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International Building & Construction Show

18 - 21 SEPTEMBER 2018
EGYPT INTERNATIONAL EXHIBITION CENTER
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GREEN BUILDINGS AND RETROFIT - THE HANDS-ON APPROACH TO ACHIEVING SUSTAINABILITY

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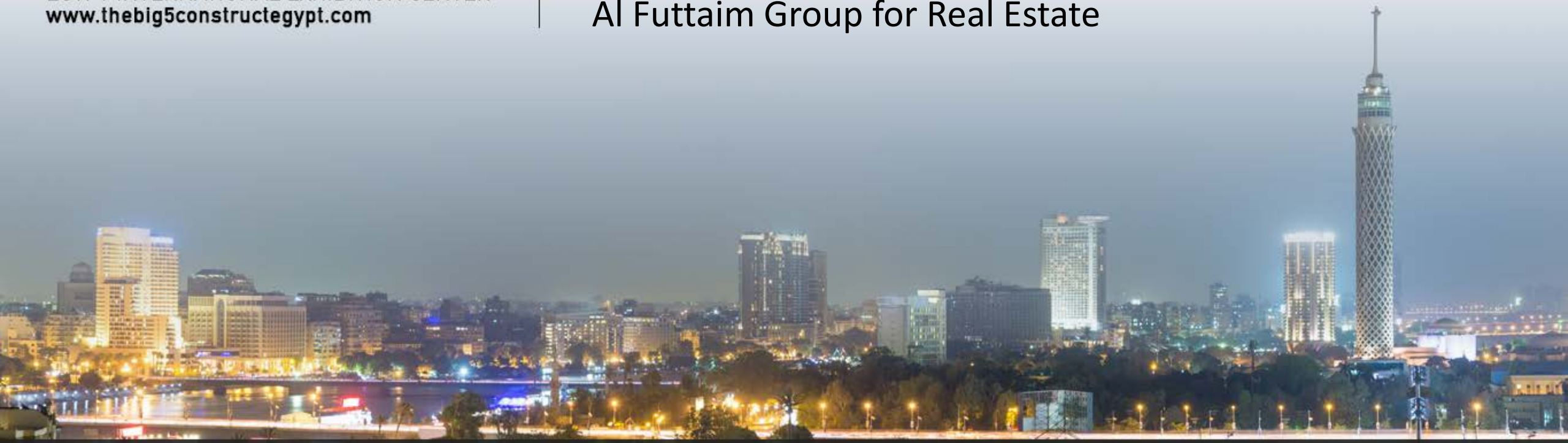
Al Futtaim Group for Real Estate



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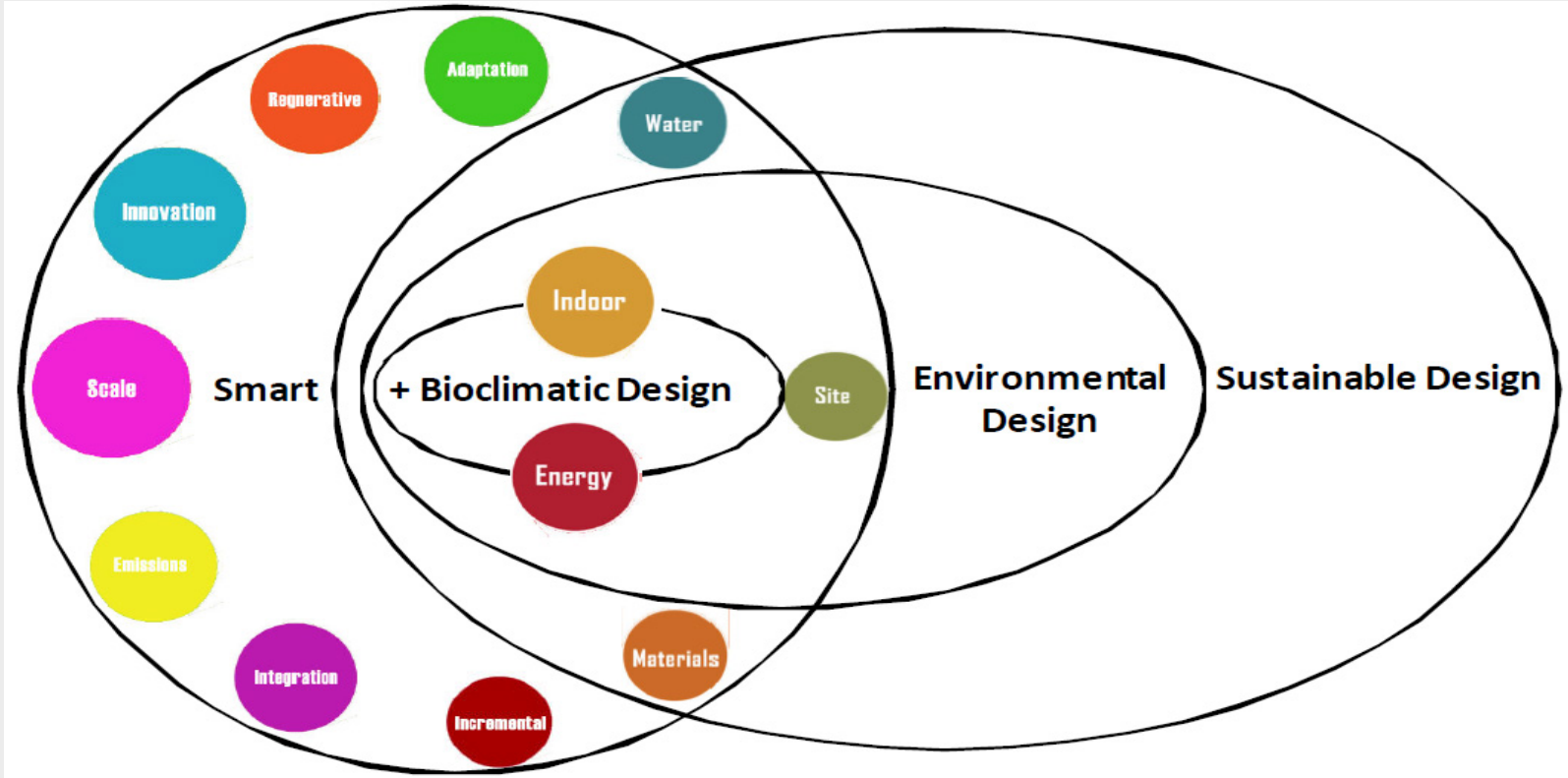
Outlines

- 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

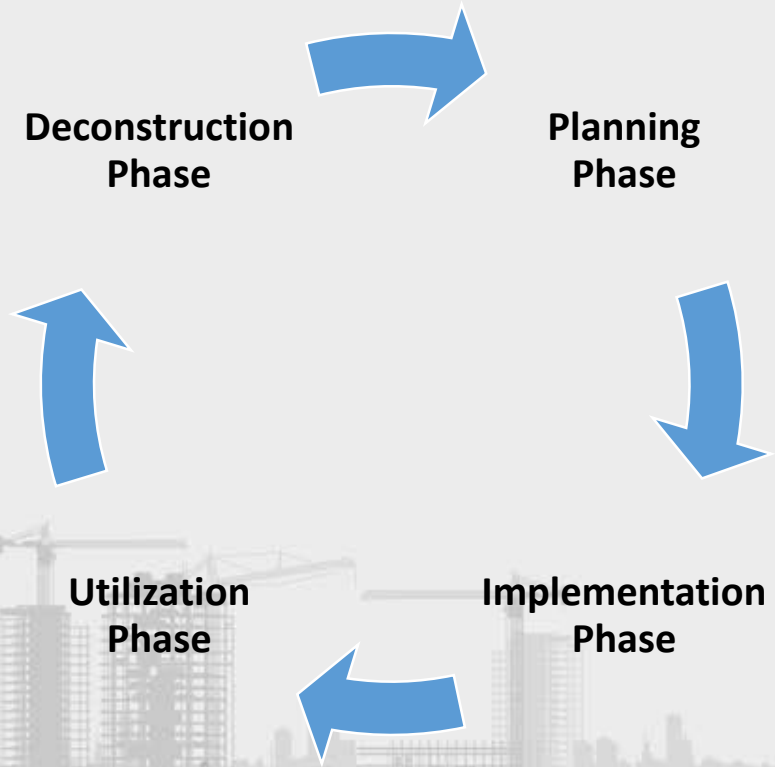
The development of the sustainable design



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



Introduction

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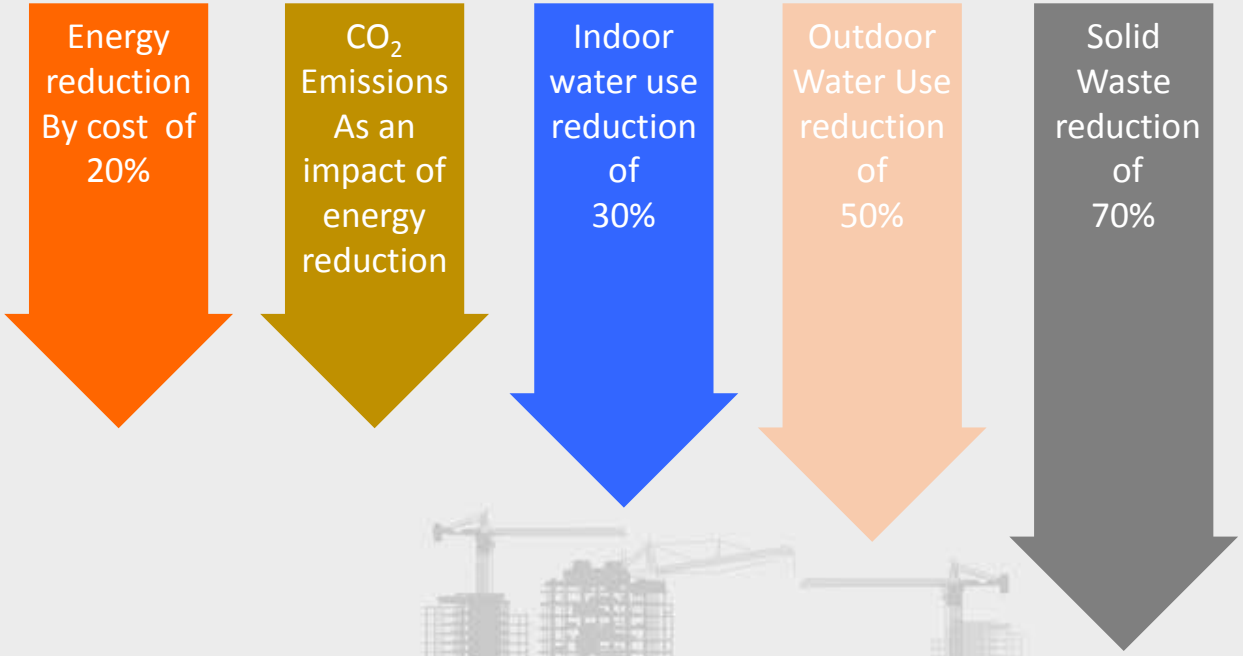
Sustainable buildings are those that use less non-renewable energy, aims to improve the natural environment and limits the use of harmful materials on the environment and the users of the buildings.

- 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.



Introduction

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USA

UK

Egypt

What You can't measure You can't Control

GPRS

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

GPRS

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

GPRS

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.

Section2: Stakeholders and Sustainability *"Shared Responsibilities"*

Stakeholders

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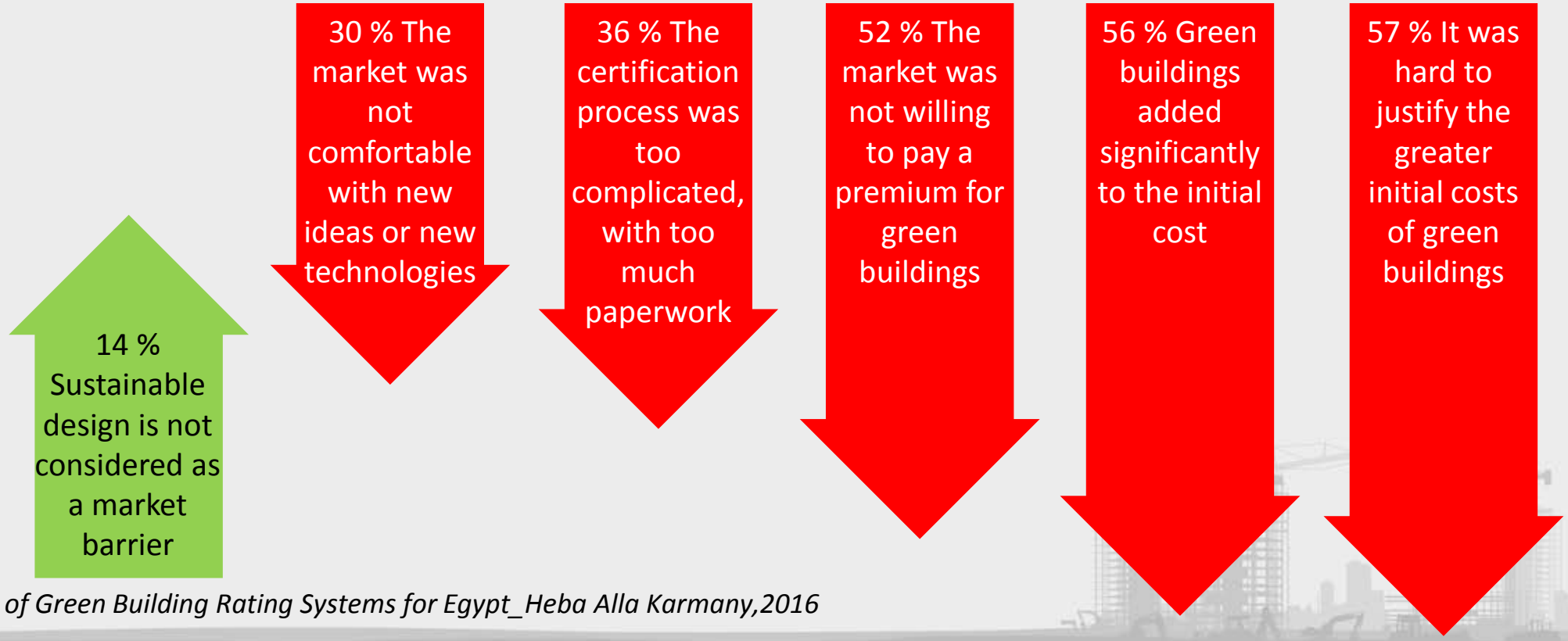
Processes for engaging with stakeholders [1]

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



Evaluation of Green Building Rating Systems for Egypt_Heba Alla Karmany,2016

Stakeholders

A. Government Authorities:

Control & regulatory instruments	Economic & market based instruments	Fiscal instruments & incentives	Support, information & voluntary action
EE Buildings Codes	Utilities	Capital subsidies	Tenant behavior
Audit and measurement	Institutional investors	Grants	Education & training of professionals
		subsidized loans	
		R&D	

Stakeholders

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"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

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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

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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

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D. Utilities:

Stimulate customers to save energy by launching information campaigns, providing advice

Take part in the education and training effort needed to promote energy savings and efficiency

Regularly survey customers to understand their knowledge and information needs with respect to EE

Reinforce current knowledge and deliver new information on a regular basis

Utilities promote a new energy aware culture amongst customers and other stakeholders

Stakeholders

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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

Stakeholders

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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

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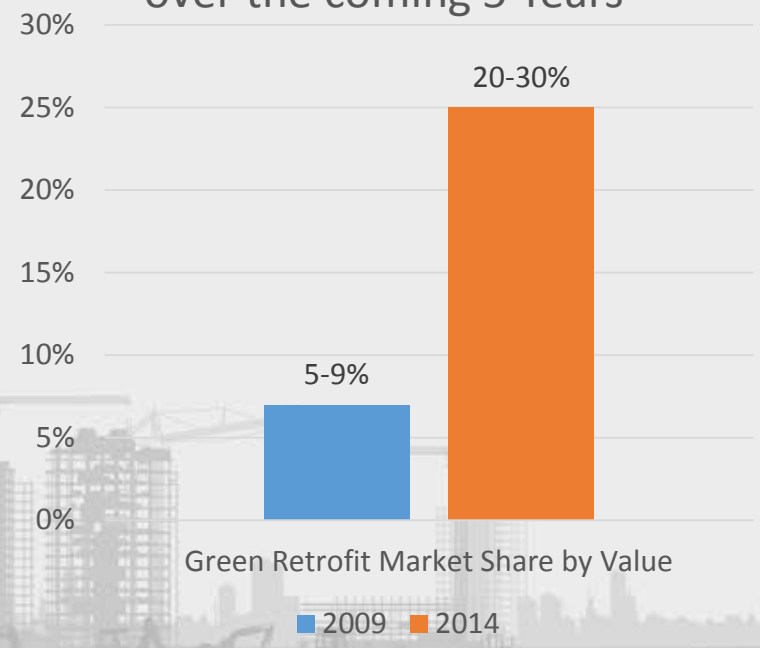
The Green Retrofit are most efficient for building aged more than 20 years

- 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

Green Building Retrofit Market Poses Strong Growth over the coming 5 Years[1]



1 – Green Building Retrofit and Renovation, McGraw Hill Construction.

Green Building and Retrofit

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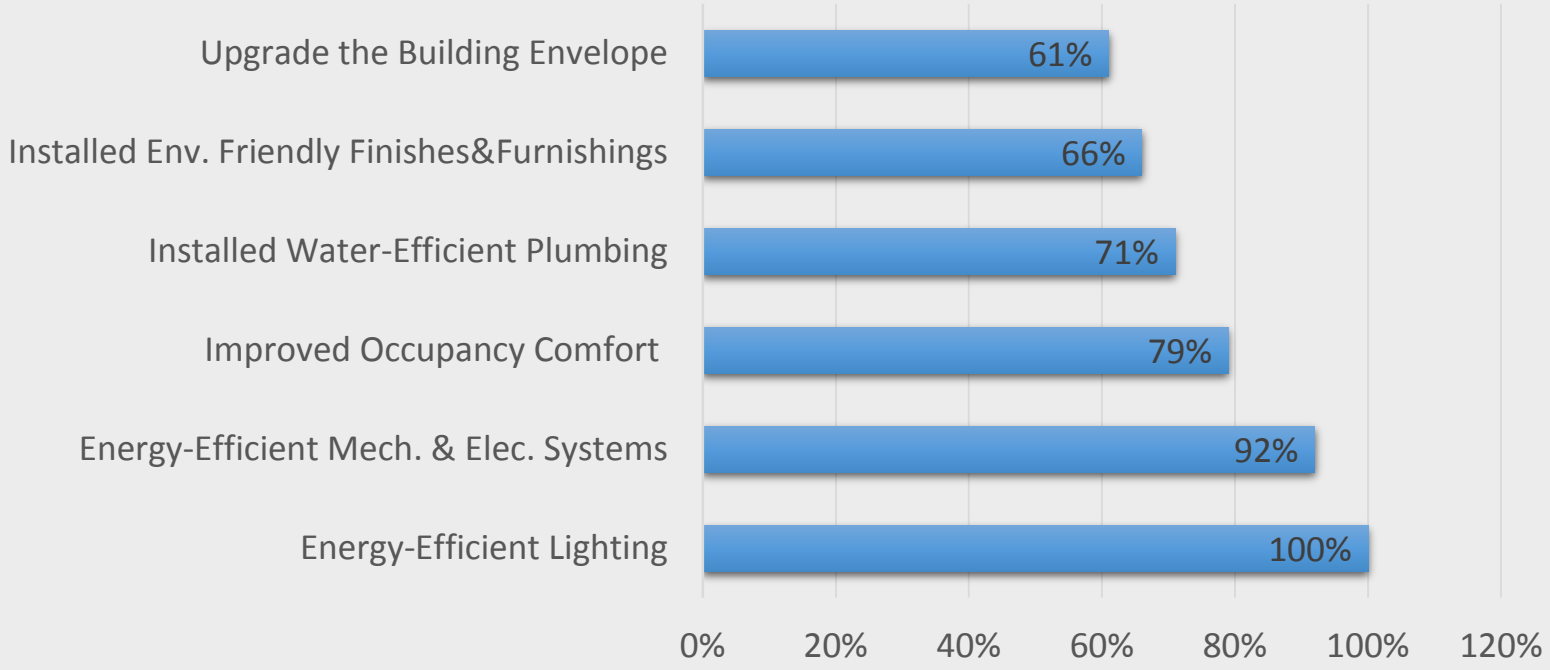
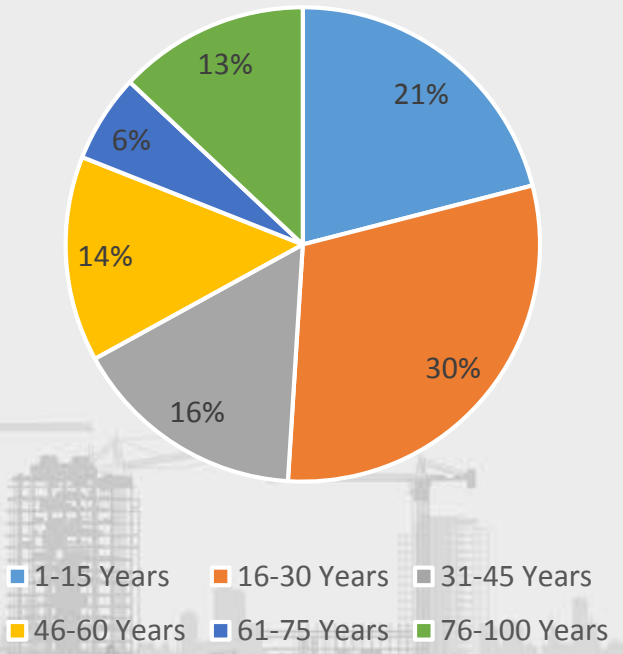
Green Retrofit Activities



Age of Green Retrofited Buildings



1 – Green Building Retrofit and Renovation, McGraw Hill Construction.

Green Building and Retrofit

The use of Solar Water Heaters

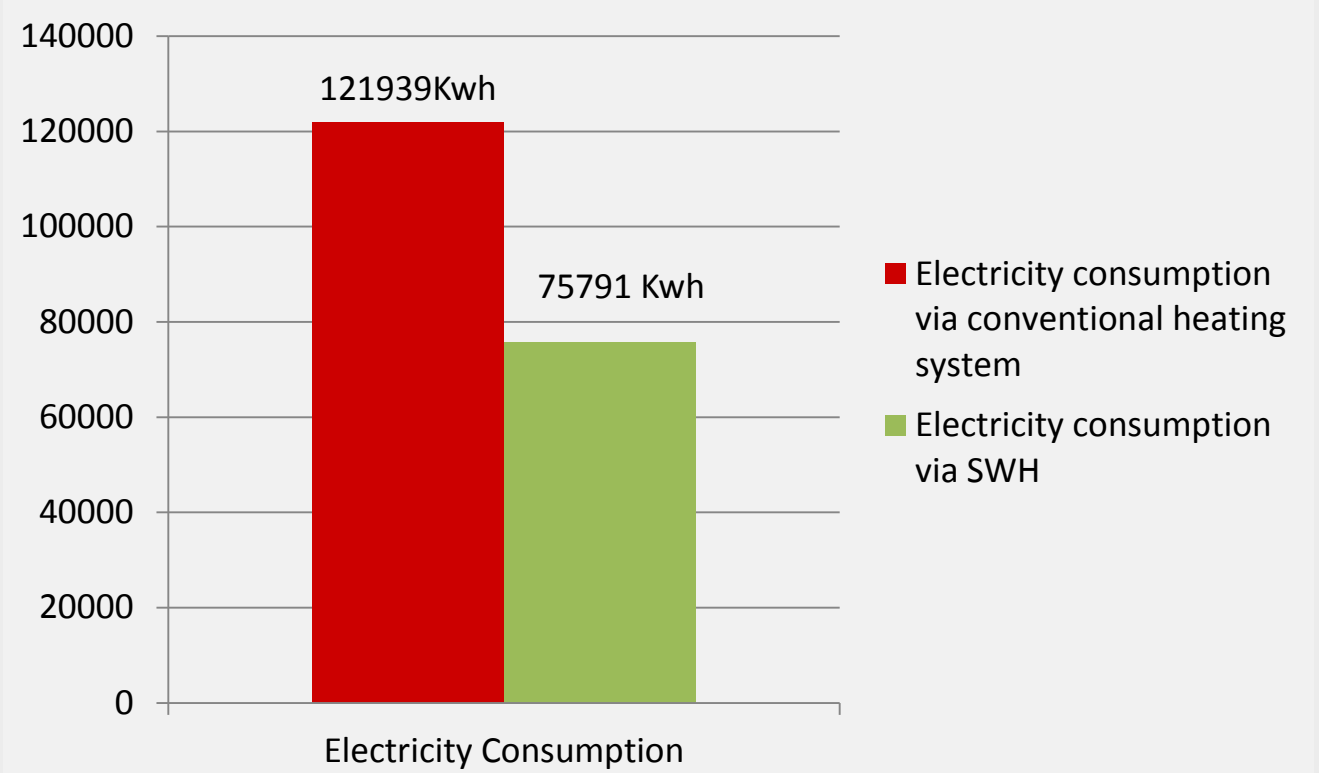
Facts and numbers:

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: 75 Liters
- Maximum Daily Consumption: 428 Liters
- Total Electricity Savings: 75791KWh
- CO2 emissions avoided: 28223.1kg
- The relation between collector area and capacity is 1m2 = 0.7kW

Savings = 40% from the electricity needed to heat water.

40% Saving



Green Building and Retrofit

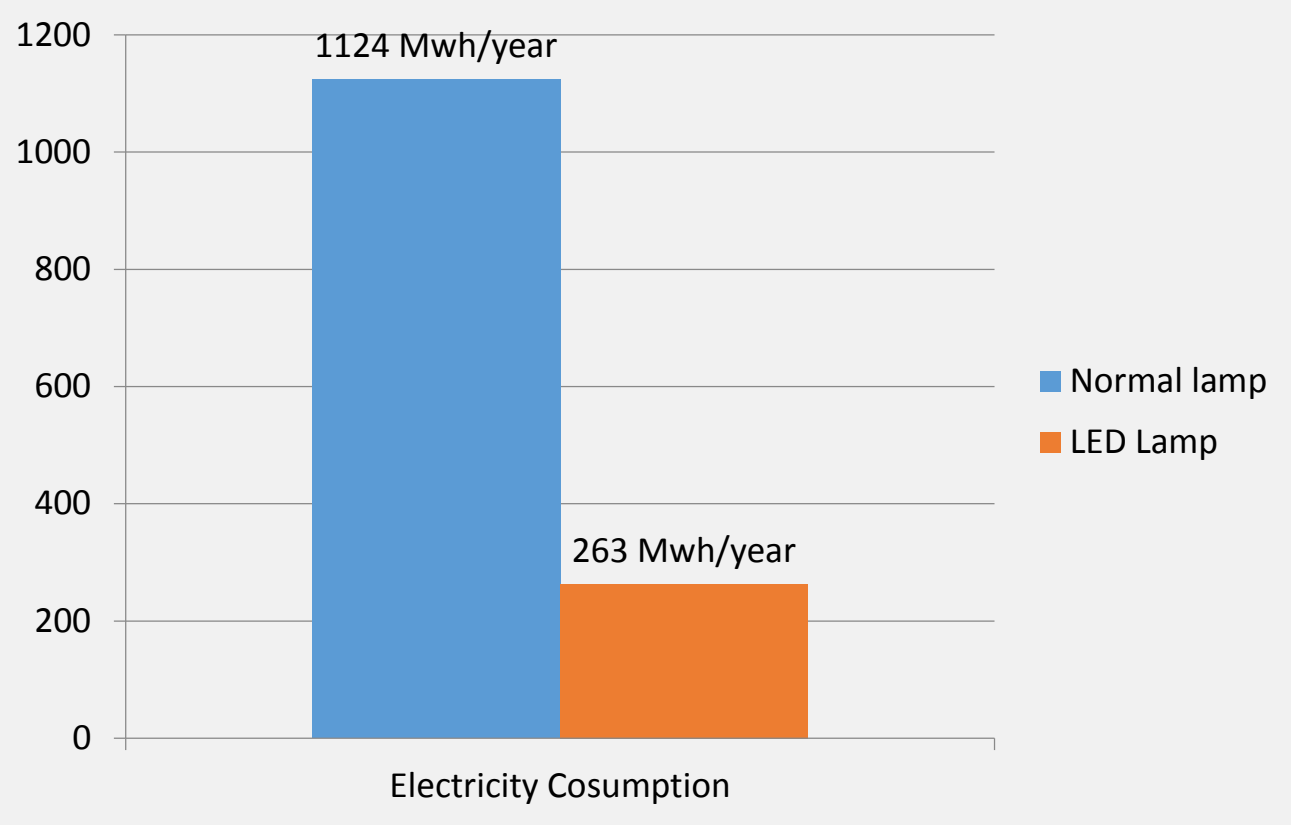
Using LED Lighting Units

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 = 3725 ranging from 200-300-60 watt
- Total energy saving per year= 860 Mw
- Total savings per year = 344000 LE

Savings 77%



Green Building and Retrofit

Use of Low Flow aerator

Fixture	Threshold below code baseline
Toilet Water Closet	20%
Urinal	50%
Public Lavatory	20%
Private Lavatory	32%
Kitchen Faucet	20%
Showerhead	20%

Green Building and Retrofit

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 helped reduction 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%

Annual Electricity Consumption using 6mm clear glass

	NW (K . W .H)	SW (K . W .H)
Ground floor	4418	4410
First floor	5133	5977
Second floor	5445	6392
Third floor	5104	5957
Fourth floor	5767	6589
Roof	5824	6384

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 suggested solution has an average of 7% reduction in the annual electricity consumption

Savings 7%

Annual Electricity Consumption using 6mm clear glass

	Annual average of zone cooling (Kw.h)				
	No Shading system	Alt.1. Left fin and horizontal overhang	Alt.2. Right Fin and horizontal overhang	Alt.3. Left and Right fins with horizontal overhang	Alt.4. horizontal louvers with tilt angle of 30°
South/West	1432.15	1246.33 (12.9%)	1305.89 (8.8%)	1219.67 (14.8%)	1278.89 (10.7%)
North/West	672.16	664.27 (1.1%)	660.51 (1.7%)	580.31 (13.6%)	663.46 (1.2%)
South/East	674.61	639.71 (5.17%)	639.74 (5.16%)	622.09 (7.78%)	643.81 (4.56%)
North/East	716.27	688.30 (3.90%)	695.23 (2.93%)	682.36 (4.73%)	690.48 (3.60%)

Green Building and Retrofit

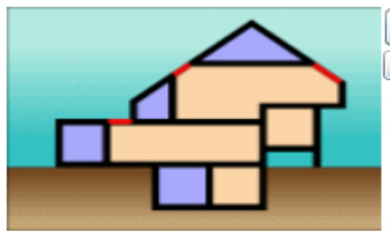
Use of White Gravel over roofs

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 increase the thermal resistance as well as it has high SRI values helping reflecting back sunlight.

Savings 6%



Select element | R-value

Print as pdf | Save file (local) | Open file | Metric

Internal surface resistance	0.10	m2K/W
External surface resistance	0.04	m2K/W
Upper limit resistance	3.37	m2K/W
Lower limit resistance	3.37	m2K/W
Corrections	0.0000 m2K/W	0.00 %

Select example

The example constructions can take a few seconds to be displayed

Restart

R-value 3.370 m2K/W

Layer	Material	Colour	Thermal conductivity (W/mK)	Thickness (mm)	Thermal resistance (m2K/W)	Bridged layer	Corrections
Layer1	Concrete tile		1.4	20	0.01		
Layer2	Cement and lime based render		0.39	20	0.05		
Layer3	Sand and gravel		2	60	0.03		
Layer4	Light-weight aggregate blocks 1200 kg/m3		0.5	50	0.1		
Layer5	Waterproof membrane		0.05	4	0.08		
Layer6	EPS 250 (35 kg/m3)		0.033	50	1.52		
Layer7	Light-weight blocks 600 kg/m3		0.19	250	1.32		
Layer8	Plaster (lightweight)		0.16	20	0.12		

Green Building and Retrofit

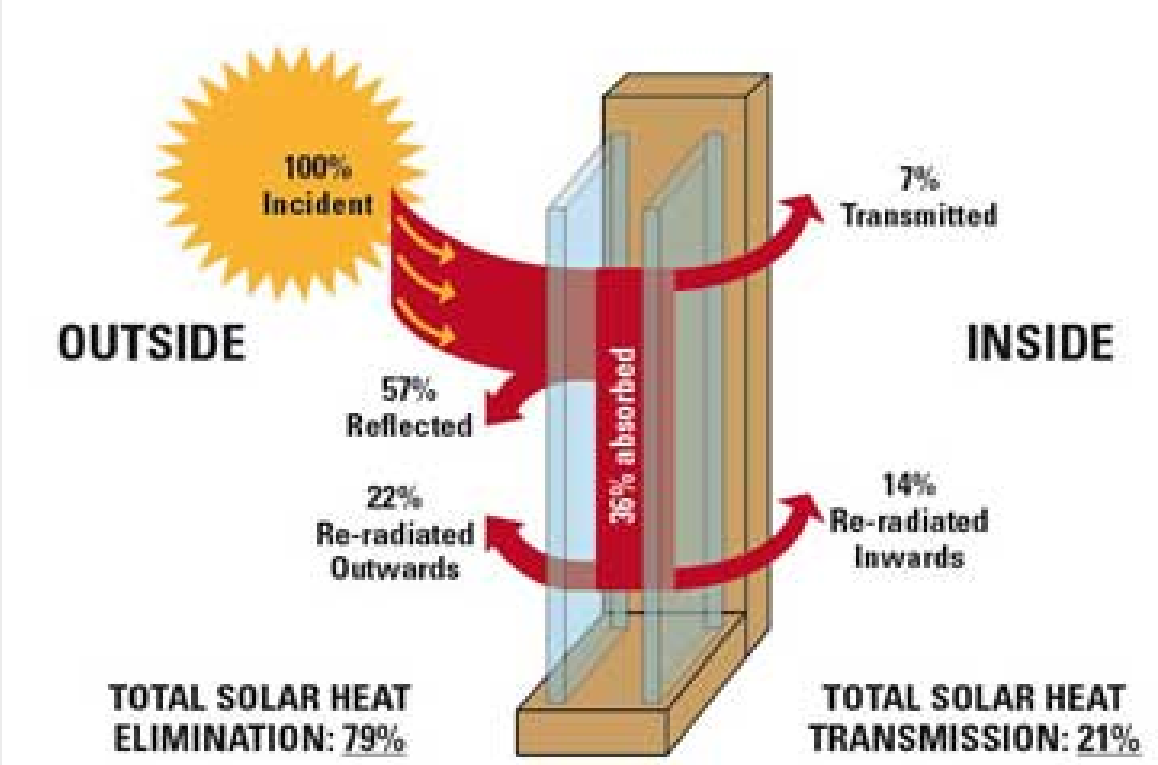
Using of Double Glass

Facts and numbers

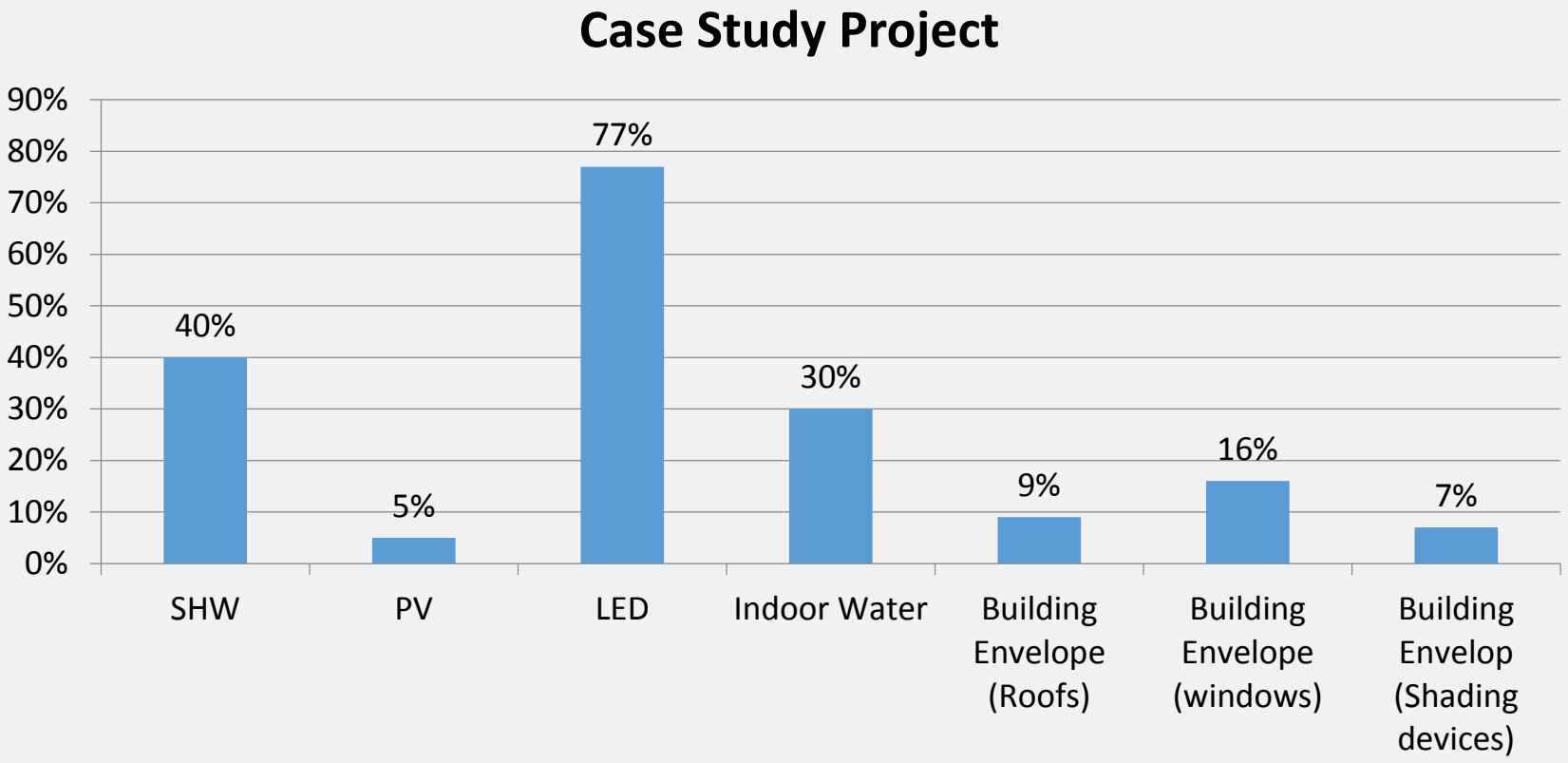
After the reduction percentage achieved in Case Study project it was decided to achieve higher reduction percentage by using double glass window.

The annual electricity consumption assumed to be reduced by 43%

Savings 43%



Results



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

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In Average period of 10 years

- 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%

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