GREEN BUILDINGS AND RETROFIT - THE HANDS-ON APPROACH TO ACHIEVING SUSTAINABILITY

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Al Futtaim Group for Real Estate
Outlines

• Section 1: Introduction
  • Sustainability
  • Assessment Method for Sustainable Buildings
  • GPRS

• Section 2: Stakeholders and Sustainability “Shared Responsibilities”

• Section 3: Green Building and Retrofit
  • Retrofit Introduction
  • Case Study

• Section 4: Results, Discussion & Conclusion
Section 1: Introduction
Introduction

The development of the sustainable design
Introduction

Life-cycle phases of a building

- **Planning phase**
  - Project development, Planning

- **Implementation phase**
  - Materials reclamation, Preparation
  - Transportation
  - Construction of the building

- **Utilization phase**
  - Maintenance
  - Operation
  - Management / Administration

- **Deconstruction phase**
  - Deconstruction planning
  - Deconstruction
  - Recycling / Disposal
Sustainable buildings are those that use less non-renewable energy, aims to improve the natural environment and limits the use of harmful materials on the environment and the users of the buildings.

- reduces operating costs
- makes a positive impact on public health and the environment
- enhances building and organizational marketability
- increases occupant productivity
- Help create a sustainable community.

**Energy reduction**
By cost of 20%

**CO₂ Emissions**
As an impact of energy reduction

**Indoor water use reduction**
of 30%

**Outdoor Water Use reduction**
of 50%

**Solid Waste reduction**
of 70%
Introduction

What You can’t measure You can’t Control

USA

UK

Egypt

What You can’t measure You can’t Control
In 2009, the Egyptian Green Building Council (GBC-Egypt) was established to improve and act towards a better environment through adopting the green building approach.

In April 2011, the first version of the Green Pyramid Rating System (GPRS) was introduced.

The second version followed in 2017 building on the 3rd version of the LEED system. It was developed by the Housing and Building National Center (HBRC) to adapt to the local context and achieve Egypt’s vision 2030.

GPRS Certified: 40–49 credits
Silver Pyramid: 50–59 credits
Gold Pyramid: 60–79 credits
Green Pyramid: 80 credits and above
The aims of the Green Pyramid Rating System are:

1) To provide a benchmark for good practice that enables buildings in Egypt to be assessed for their green credentials through a credible, challenging and transparent environmental rating system;

2) To enable building designers, constructors and developers to make reasoned choices based upon the environmental impact of their decisions;

3) To stimulate awareness of, and demand for sustainable green buildings;

4) To allow informed dialogue with interested parties and contribute to wider debate on Green Building in Egypt over the coming years
The incentives related to a Green Permit included:

1) Access to preferred and prime locations and property per the Government of Egypt,
2) Tax Breaks, Waivers and Postponements,
3) Financial Assistance including guarantees, credit and insurance,
4) Utility Concessions,
5) Equipment support and finance, and
6) Employee support and assistance.
Section 2: Stakeholders and Sustainability “Shared Responsibilities”
Stakeholders

Processes for engaging with stakeholders

Identifying the stakeholders

A. Government Authorities
B. Developers
C. Investors
D. Utilities
E. Suppliers and Manufacturers
F. Architects, Engineers, Contractors
G. Occupiers

1 - Stakeholder Engagement: Achieving Sustainability in the Construction Sector, sustainability
ISSN 2071-1050, P695-710
Stakeholders

- 30% The market was not comfortable with new ideas or new technologies
- 36% The certification process was too complicated, with too much paperwork
- 52% The market was not willing to pay a premium for green buildings
- 56% Green buildings added significantly to the initial cost
- 57% It was hard to justify the greater initial costs of green buildings

14% Sustainable design is not considered as a market barrier

### Stakeholders

#### A. Government Authorities:

<table>
<thead>
<tr>
<th>Control &amp; regulatory instruments</th>
<th>Economic &amp; market based instruments</th>
<th>Fiscal instruments &amp; incentives</th>
<th>Support, information &amp; voluntary action</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE Buildings Codes</td>
<td>Utilities</td>
<td>Capital subsidies</td>
<td>Tenant behavior</td>
</tr>
<tr>
<td>Audit and measurement</td>
<td>Institutional investors</td>
<td>Grants</td>
<td>Education &amp; training of professionals</td>
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<td></td>
<td></td>
<td>subsidized loans</td>
<td></td>
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<td></td>
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<td>R&amp;D</td>
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</table>
Stakeholders

“No One is Left Behind”

Egypt Vision 2030, constitutes the national umbrella through which the Sustainable Development Goals will be implemented in Egypt.

This to guide the country’s development pathways in the coming 15 years, which require high level of engagement of different partners, and to translate the vision into actions.
Stakeholders

B. Developers:

**Education, Training and Communication**

- to promote energy savings for owners, users & facility managers
- Communicate energy performance targets of new developments

**Specifications**

- Set EE target as primary design goal
- Tighten targets for building O&M
- IDC tender with emphasis on energy requirements
Stakeholders

C. Investors:

- Sponsoring institutions who have lending programs targeted at EE retrofits
- Include energy performance in property valuation method
- Use EE analysis to enhance traditional decision-making
- Target investments funds that focus on EE
- Adopt lifecycle cost approach to investment decisions
- Assign value to EE through financial mechanisms and funding sources
### Stakeholders

#### D. Utilities:

<table>
<thead>
<tr>
<th>Action</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulate customers to save energy</td>
<td>by launching information campaigns, providing advice</td>
</tr>
<tr>
<td>Take part in the education and training effort needed</td>
<td>to promote energy savings and efficiency</td>
</tr>
<tr>
<td>Regularly survey customers</td>
<td>to understand their knowledge and information needs with respect to EE</td>
</tr>
<tr>
<td>Reinforce current knowledge and deliver new information</td>
<td>on a regular basis</td>
</tr>
<tr>
<td>Utilities promote a new energy aware culture</td>
<td>amongst customers and other stakeholders</td>
</tr>
</tbody>
</table>
### Stakeholders

**E. Suppliers and Manufacturers:**

#### Education, Training and Communication
- Provide contractors and end-user with training and operations
- Ensure all customers receive & understand information & training
- Simplify products where feasible to lower the skill level necessary for use

#### Marketing
- Develop marketing campaigns to promote building’s energy performance
- Revisit equipment pricing in line with EE and Sustain awareness throughout customer base

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[Logo and Website Information]

**www.thebig5constructegypt.com**

Real time updates on: [Social Media Icons]
Stakeholders

F. Architects, Engineers, Contractors, Craftsmen:

- Enroll in EE training program
- Reward those who attain a high level of proficiency
- Provide voluntary certifications for projects to promote energy efficient contractions and use
- Support continuing education on EE, eventually making it an essential job requirement or performance criterion
- Designers and contractor implement EE as a standard practice
Stakeholders

G. Occupiers:

- Require information on energy performance through voluntary certification systems and programs
- Receive training in how to operate one’s building(s)
- Acceptance of new EE features, including those that affect appearance
- Building occupants fully comprehend and value EE
Section 3: Green Building and Retrofit
Green Building and Retrofit

The Green Retrofit are most efficient for building aged more than 20 years

- Improve energy and environmental performance,

- Reduce water use,

- Improve the comfort and quality of the space in terms of natural light, air quality, and noise

The building and its equipment must be maintained to sustain these improvements over time.

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Green Building and Retrofit

Green Retrofit Activities

- Upgrade the Building Envelope: 61%
- Installed Env. Friendly Finishes & Furnishings: 66%
- Installed Water-Efficient Plumbing: 71%
- Improved Occupancy Comfort: 79%
- Energy-Efficient Lighting: 100%

Age of Green Retrofitted Buildings

- 1-15 Years: 21%
- 16-30 Years: 30%
- 31-45 Years: 16%
- 46-60 Years: 14%
- 61-75 Years: 13%
- 76-100 Years: 6%

The use of Solar Water Heaters

Facts and numbers:
The system is installed in Case Study Project to cover a number of 120 Apartments areas in ranging from 136 m² to 80 m².
- Maximum Hourly consumption: 73 liters
- Maximum Daily Consumption: 438 liters
- Total Electricity Savings: 75,791KWh
- CO2 emissions avoided: 35,223.12 Kg
- The relation between collector area and capacity is 1m² = 0.7kW
Savings = 40% from the electricity needed to heat water.
Green Building and Retrofit

Using LED Lighting Units

**Facts and numbers**
In Case Study Project to control the energy performance for the units, a user guide for units owners is under preparation in order to limit the type of lamps to be used. The current study is performed over the LED for inside the units:
- Total number of Lighting Fixtures = 3755 ranging from 200-300-60 watt
- Total energy saving per year = 860 Mw
- Total savings per year = 344000 LE

**Savings 77%**

**Electricity Consumption**

- Normal lamp: 1124 Mwh/year
- LED Lamp: 263 Mwh/year
**Use of Low Flow aerator**

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Threshold below code baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet Water Closet</td>
<td>20%</td>
</tr>
<tr>
<td>Urinal</td>
<td>50%</td>
</tr>
<tr>
<td>Public Lavatory</td>
<td>20%</td>
</tr>
<tr>
<td>Private Lavatory</td>
<td>32%</td>
</tr>
<tr>
<td>Kitchen Faucet</td>
<td>20%</td>
</tr>
<tr>
<td>Showerhead</td>
<td>20%</td>
</tr>
</tbody>
</table>
Using of Reflective Glass

Facts and numbers:
The original design considered the use of 6mm clear glass windows:
The annual electricity consumption for the South West Façade was 35,709 Kwh.
It was decided to use reflective glass for all the elevations which lead to a reduction of around 16% in the annual electricity consumption.
It reduces the annual electricity consumption for one building from 63,275 Kwh to reach 52,911Kwh.

Savings 16%

<table>
<thead>
<tr>
<th></th>
<th>NW (K.W.H)</th>
<th>SW (K.W.H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground floor</td>
<td>4418</td>
<td>4410</td>
</tr>
<tr>
<td>First floor</td>
<td>5133</td>
<td>5977</td>
</tr>
<tr>
<td>Second floor</td>
<td>5445</td>
<td>6392</td>
</tr>
<tr>
<td>Third floor</td>
<td>5104</td>
<td>5957</td>
</tr>
<tr>
<td>Fourth floor</td>
<td>5767</td>
<td>6589</td>
</tr>
<tr>
<td>Roof</td>
<td>5824</td>
<td>6384</td>
</tr>
</tbody>
</table>
Green Building and Retrofit

Using of louvers over the openings

Facts and numbers
The original design didn’t consider the shading devices over the openings, that leads to a higher electricity consumption as well as a higher daylighting intensity inside the spaces which exceed 200 lux.
The louvers helped achieving an average of 7% reduction in the annual electricity consumption.

Savings 7%
Use of White Gravel over roofs

**Facts and numbers**

The thermal insulation layer for the roofing system is Extruded Polystyrene with density 35kg/m³ and thickness 50mm and this helped achieving R-value 3.370 exceeding what is required in the Egyptian Code for Energy Efficiency.

Adding the white gravel layer on the top of the roof finishes layer increases the thermal resistance as well as it has high SRI values helping reflect back sunlight.

Savings 6%
Green Building and Retrofit

Using of Double Glass

Facts and numbers:
After the reduction percentage achieved in the Case Study project, it was decided to achieve a higher reduction percentage by using double glass windows. The annual electricity consumption was assumed to be reduced by 43%.

Savings 43%
Case Study Project

Total energy savings:
- 23% in Lighting energy
- 15% water heating energy
- 38% heating and cooling energy

The Project achieved 25% total energy saving and 30% total water savings.
Section 4: Results, Discussion & Conclusion
Results

Energy Cost Saving will be Recouped
Decrease in the Operation Cost by 16%
Increase in Building Value by 7%
Increase in the ROI by 15%
Increase in Overall Occupancy by 2.5%
Companies request of leasing Green Retrofitted spaces represent 30%

In Average period of 10 years