more on emerging healthcare, hotel, and recreation buildings.

**Commercial and office buildings** include retail, private and government office buildings. Commercial and office sector has close to half of the total certified Green Buildings.

**Residential buildings** sector includes multi unit and single dwelling buildings. It is the second largest market sector. However, in countries such as Singapore, Japan, and South Korea, the residential Green Building certification tools were founded earlier and this sector performs better than the commercial sector.

**Green Buildings in Educational** sector is prevalent in Australia, New Zealand, and South Korea where Green Building rating tools have been developed for the buildings in education sector. This sector is expected to grow at a double digit rate in these countries.

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### Green Buildings Market: End-user Analysis by Number of Green Buildings (Asia Pacific), 2009

- **Commercial and office**: 45%
- **Residential**: 25%
- **Education**: 8%
- **Industry**: 8%
- **Hotel and recreation**: 4%
- **Healthcare**: 2%
- **Others**: 8%

*Source: Frost & Sullivan*
Almost 11% to 14% of the newly designed buildings in Australia are Green Buildings. In Singapore Green Buildings’ land area covers 4% of total area for building construction. New Zealand Green Building Council has proposed to increase Green Buildings market share from 10% to 25% within building construction market in New Zealand.

All eight countries covered in this study are facing challenges to transform existing buildings into Green buildings.

Japan and South Korea are relatively advanced and performing better compared to other countries in retrofitting green features into existing buildings. Their Green Building rating tools are able to rate both new and existing buildings.

Recently developed rating systems for Green Buildings in Malaysia and Indonesia will drive retrofitting of existing buildings with green features.

Source: Frost & Sullivan
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Market Structure

Green Buildings Market: Number of Green Buildings (Asia Pacific), 2009

- South Korea has more than 1000 buildings which are already green certified or under evaluation for the certification.
- With 170 certified buildings and around 500 buildings under evaluation, the Australian market is second in terms of size in the region.
- Singapore is the third largest market in the region with close to 700 buildings already certified or under evaluation for green certification.
- The countries mentioned above are actively promoting Green Building markets, supported by government and GB council’s initiatives.
- Although Japan initially was a major participant in the market, Hong Kong managed to make faster progress, with over 300 buildings already certified or under evaluation for green certification.
- The New Zealand Green Building market is expected to grow within a short period of time. Malaysia and Indonesia Green Building markets growth will be helped by newly designed rating tools.
- Leading Green Building markets in Asia Pacific region are South Korea, Australia and Singapore, due to both government support and market stakeholders’ commitment and efforts. Hong Kong has achieved similar positioning with slightly less number government incentives.

- Japan, and New Zealand have made progresses too, but in terms of market stakeholders’ involvement and government support they are behind from leading markets mentioned above.

- The market is at the initial stage of development. Malaysia and Indonesia have recently introduced their own rating systems and GB councils. These markets have high growth potential in the future.
### Green Buildings Market: Impact of Top Five Industry Challenges (Asia Pacific), 2009-2015

<table>
<thead>
<tr>
<th>Challenge</th>
<th>1-2 Years</th>
<th>3-4 Years</th>
<th>5-7 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty in renovating existing buildings into Green Buildings</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Lack of knowledge and brand awareness of Green Building and its benefits among various stakeholders</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Additional cost of designing, developing, and operating Green Buildings</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Low integrated involvement of the various market stakeholders; low regional market collaborations</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Inadequate skills, expertise and professionalism</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
</tr>
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</table>

Source: Frost & Sullivan
Green Building: Case Studies
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Green Building: Case Study
*Mirvac School of Sustainable Development*

The Bond University School of Sustainable Development is the first Six Star Green Star educational building completed in Australia. The building has been awarded a 6 Star rating by the Green Building Council of Australia using the Green Star – Education PILOT rating tool. The building achieved 83 points out of a possible 105.

**Project** – Bond University School of Sustainable Development  
**Location** – Bond University, Robina, QLD 4226, Australia  
**Project Cost** - $13,000,000, cost about 30% more than Conventional Building  
**Building Type** – Education facility, teaching and office space  
**Duration of Construction** – 50 Weeks  
**Completion Date** – 19/06/2008

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>Comprises of 32 offices, two research rooms, three studios, four meeting rooms, one living laboratory, covered outdoor teaching, and spaces for recreation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built on an east-west axis to maximize natural daylight and to capture prevailing breezes</td>
</tr>
<tr>
<td>About 92% of construction waste by weight was reused or recycled</td>
</tr>
<tr>
<td>About 50% of the structure, such as framing, roofing and facade can be easily disassembled</td>
</tr>
<tr>
<td>About 30% of concrete mixture in construction used industrial waste (fly-ash)</td>
</tr>
<tr>
<td>About 82% reduction in carbon emissions from the operating building compared to the emissions from normal buildings</td>
</tr>
<tr>
<td>About 95% of loose furniture is re-used</td>
</tr>
<tr>
<td>Over 90% reduction in PVC use within the building</td>
</tr>
<tr>
<td>Over 60% of usable work area requires only daylight to function during the day</td>
</tr>
<tr>
<td>Almost 100% of the usable work area has a direct line of sight to the external environment</td>
</tr>
<tr>
<td>Over 95%+ of all paints, adhesives, sealants, carpets and other floor finishes are low volatile organic compound (VOC) emitting</td>
</tr>
<tr>
<td>Almost 100% of the air-conditioning refrigerants have Ozone Depletion Potential rating of zero</td>
</tr>
</tbody>
</table>
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Green Building: Case Study (Contd…)

Mirvac School of Sustainable Development

Green Buildings Market: Various Snapshots of Mirvac School of Sustainable Development, (Australia), 2008

Source: Bond University Mirvac School of Sustainable Development, (Australia) 2008
One Island East was awarded with “Platinum” rating by Hong Kong BEAM for the Environmental performance in 2009. Island East, offering over eight million square feet of office space, comprises one of the most dynamic business districts in Hong Kong.

**Location**
- 18 Westland's Road, Hong Kong
- Use - Office, payback period – 8-10 years
- Height - Antenna/Spire 308 meters, 70 Floor area 141,000 sq. m
- Cost - $260,000,000 USD
- Companies
  - Architect - Wong & Quyang
  - Contractor - Gammon Construction
  - Developer - Swire Properties
- Constructed - 2006 - 2008

**Landscaped gardens**
- Almost 75% of the site reserved as green area
- Designed by award-winning landscape architect
- About 4.7 acres (over three and half football fields) of landscaped gardens.
- Water features flank the building

**GREEN FEATURES**
- Indirect office lighting designed with adjustable illumination levels reduces energy consumption by as much as 60%
- Extra large low-e glazing panels ensure maximum light penetration with minimum energy loss, heat gain and noise
- Employed award-winning building design technology to optimize the design process that minimizes construction material wastage
- Only 1% of waste from demolition work, compared to an average of 20-25% in the industry, was sent to landfill sites while the rest was recycled
- Provisional Platinum rating of BEAM
Computerized Building Management System (BMS) closely monitors the air-conditioning systems, fire services, security, plant systems, and other critical systems, ensuring energy optimization and the highest service standards. Automatic condenser tube cleaning systems ensure that the water-cooled chillers are operating efficiently. Seawater cools the vast majority of air-conditioning systems resulting in a 20% energy saving. Cooled exhaust air is harvested for energy exchange with hot incoming fresh air through heat wheels to save energy. Variable speed drivers provide a customized approach to air conditioning and minimize unnecessary energy consumption. Carbon dioxide sensors used in Island East efficiently optimize the volume of fresh air supply received by tenants avoiding unnecessary energy wastage.

Source: Swire Island East: Building Green Values report, 2009
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Future Market Trends
Governments’ long-term carbon emission reduction strategies will drive energy efficiency in buildings industry

Asia Pacific green building markets will be driven by the latest carbon emission reduction targets such as 2020, 2030 energy efficiency and neutral carbon emission plans developed by government in various countries.

Cash incentives for green building development

Singapore, Australia, Hong Kong, and Japan have developed strong support systems and incentives for Green Building developers, designers, and owners. Other countries in the region are following them to implement these practices to drive market growth.

Green buildings in government sector

In some countries, government offices need to be transformed into Green Buildings because of regulatory requirements. Government sector will be a key area for growth for green buildings market.

Green Building rating systems

All eight countries researched for the study have developed their own rating tools. Most of rating tools are designed by non-government and non-profit associations. These bodies are playing an instrumental role to educate the market stakeholders, as well as to nominate, recognize and certify buildings which have green features.
## Legislation and Laws

<table>
<thead>
<tr>
<th>Country</th>
<th>Relevant Legislation and Laws</th>
<th>Year of Enactment</th>
<th>Relevant Growth Opportunities</th>
</tr>
</thead>
</table>
| Australia   | • Australian Federal, State, Local governments announced to transform all Government buildings into Green Buildings  
• Carbon Neutral Building – 2020 challenge                                                                 | Amended in 2009 | Significant growth is expected in government buildings sector, Energy Efficiency will be the focus in Green Buildings due to Neutral Carbon emission goals                                                                                   |
| Singapore   | 2030 – **Second Master Plan** to achieve 80% of Green Mark certification within the buildings construction market | 2009              | Heavy investment and rapid growth in Green Building industry are expected                                                                                                                                                   |
| Hong Kong   | • Government buildings will install energy efficient lighting systems, retrofit plumbing with water saving devices  
• Carbon audits                                                                                          | 2009              | Total $900 million government fund will be allocated to these projects within next two years                                                                                                                               |
<p>| New Zealand | <strong>Target Two</strong> sets the goal to raise Green Buildings market share to 25% from current share of 10%                                                   | 2009              | Strong growth in green buildings market is expected                                                                                                                                                                         |</p>
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</table>
| Japan      | •Prime Minister’s 25% Carbon Emission Reduction Goal by 2020  
•Kyoto Protocol Target Achievement Plan  
•Environmental Action Plan under MLITT | Amended in 2009  
2004             | Rise in overall market awareness, international participation and market growth are expected |
| South Korea| •Sustainable multifunctional administrative city—CO2-Neutral City  
•LCCO2 quantitative assessment—building at urban, national, and global levels | Will be enacted soon | National and international collaborations, and strong market growth are expected              |
| Malaysia   | •Code of Practice on energy efficiency and use of renewable energy for non-residential buildings  
•Energy efficiency and construction guidelines for Malaysian industries | 2007  
2007                         | Energy efficiency will be given priority for Green building certification.                      |
### Economic Trends

#### Demand and Supply
Market demand has been driven by government incentives and regulations. As the awareness about green buildings increases, the market will be driven by consumer demand.

#### Investment
Government investments to support the Green Buildings markets are substantial. Also, private investors recognize the profitable investment opportunities in Green buildings market.

#### Trade
Trade related to Green Building materials, resources, technologies, and skills within Asia Pacific accelerated in the last decade.

### Opportunities

Stakeholders of Green Building markets in Australia, Hong Kong, and Singapore are committed to design, build, develop, and manage Green buildings. Businesses are aware about the benefits of green buildings and market opportunities that exist in green building market. The markets in these countries will be driven by the demand from end-users.

Increase in investments by governments and private investors ensures higher profitability and higher return on investment. Like organic food market, Green Buildings financial investment instruments offer unique, niche investment opportunities with assured high return.

Australia leads in trading and exchange of information related to Green Building. Other countries are expected to follow suit.
**Green Buildings – A Strategic Analysis of the Asia Pacific Markets**

**Strategic Conclusions**

<table>
<thead>
<tr>
<th>Green Building are potential solutions to global problems such as global warming, high carbon dioxide emission, high energy consumption, and ozone layer depletion.</th>
<th>Non-governmental associations and Green Building councils develop incentives to boost the Green Building market</th>
<th>The Asia pacific Green Building markets attract huge investments for government and non-government projects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Building practices implement and promote energy and water efficiency, healthy environment, reuse, recycling, and lower wastage of materials within the building.</td>
<td>Major mergers and acquisitions have not taken place, though many multinational Green Building developers have entered and are currently leading the market in some Asia Pacific countries.</td>
<td></td>
</tr>
<tr>
<td>Government initiatives and involvement are major drivers for the growth of Green Buildings market.</td>
<td>Commercial, residential and office buildings are major market sectors in most Asia Pacific countries.</td>
<td>In 2009, share of Green Buildings in building construction industry had been less than 6%. It is expected that close to 10% and 50% of the newly designed buildings will be green by 2010 and 2030 respectively.</td>
</tr>
</tbody>
</table>
Thank You