Green Buildings in Japan: Current State and Research Opportunities

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Agenda

1. Attitudes of Japanese households and investors to green-building investments (survey results)

2. Japanese public policy programs for green buildings

3. Research opportunities
Survey question: What is your attitude to installing the following eco-friendly equipments in your house?

- **Solar Power System**: 3.7% already installed, 59.8% some interest, 36.5% no interest
- **Solar Heating System**: 26.6% already installed, 56.5% some interest, 40.9% no interest
- **Electric Heat-Pump Water Heater**: 9.6% already installed, 53.7% some interest, 36.7% no interest
- **High Efficiency Gas Water Heater**: 19.9% already installed, 32.3% some interest, 65.8% no interest
- **Gas Co-Generation System**: 8.8% already installed, 30.5% some interest, 68.7% no interest
- **Fuel Cell System**: 2.2% already installed, 38.4% some interest, 61.4% no interest
- **Insulation retrofit**: 16.2% already installed, 50.2% some interest, 33.6% no interest
- **Rainwater Storage**: 17.7% already installed, 41.6% some interest, 56.7% no interest
- **Green rooftop or wall surface**: 9.9% already installed, 32.3% some interest, 66.8% no interest

Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Survey on Diversified Attitude to Housing (January 2009).
Households’ Attitude to Green Buildings

Survey question: For those with no interest, what are the reasons for your lack of interest?

- No interest in environmental protection: 39.4%
- High initial costs: 30.4%
- High maintenance costs: 12.1%
- Long payback period: 12.4%
- Spatial/structural restrictions: 8.9%
- Restrictions by lease agreement or property management: 12.5%
- No obvious benefit of installation: 16.4%
- Lack of information about the overall picture: 28.8%
- Others: 4.7%
- No special reason: 4.7%

Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Survey on Diversified Attitude to Housing (January 2009).
### Real Estate Investors’ Attitude to Green Buildings

**Survey question:** Which environmental issues do you emphasize most in your investment decision-making?

<table>
<thead>
<tr>
<th>Internal noise reduction</th>
<th>Individual air conditioning</th>
<th>Daylight intake</th>
<th>Lighting control</th>
<th>Internal air quality</th>
<th>Ventilation capacity</th>
<th>Flexible configuration</th>
<th>Barrier free facilities</th>
<th>Common space</th>
<th>Earthquake resistance</th>
<th>Maintenance of equipments</th>
<th>Functionality</th>
<th>Greening &amp; crime prevention</th>
<th>Aesthetic issues</th>
<th>Insulation</th>
<th>Co-generation system, etc.</th>
<th>Energy efficiency</th>
<th>Water usage efficiency</th>
<th>Reuse &amp; recycle</th>
<th>CFC, etc.</th>
<th>Neighborhood noise reduction</th>
<th>Neighbors’ access to sunlight</th>
<th>Less traffic generation</th>
<th>Traffic convenience</th>
<th>Garbage reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal environment</td>
<td>Building function</td>
<td>External environment</td>
<td>Energy usage</td>
<td>Resource usage</td>
<td>Neighborhood environment</td>
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<td>Garbage reduction</td>
</tr>
</tbody>
</table>
| Source: Japan Real Estate Institute, Survey on Real Estate Investors’ Emphases on Environmental Issues (April 2009).
Tokyo Metropolitan Government launched its own green building assessment programs in 2002.

**Tokyo Green Building Program** (Since 2002, 1504 projects)
- Mandatory evaluation and improvement planning of assets
- For new construction or renovation exceeding 10,000m² in floor area.
- Radar Chart

**Tokyo Cap and Trade Program (ETS)**
- targeted to large business operation > 1,500 kl of crude oil equivalent per year.
- 2002-2010/3: Mandatory evaluation, planning, and monitoring.
- 2010/4-: Advanced to Tokyo Cap and Trade Program
  - Mandatory reduction (-17% by 2020) with penalty for 1,400 large buildings and factories
  - All tenants are obligated to cooperate (Large tenants submit their plans)
  - Excess reduction can be traded

www2.kankyo.metro.tokyo.jp/sgw/English/Mitigation_program.htm
www.kankyo.metro.tokyo.jp/kouhou/english/2008/warming/cu06_07.html#cu06
CASBEE Assessments in Japan

CASBEE assessments at national and local levels started in 2004 and now cover roughly 4,000 projects and 30M population.

<table>
<thead>
<tr>
<th>Name of Local Governments</th>
<th>Population (1000's)</th>
<th>Minimum Floor Area (m²)</th>
<th>Program enforcement Date</th>
<th>Number of CASBEE submissions as of March 31, 2009.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2004FY</td>
</tr>
<tr>
<td>1 City of Nagoya</td>
<td>2,236</td>
<td>2,000</td>
<td>2004.04.1</td>
<td>148</td>
</tr>
<tr>
<td>2 City of Osaka</td>
<td>2,645</td>
<td>5,000</td>
<td>2004.10.1</td>
<td>26</td>
</tr>
<tr>
<td>3 City of Yokohama</td>
<td>3,635</td>
<td>5,000</td>
<td>2005.07.1</td>
<td>—</td>
</tr>
<tr>
<td>4 City of Kyoto</td>
<td>1,467</td>
<td>2,000</td>
<td>2005.10.1</td>
<td>—</td>
</tr>
<tr>
<td>5 Kyoto Prefecture</td>
<td>1,165*</td>
<td>2,000</td>
<td>2006.04.1</td>
<td>—</td>
</tr>
<tr>
<td>6 Osaka Prefecture</td>
<td>6,176*</td>
<td>5,000</td>
<td>2006.04.1</td>
<td>—</td>
</tr>
<tr>
<td>7 City of Kobe</td>
<td>1,529</td>
<td>2,000</td>
<td>2006.08.1</td>
<td>—</td>
</tr>
<tr>
<td>8 Hyogo Prefecture</td>
<td>4,057*</td>
<td>2,000</td>
<td>2006.10.1</td>
<td>—</td>
</tr>
<tr>
<td>9 City of Kawasaki</td>
<td>1,385</td>
<td>5,000</td>
<td>2006.10.1</td>
<td>—</td>
</tr>
<tr>
<td>10 Shizuoka Prefecture</td>
<td>3,793</td>
<td>2,000</td>
<td>2007.07.1</td>
<td>—</td>
</tr>
<tr>
<td>11 Fukuoka Prefecture</td>
<td>1,435</td>
<td>5,000</td>
<td>2007.10.1</td>
<td>—</td>
</tr>
<tr>
<td>12 City of Sapporo</td>
<td>1,894</td>
<td>5,000</td>
<td>2007.11.1</td>
<td>—</td>
</tr>
<tr>
<td>13 City of Kita-Kyushu</td>
<td>982</td>
<td>2,000</td>
<td>2007.11.1</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>420</td>
<td>818</td>
<td>1,198</td>
</tr>
</tbody>
</table>

*Numbers for Kyoto prefecture, Osaka Prefecture, and Hyogo Prefecture exclude those for City of Kyoto, City of Osaka, and City of Kobe, respectively.

** There are additional 87 CASBEE-rated properties as of October 27, 2009.
Assessment Tools Around the World
Research Opportunities in Japan

• Advantages
  – Tokyo has largest office stock (675M sqft = 1.3xParis = 1.5xNY = 4xLondon)
  – A wealth of physical and engineering information
    • 4,000 CASBEE-rated projects, 1500 projects under Tokyo Green Building Program, 1400 projects under Tokyo Cap and Trade Program, all mandatory evaluation
  – Bunch of building characteristics attached to appraisal price data

• Disadvantage
  – Lack of price data on contracted rent and transaction prices

• Recent progress
  – MLIT-funded research project on real estate transaction prices
    • Merging transaction prices with hedonic variables and green scores
  – Japanese NSF (Kakenhi) project on contracted rents
    • Merging contracted rents with hedonic variables and green scores

• Future
  – Data on emission trades by building owners from 2011

• Caution
  – Different countries have different structures on lease contracts and rental markets
Potential Effects of Green Buildings on Rent

Effects on rent depend on the source of value, type of lease contract, and bargaining power of tenants.

<table>
<thead>
<tr>
<th>Case of Reduced Costs</th>
<th>Gross Lease</th>
<th>Net Lease</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Landlord’s Market”</td>
<td>0</td>
<td>++</td>
</tr>
<tr>
<td>“Tenant’s Market”</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case of Enhanced Revenue of Tenants</th>
<th>Gross Lease</th>
<th>Net Lease</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Landlord’s Market”</td>
<td>+</td>
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<tr>
<td>“Tenant’s Market”</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

“+”, “0”, and “-” stand for positive, no, and negative effects on rents, respectively. “++” stands for a greater positive effect when measured in % increase in rent. Yoshida (2009)

- Landlords cannot raise, and may even be required to reduce, gross rent if green buildings are cost efficient.