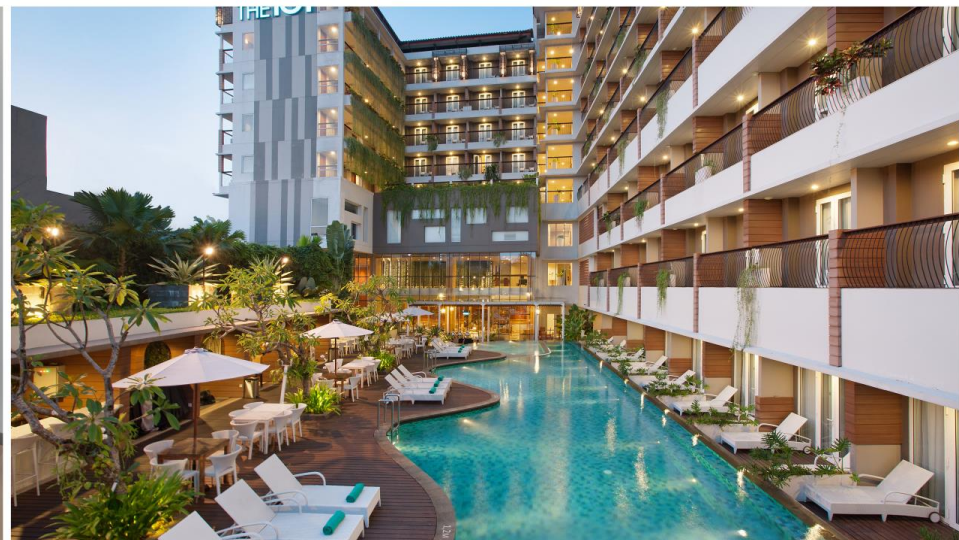




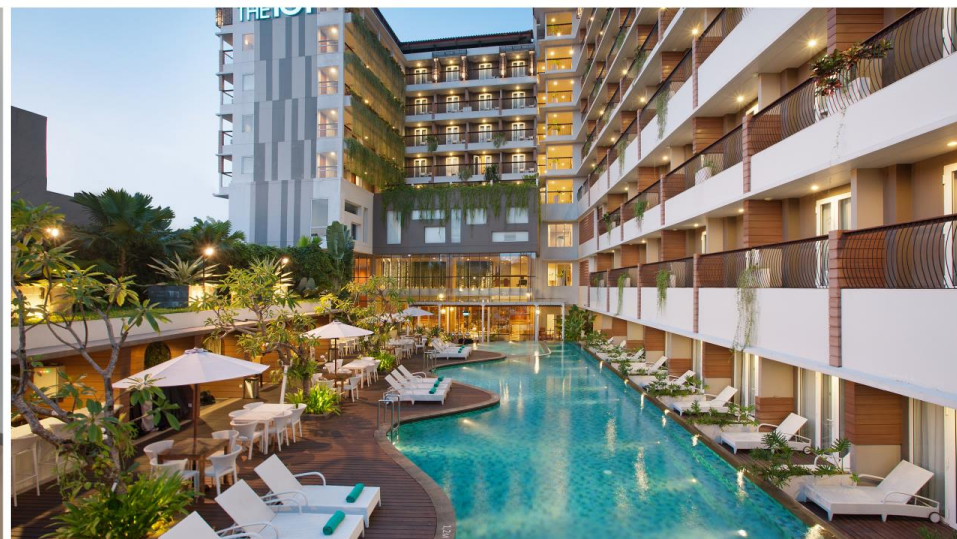
GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS



Creating Markets, Creating Opportunities

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HOTELS IN EAST ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Cambodia	\$135,000	\$14,850	0.8
China	815,000 ¥ \$118,000	58,600 ¥ \$8,500	1.2
Fiji	\$26,000	\$36,000	0
Indonesia	1,115,000 Thousand Rp \$74,500	140,000 Thousand Rp \$9,300	0.7
Philippines	1,500,000 PhP \$27,700	1,200,000 PhP \$22,000	0.1
Thailand	\$35,000	\$4,800	0.6
Vietnam	120 MVnd \$5,100	100 MVnd \$4,200	0.1



ENERGY

The best ROI is reached through the following interventions:

- Reduced Window To Wall Rati
- Air Conditioning with Water Cooled Chiller
- Heat Pumps for Hot Water
- Energy Saving Light Bulbs
- Reduced Window To Wall Ratio

In cooler climates, these interventions yield good results:

- Natural Ventilation
- Sensible Heat Recovery



WATER

The most cost effective strategies include:

- Low-Flow Showerheads in Guest Rooms
- Dual Flush for all Guest Water Closets



MATERIALS

- Floor slabs are biggest efficiency driver, ranging from 35% - 40% of embedded energy potential
- Using other materials in these elements of a hotel usually saves over 20%



HOTELS IN SOUTH ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Bangladesh	\$83,655	\$7,450	0.9
India (Delhi)	Rs9,550,050 \$129,000	Rs1,261,230 \$17,000	0.6
India (Mumbai)	Rs12,282,600 \$166,000	Rs915,290 \$12,400	1.2
Sri Lanka	\$152,810	\$13,235	1



<https://www.edgebuildings.com/projects/the-101-bogor-suryakencana>



ENERGY

Potential strategies include:

- Reduced Window to Wall Ratio
- Energy-Saving Light Bulbs
- Lighting controls for corridor
- Air conditioning with water cooled chiller
- Efficient Air Conditioning and De-Humidifiers



WATER

Effective interventions include:

- Low-Flow Showerheads in Guest Rooms
- Dual Flush for all Guest Water Closets
- Gray Water Systems and Recycling



MATERIALS

The EDGE standard can be reached through:

- In-Situ Through Concrete >30% PFA Slab Flooring
- Common bricks for external and internal walls
- UPVC window frames

HOTELS IN AFRICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Payback Period in Years	Utility Savings / month
Angola	\$142,055	0.3	\$34,745
Cote D'Ivoire	\$67,900	0.8	\$6,900
Ghana	\$132,590	0.3	\$43,290
Kenya	\$89,720	0.5	\$13,750
Nigeria	\$27,320	0.4	\$5,635
South Africa	ZAR 2,442,250 \$170,000	1	ZAR 203,100 \$14,110



ENERGY

Most effective measures include:

- Reduced Window-to-Wall Ratio
- Heat Pump for Hot Water
- Energy-Saving Light Bulbs
- Occupancy Sensors in Bathrooms
- In some climates, Natural Ventilation for Corridors is also very effective.



WATER

The EDGE standard can typically be reached through:

- Efficient Water Closets
- Low-Flow Showers
- Aerators and Auto-Shutoff Faucets
- These can be supplemented with Gray Water Systems and Recycling, if applicable



MATERIALS

- Floor slabs are the biggest efficiency drivers, ranging from 35% - 60% of material costs out of 7 total interventions.

HOTELS IN LATIN AMERICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Argentina	\$221,930	\$8,725	2.1
Brazil	\$180,500	\$11,735	1.3
Colombia	\$159,900	\$11,735	1.7
Costa Rica	73,050,000 CRC \$127,700	5,728,000 CRC \$10,000	1.1
Mexico	\$227,000	\$7,430	3.1
Peru	175,700 S \$53,160	46,350 S \$14,000	0.3

Natural Ventilation



<http://sivabuilders.in>



ENERGY

The best ROI is from the following measures:

- External Shading Device
- Energy Saving Light Bulbs
- Variable Refrigerant Flow Cooling System
- Air Conditioning with Air Cooled Screw Chiller

In dryer climates, Natural Ventilation makes a significant impact at negligible investment.



WATER

The most cost effective measures include:

- Low-Flow Showerheads in Guest Rooms
- Dual Flush for all Guest Water Closets
- Aerator and Auto Shut-off Faucet



MATERIALS

- Floor Slabs are the biggest efficiency driver ranging from 25% - 40% saving by reducing the amount of concrete used.



ROI ON MEASURES PERIOD NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Egypt	\$226,000	\$8,500	2.2
Jordan	\$226,500	\$14,300	1.3
Morocco	\$214,000	\$5,200	3.4
Pakistan	\$220,000	\$5,100	3.5



ENERGY

Effective strategies include:

- Reduced Window To Wall Ratio
- External Shading Devices
- Insulation of Roof
- Energy-Saving Light Bulbs



WATER

Best ROI is reached through:

- Low-Flow Showerheads in Guest Rooms
- Dual Flush for all Guest Water Closets
- Gray Water Systems and Recycling



MATERIALS

- Floor slabs are biggest efficiency driver, ranging from 35% - 40% of embedded energy potential
- Using materials other than the base case in these elements of a hotel usually saves over 20%



HOTELS IN EAST EUROPE

ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Armenia	\$75,980	\$10,300	0.6
Poland	\$82,340	\$15,000	0.5
Russian Federation	\$148,160	\$15,480	0.8
Serbia	\$70,720	\$15,770	0.4
Ukraine	\$79,530	\$3,820	1.7
Turkey	\$84,980	\$12,300	0.6

Occupancy sensors in hotels



Room controller with on-board presence detection



ENERGY

Potential strategies include:

- Reduced Window To Wall Ratio
- Energy saving lightbulbs in Internal spaces
- Occupancy Sensors in Bathrooms
- Insulation of External Walls
- Recovery of waste heat from the generator for space heating



WATER

The EDGE standard can be reached through these measures:

- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and dual flush for water closets
- Dual flush for water closets in guest rooms



MATERIALS

- Floor Slabs are biggest efficiency drivers ranging from 30% of material costs out of 6 total interventions
- Using other materials in these elements of a hotel usually saves over 40%



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN EAST ASIA



HOTELS – CAMBODIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 21% Savings through:

- Heat Pump for Hot Water
- Energy Saving Light Bulbs
- Solar Hot Water Collectors



Water – 20% Savings through:

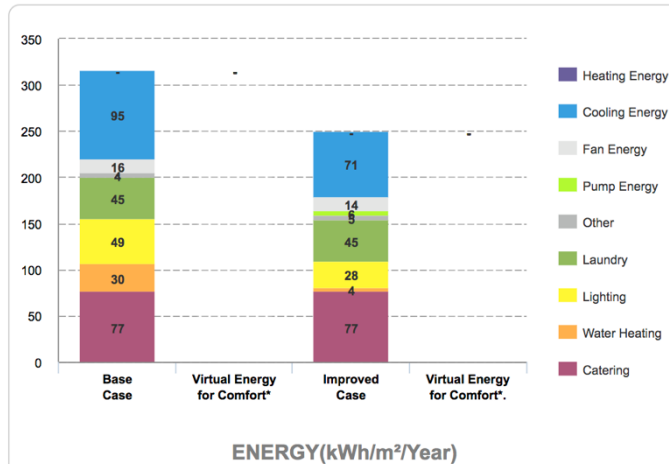
- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush for Water Closets and Efficient Urinals
- Rainwater Harvesting System



Materials – 36% Savings through:

- In-Situ Trough Concrete Slab Flooring

20.90% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$135,000

Utility Costs Savings
\$14,850 / month

Payback in Years
0.8

Operational CO₂
Savings
780 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window to Wall Ratio, Low-E Coated Glass
- Air Conditioning with Air Cooled Screw Chiller
- Energy Saving Lighting for back-of-house, internal, external spaces



Water – 28% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 51% Savings through:

- Facing Brick and Hollow Concrete Blocks for External Walls



AC HOTEL VERACRUZ (MEXICO)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – CHINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 23% Savings through:

- External Shading Devices, Natural Ventilation
- Low E-Coated Glass
- DX Split System (Cooling), Heat Pump for Hot Water
- Absorption Chiller, Sensible Heat Recovery



Water – 24% Savings through:

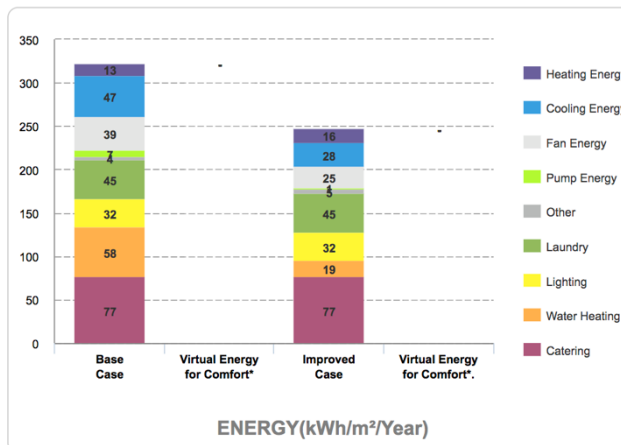
- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush for Water Closets and Efficient Urinals
- Grey Water Treatment and Recycling System



Materials – 34% Savings through:

- In-Situ Trough Concrete Slab Flooring

23.23% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
815,000 ¥

Utility Costs Savings
58,600 ¥ / month

Payback in Years
1.2

Operational CO₂
Savings
1,400 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 47% Savings through:

- External Shading Devices, Insulation of Roof and External Walls
- Higher Thermal Performance Glass, Energy-Efficient Air Conditioning, Energy-Saving Lighting System



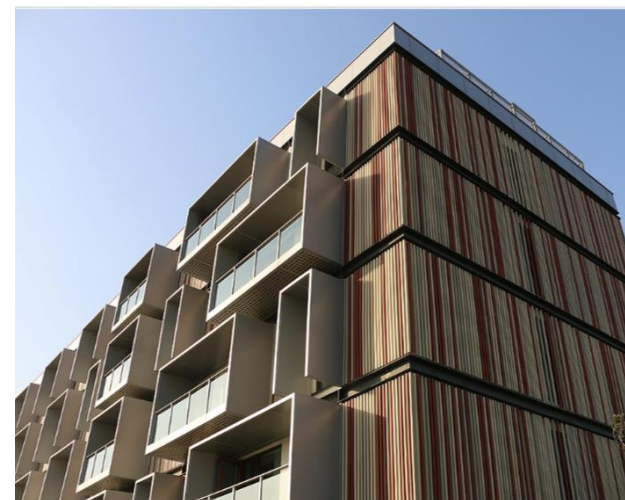
Water – 42% Savings through:

- Low-Flow Showerheads and Faucets, Dual Flush Toilets
- Rainwater Harvesting System
- Gray Water Treatment & Recycling System



Materials – 34% Savings through:

- Solid Dense Concrete Blocks for Internal and External Walls
- Laminated Wooded Floors
- Timber Window Frames



BRUCK PASSIVE HOUSE HOTEL (NANJING)

HOTELS – FIJI CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 25% Savings through:

- External Shading Devices
- Air Conditioning with Air Cooled Screw Chiller
- Heat Pump for Hot Water
- Energy Saving Light Bulbs



Water – 37% Savings through:

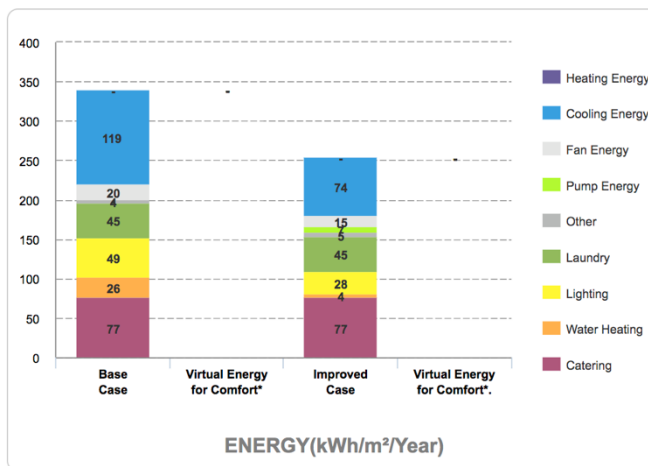
- Low-Flow Showerheads and Faucets in Guestrooms
- Gray Water Recycling, Rainwater Harvesting System



Materials – 36% Savings through:

- In-Situ Trough Concrete Slab Flooring

25.44% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$26,000

Utility Costs Savings
\$36,000 / month

Payback in Years
0

Operational CO₂
Savings
700 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 63% Savings through:

- Reduced Window to Wall Ratio, External Shading Device
- Low-E Coated Glass, Variable Refrigerant Volume Cooling System
- Heat Pump for Hot Water, Energy Saving Lighting



Water – 22% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Dual Flush Water Closets
- Water-Efficient Urinals, Dishwashers and Landscaping
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 44% Savings through:

- Autoclaved Aerators Concrete Blocks for External and Internal Walls
- UPVC Window Frames



THE 101 YOGYAKARTA TUGU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – INDONESIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 22% Savings through:

- Air Conditioning with Air Cooled Screw Chiller
- Heat Pump for Hot Water
- Energy Saving Light Bulbs
- Solar Hot Water Collectors



Water – 20% Savings through:

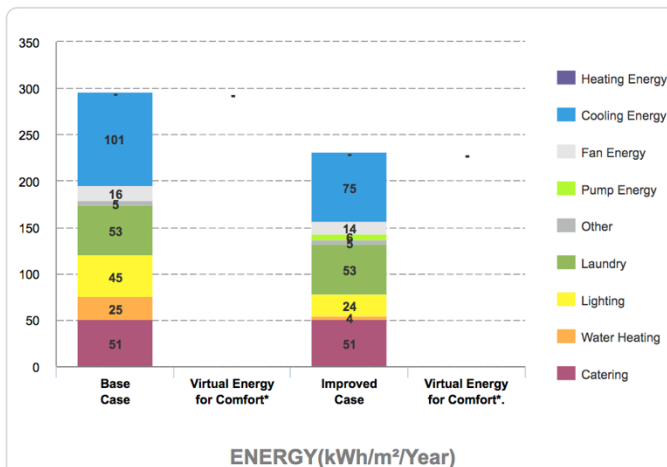
- Low-Flow Showerheads and Faucets in Guestrooms
- Rainwater Harvesting System



Materials – 56% Savings through:

- Re-Use of Existing Floorslab

21.68% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
1,115,000
Thousand Rp

Utility Costs Savings
140,000 Thousand Rp /
month

Payback in Years: 0.7

Operational CO₂ Savings
600 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio and External Shading Devices
- Insulation of Roof and External Walls, Natural Ventilation in Corridors, Air Conditioning with Air Cooled Screw Chiller
- Energy-Saving Light Bulbs and Solar Photovoltaics



Water – 21% Savings through:

- Low-Flow Plumbing Fixtures for Washbasins and Showerheads,
- Dual Flush Water Closets
- Water-Efficient Kitchen Faucets and Landscaping



Materials – 37% Savings through:

- Micro Concrete Tiles on Steel Rafters for Roof, Stone Profile Cladding and Autoclaved Aerated Concrete Block Walls, Wood Block Finish Flooring



SPRINGHILL CONDOTEL AT JIMBARAN JIJAU (BALI)

HOTELS – PHILIPPINES CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 25% Savings through:

- Air Conditioning with Water Cooled Chiller
- Energy Saving Light Bulbs



Water – 21% Savings through:

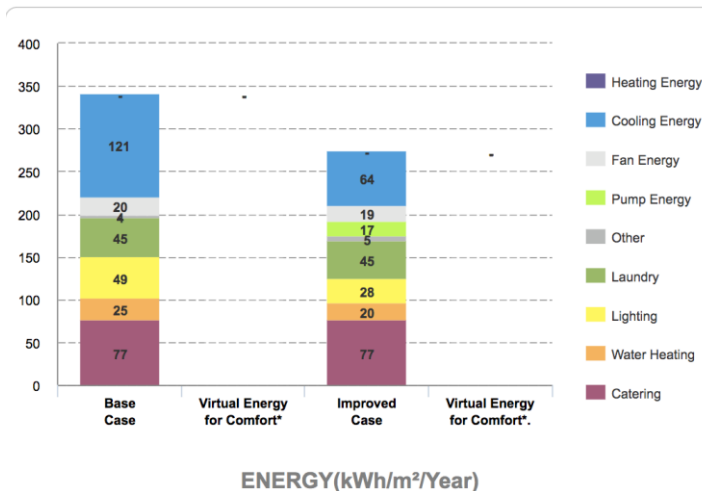
- Low-Flow Showerheads in Guestrooms
- Aerators & Auto Shut-off Faucets in All Other Bathrooms
- Gray Water Treatment and Recycling System



Materials – 35% Savings through:

- In-Situ Trough Concrete Slab Flooring

20.10% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
1,500,000 PhP

Utility Costs Savings
1,200,000 PhP / month

Payback in Years
0.1

Operational CO₂ Savings
856 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 22% Savings through:

- Reduced Window to Wall Ratio, Low-E Coated Glass, Insulation of Roof and External Walls, Air Conditioning with Air Cooled Screw Chiller
- Sensible Heat Recovery from Exhaust Air, Preheating Water from Generator Waste Heat
- Energy-Saving Lighting System for Internal Spaces with Lighting Controls



Water – 24% Savings through:

- Low-Flow Plumbing Fixtures for Washbasins and Showerheads
- Dual Flush Water Closets, Water Efficient Landscaping
- Water Recovery Systems, Blackwater Treatment and Recovery System



Materials – 22% Savings through:

- Medium-Weight Hollow Concrete blocks for Internal and External Walls, Terrazzo Tile Flooring



RADISSON BLU HOTEL (GHANA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – THAILAND CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 24% Savings through:

- External Shading Devices
- Air Conditioning with Air Cooled Screw Chiller
- Heat Pump for Hot Water
- Energy Saving Light Bulbs



Water – 34% Savings through:

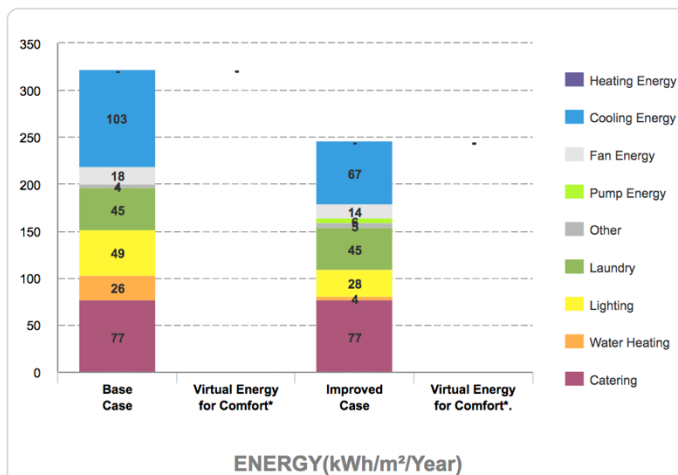
- Low-Flow Showerheads in Guestrooms
- Gray Water Recycling, Rainwater Harvesting System



Materials – 57% Savings through:

- Re-use of Existing Floorslabs

23.89% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$35,000

Utility Costs Savings
\$4,800 / month

Payback in Years
0.6

Operational CO₂
Savings
600 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 46% Savings through:

- Reduced Window to Wall Ratio, External Shading Device
- Low-E Coated Glass, Variable Refrigerant Volume Cooling System
- Heat Pump for Hot Water, Energy Saving Lighting



Water – 25% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Dual Flush Water Closets
- Water-Efficient Urinals, Dishwashers and Landscaping
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 41% Savings through:

- Autoclaved Aerators Concrete Blocks for External and Internal Walls
- UPVC Window Frames



THE 101 BOGOR SURYAKANCANA (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – VIETNAM CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 26% Savings through:

- External Shading Devices
- Air Conditioning with Air Cooled Screw Chiller
- Heat Pump for Hot Water
- Energy Saving Light Bulbs



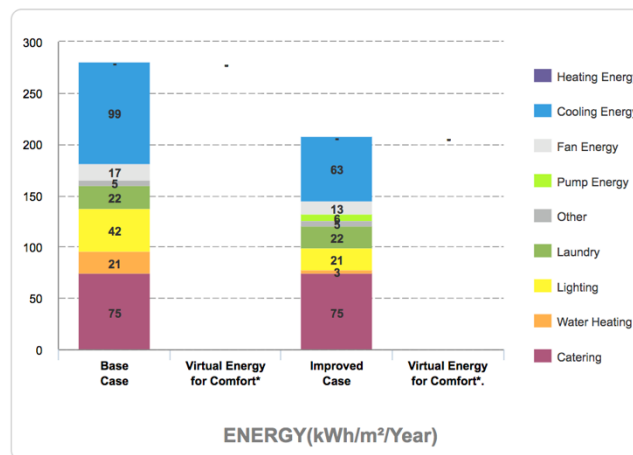
Water – 34% Savings through:

- Low-Flow Showerheads in Guestrooms
- Gray Water Recycling, Rainwater Harvesting System



Materials – 57% Savings through:

- Re-use of Existing Floorslab



PROJECT METRICS

Incremental Cost
120 mVND

Utility Costs Savings
100 mVND / month

Payback in Years
0.1

Operational CO₂
Savings
480 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio Low-E Coated Glass, Variable Speed Drives on the Fans of Cooling Tower
- Air Conditioning with Water Cooled Screw Chiller
- Energy Saving Lighting for Back of House, Heat Pumps



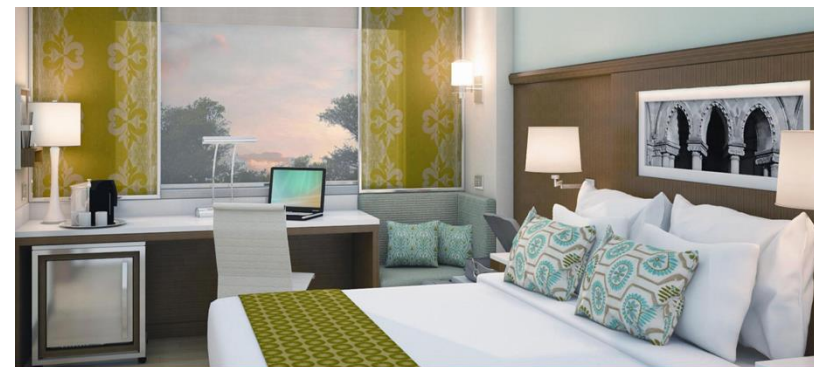
Water – 23% Savings through:

- Dual Flush Water Closets
- Blackwater Treatment and Recovery System



Materials – 30% Savings through:

- 150mm In-Situ Reinforced Concrete Slab for Floors and Roof
- 200mm Solid Dense Concrete Blocks for Internal and External Walls
- Laminated Wooden Flooring



SAMHI- FAIRFIELD BY MARRIOTT (INDIA)

In-country certified project to replace related example once an EDGE project is certified.



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN SOUTH ASIA



Creating Markets, Creating Opportunities

HOTELS – BANGLADESH CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 20% Savings through:

- External Shading Devices
- Insulation on roof and external wall
- Air conditioning with water cooled chiller
- Low E-Coated Glass



Water – 31% Savings through:

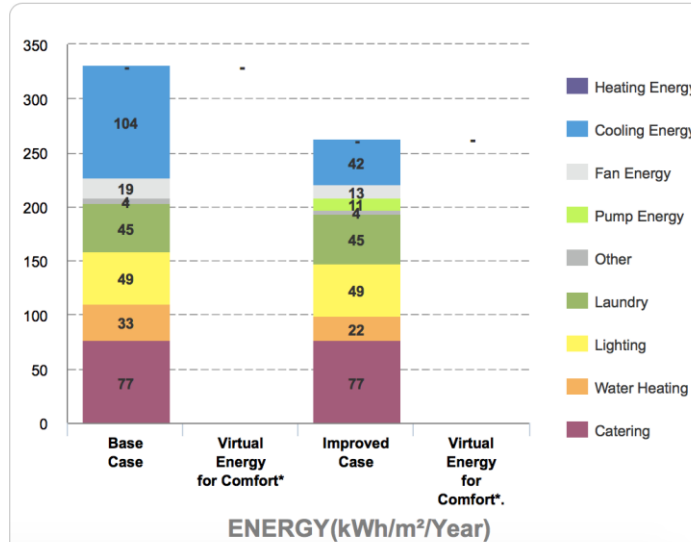
- Low flow shower heads and faucets in guest rooms
- Gray water treatment and recycling



Materials – 27% Savings through:

- In-Situ Trough >30% PFA, Concrete Slab Flooring
- Common brick wall for internal and external

20.44% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$83,655

Utility Costs Savings

\$7448 / month

Payback in Years

0.9

Operational CO₂ Savings

652 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 60% Savings through:

- Reduced Window to Wall Ratio and external shading devices
- Low-E coated glass
- Natural corridor ventilation, variable refrigerant volume cooling system, heat pump for hot water
- Energy Saving Lighting, lighting controls for corridors



Water – 26% Savings through:

- Low flow shower heads and low flow faucets in guest room
- Dual flush water closets in all bathrooms
- Water-efficient kitchen faucets



Materials – 34% Savings through:

- Cored bricks for internal and external wall with plaster
- Parquet wood flooring



ECO GREEN BOUTIQUE HOTEL

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – INDIA (DELHI) CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- Air conditioning with water cooled chiller
- Energy-Saving Light Bulbs for internal and external spaces & also in back-of-house
- Lightening controls for corridor



Water – 23% Savings through:

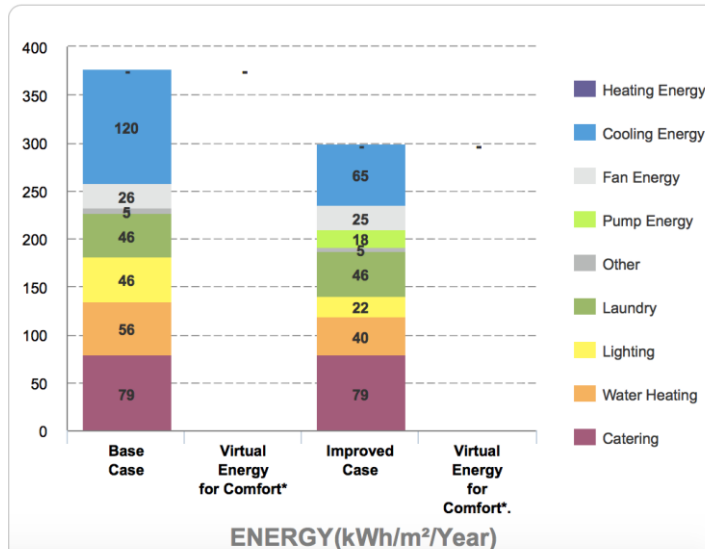
- Low flow shower head in guest rooms
- Water efficient dishwashers & pre-rinse valve
- Water efficient urinals



Materials – 27% Savings through:

- In-Situ Through Concrete >30% PFA Slab Flooring
- Common wall for external and internal use

20.63% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

Rs 12,282,680

Utility Costs Savings

Rs 915,230 / month

Payback in Years

1.2

Operational CO₂

Savings

913 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio and external shading devices
- Low-E coated glass
- Variable speed drive on the fans of cooling tower
- Air conditioning with water cooled screw chillers
- Energy Saving Lighting, for outdoor space and heat pumps
- Variable speed drive pumps



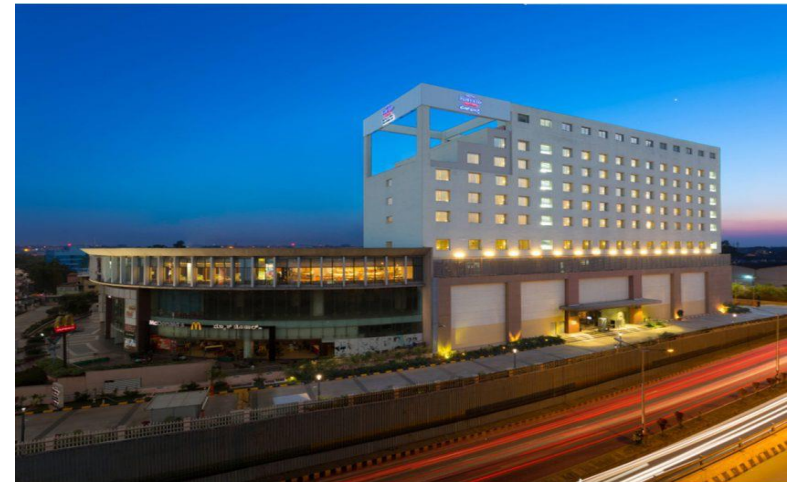
Water – 23% Savings through:

- Black water treatment and recycling system
- Dual flush for all bathrooms



Materials – 30% Savings through:

- In-Situ reinforced concrete
- Solid dense concrete blocks for internal and external walls
- Laminated wooden flooring



SAMHI – MARRIOTT (INDIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – INDIA (MUMBAI) CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- Higher Thermal Performance Glass
- Energy-Saving Light Bulbs for internal space



Water – 26% Savings through:

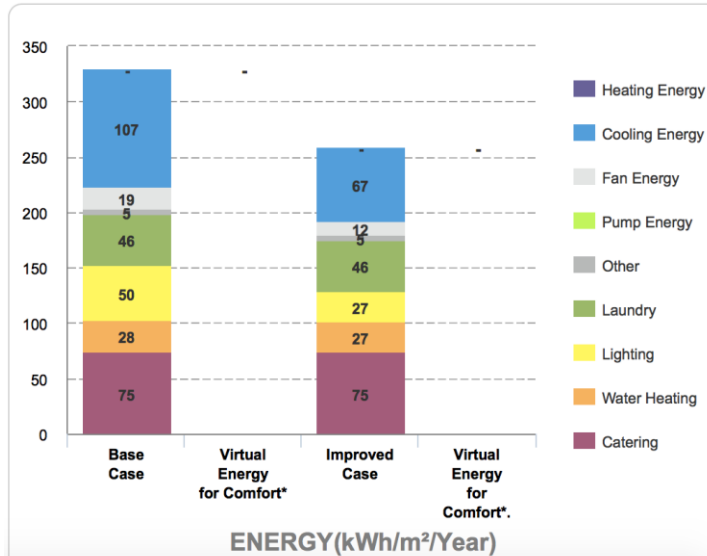
- Gray Water Treatment and Recycling System
- Water efficient dish washers



Materials – 42% Savings through:

- In-Situ Trough Concrete Slab Flooring
- Aerated Autoclaved Concrete Blocks
- UPVC window frames

21.35% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

Rs 9,550,050

Utility Costs Savings
Rs 1,261,230 / month

Payback in Years

0.6

Operational CO₂
Savings

795 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio and external shading devices
- Solar Photovoltaic
- Natural corridor ventilation, variable refrigerant volume cooling system, heat pump for hot water
- Energy Saving Lighting, lighting controls for corridors
- Air cooling in air cooled screw chillers



Water – 21% Savings through:

- Low flow plumbing fixtures for showerheads and washbasin
- Dual flush water closets for all bathrooms
- Water-efficient urinals, kitchen faucets and landscaping



Materials – 37% Savings through:

- Micro concrete tiles on steel rafters for roof construction
- Timber window frames and wood block finishing for flooring
- Autoclaved Aerated Concrete Blocks for external and internal walls



SPRINGHILL CONDOTEL AT JIMBARAN HIJAU

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – SRI LANKA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 22% Savings through:

- External Shading Devices
- Variable Refrigerant Flow (VRF) Cooling System
- Energy-Saving Light Bulbs



Water – 22% Savings through:

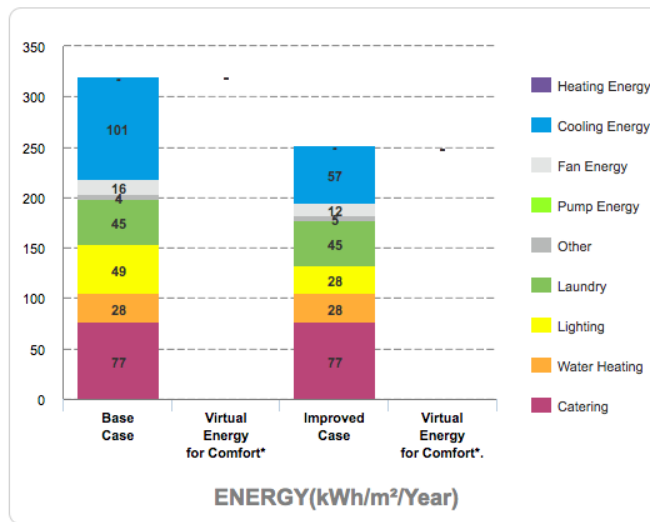
- Gray Water Treatment and Recycling System

Materials – 43% Savings through:



- In-Situ Trough Concrete Slab Flooring
- Facing Brick and Hollow Concrete Blocks

21.84% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$152,810

Utility Costs Savings

\$13,235 / month

Payback in Years

1

Operational CO₂ Savings

780 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 63% Savings through:

- Reduced Window to Wall Ratio and external shading devices
- Low-E coated glass
- Natural corridor ventilation, variable refrigerant volume cooling system, heat pump for hot water
- Energy Saving Lighting, lighting controls for corridors



Water – 22% Savings through:

- Water-Efficient fixtures in rooms and bathrooms
- Aerators and Auto Shut-off Faucet in Bathrooms
- Water-efficient landscaping



Materials – 44% Savings through:

- Autoclaved aerated concrete blocks
- UPVC window frames



THE 101 YOGYAKARTA TUGU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN AFRICA



Creating Markets, Creating Opportunities

HOTELS –ANGOLA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- Insulation of Roof
- Preheat Water With Waste Heat from Generator
- Hot Water Heat Pump
- Energy Saving Light Bulbs
- Corridor lighting controls



Water – 22% Savings through:

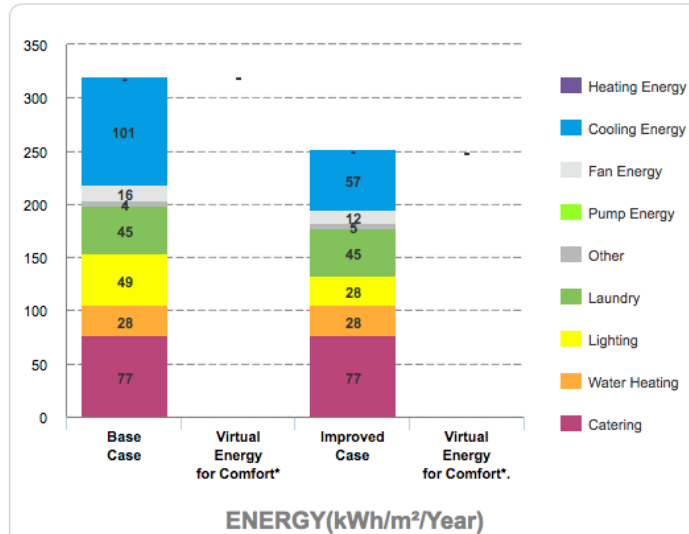
- Low Flow Showers and Faucets



Materials – 34% Savings through:

- Concrete filler slab

21.84% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$142,055

Utility Costs Savings
\$34,745 / month

Payback in Years
0.3

Operational CO₂
Savings
639 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 60% Savings through:

- Reduced Window to Wall Ratio
- External shading devices
- Energy-efficient variable refrigerant volume cooling system
- Heat pump for hot water
- Energy Saving Lighting in internal/external areas
- Solar PVs



Water – 26% Savings through:

- Low-flow showerheads
- Low-flow faucets in guest rooms
- Dual flush water closets
- Water-efficient kitchen faucets



Materials – 34% Savings through:

- Cored bricks with internal and external plaster for internal/external walls
- Parquet wood flooring



ECO GREEN BOUTIQUE HOTEL (VIETNAM)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – COTE D'IVOIRE CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 20% Savings through:

- External Shading Devices
- Low-E Coated Glass
- Natural Ventilation-Corridors
- Heat Pump for Hot Water
- Occupancy Sensors in Bathrooms



Water – 22% Savings through:

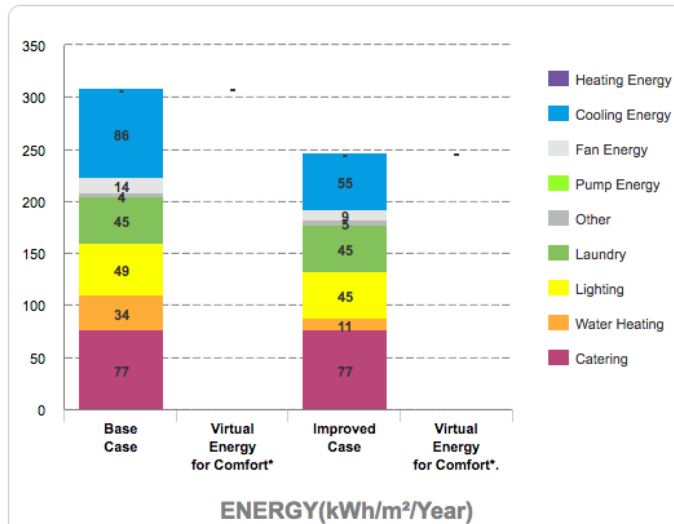
- Low Flow Showers and Faucets



Materials – 33.83% Savings through:

- Concrete Filler Slab

20.07% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$67,900

Utility Costs Savings
\$6,900 / month

Payback in Years
0.8

Operational CO₂
Savings
450 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 46% Savings through:

- Reduced Window to Wall Ratio
- External shading devices
- Low-E coated glass
- Variable refrigerant volume cooling system,
- Heat pump for hot water
- Energy Saving Lighting for internal/external spaces



Water – 25% Savings through:

- Low-flow faucets in kitchens/bathrooms
- Dual Flush water closets
- Water-efficient urinals, dishwashers, and landscaping
- Aerators and auto shut-off faucets in bathrooms



Materials – 41% Savings through:

- Autoclaved aerated concrete blocks for internal/external walls
- UPVC window frames



THE 101 BOGOR SURYAKANCANA (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – GHANA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 24% Savings through:

- Natural Ventilation-Corridors
- Variable Refrigerant Flow Cooling System
- Heat Pump for Hot Water
- Energy-Saving Lightbulbs in Internal, External Spaces



Water – 22% Savings through:

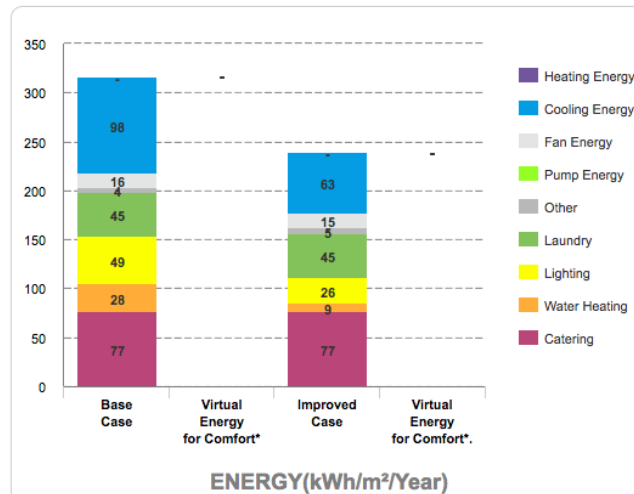
- Low Flow Showers and Faucets



Materials – 33.83% Savings through:

- Concrete Filler Slab

24.44% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$132,590

Utility Costs Savings
\$43,290 / month

Payback in Years
0.3

Operational CO₂
Savings
463 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio
- External shading devices
- Insulation of roof, external walls
- Natural ventilation in corridors
- Air conditioning with air-cooled screw chiller
- Energy-saving lighting for internal/external spaces
- Solar PVs



Water – 21% Savings through:

- Low-flow fixtures for washbasins and showerheads
- Dual-flush water closets
- Water-efficient urinals, kitchen faucets
- Water-efficient landscaping



Materials – 37% Savings through:

- Micro concrete tiles on steel rafters for roof construction
- Stone profile cladding and autoclaved aerated concrete blocks for internal/external walls
- Wood block finishes for flooring
- Timber window frames



SPRINGHILL CONDOTEL AT JIMBARAN HIJAU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – KENYA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 23% Savings through:

- External Shading Devices
- Insulation of Roof
- Variable Refrigerant Flow Cooling System
- Heat Pump for Hot Water



Water – 27% Savings through:

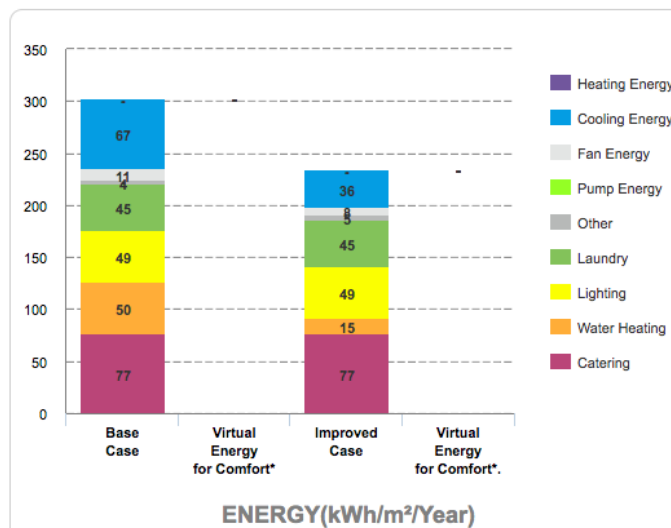
- Aerators and Auto-Shutoff Faucets
- Low Flow Showers and Faucets



Materials – 30% Savings through:

- Light-Gauge Steel Floor Cassette

22.28% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$89,720

Utility Costs Savings
\$13,750 / month

Payback in Years
0.5

Operational CO₂
Savings
460 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window to Wall Ratio
- Insulation of external walls
- Low-E coated glass
- Air conditioning with air cooled screw chiller
- Energy-saving lighting systems for back-of-house, internal, external spaces



Water – 28% Savings through:

- Low-flow faucets in kitchens, bathrooms
- Single and valve flush for water closets
- Water-efficient urinals
- Aerators and auto shut-off faucets



Materials – 51% Savings through:

- Facing brick and hollow concrete blocks for external walls



AC HOTEL BY MARIOTT VERACRUZ (MEXICO)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – NIGERIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- Higher Thermal Performance Glass
- Natural Ventilation for Corridors
- Air Conditioning with Air Cooled Screw Chiller
- Heat Pump for Hot Water
- Occupancy Sensors in Bathrooms



Water – 27% Savings through:

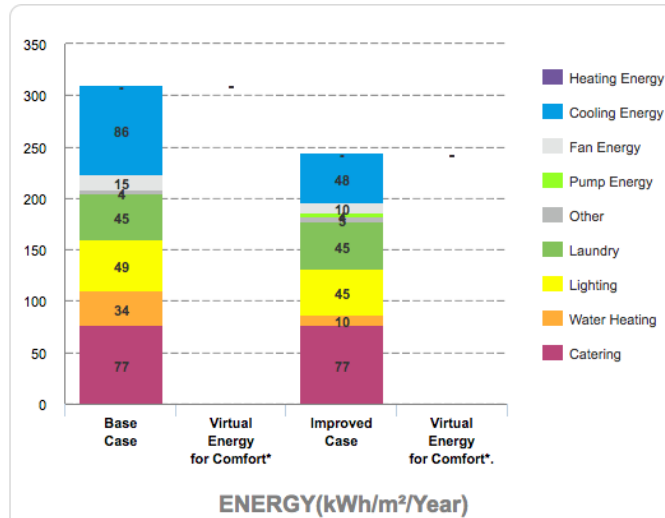
- Aerators & Auto Shut-Off Faucets
- Low Flow Showers and Faucets



Materials – 28% Savings through:

- Concrete filler slabs with polystyrene blocks

21.08% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$27,320

Utility Costs Savings
\$5,635 / month

Payback in Years
0.4

Operational CO₂
Savings
399 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio
- External shading devices
- Insulation of roof, external walls
- Natural ventilation in corridors
- Air conditioning with air-cooled screw chiller
- Energy-saving lighting for internal/external spaces
- Solar PVs



Water – 21% Savings through:

- Low-flow fixtures for washbasins and showerheads
- Dual-flush water closets
- Water-efficient urinals, kitchen faucets
- Water-efficient landscaping



Materials – 37% Savings through:

- Micro concrete tiles on steel rafters for roof construction
- Stone profile cladding and autoclaved aerated concrete blocks for internal/external walls
- Wood block finishes for flooring
- Timber window frames



SPRINGHILL CONDOTEL AT JIMBARAN HIJAU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.



BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 22% Savings through:

- External Shading Devices
- Energy-Saving Light Bulbs



Water – 22% Savings through:

- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush for Water Closets in Guest Rooms
- Water-Efficient Front Loading Washing Machine
- Water-Efficient Urinals in all Other Bathrooms

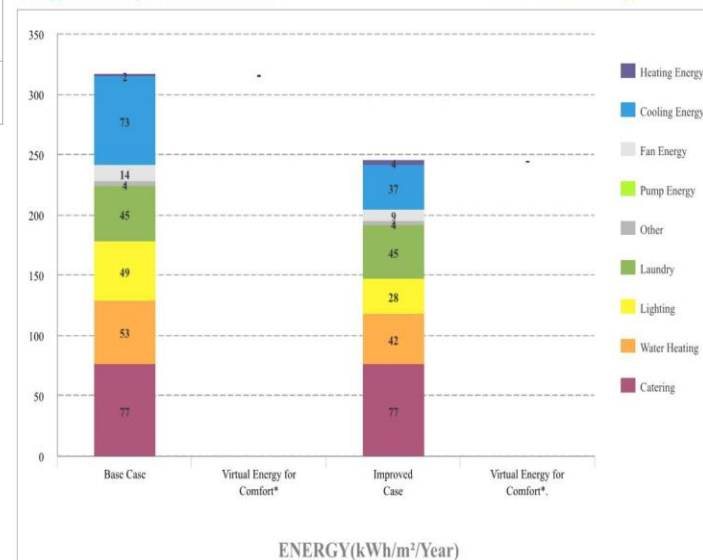


Materials – 37% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 22.42%

ENERGY SAVINGS Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
ZAR 2,442,250

Utility Costs Savings
ZAR 203,100 / month

Payback in Years
1

Operational CO₂
Savings
1,023 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 51% Savings through:

- Reduced window-to-wall ratio
- External shading devices
- Air conditioning with water-cooled chiller
- Low-E coated glass
- Insulation of roof and external walls, and energy-efficient lighting.



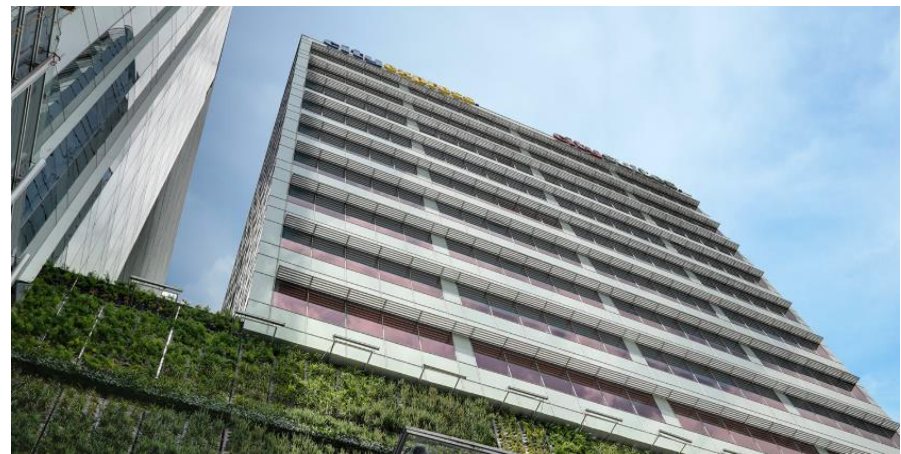
Water – 32% Savings through:

- Low-flow showerheads
- Dual flush water closets
- Water-efficient urinals



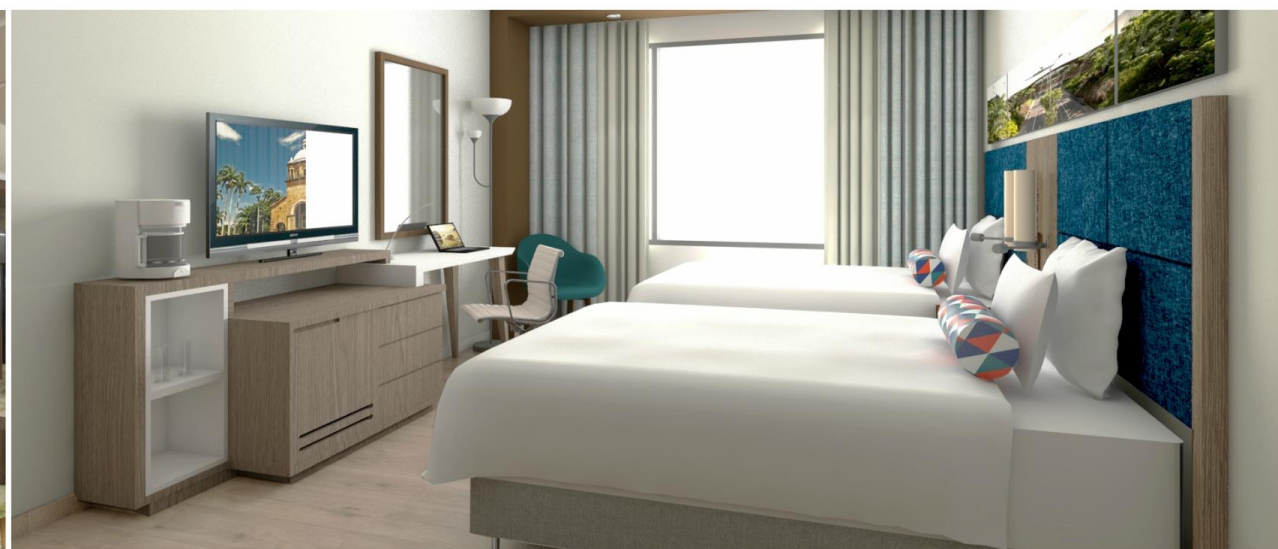
Materials – 44% Savings through:

- Concrete filler slab for floors and roof
- Medium weight hollow concrete blocks for internal walls
- Finished concrete flooring



CITY EXPRESS HOTEL (MEXICO)

In-country certified project to replace related example once an EDGE project is certified.



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN LATIN AMERICA



Creating Markets, Creating Opportunities

HOTELS – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 24% Savings through:

- External Shading Device
- Insulation of Roof and External Wall
- Variable Refrigeration Flow and Air Condition
- High Efficient Water Boiler
- Energy Saving Light Bulb



Water – 37% Savings through:

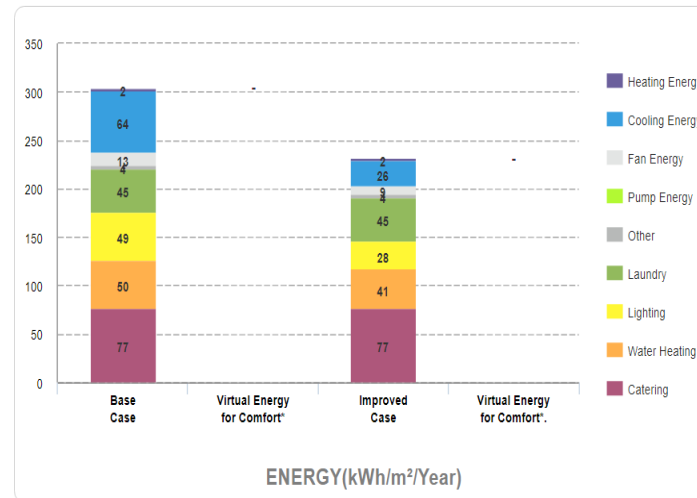
- Low-Flow Showerheads and Faucets Guestrooms
- Dual-Flush in Guest Room
- Water Efficient Landscape and Urinals



Materials – 30% Savings through:

- Composite Slim Slabs with Steel I-Beam Floor

23.88% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$221,930

Utility Cost Savings

\$8,725/month

Payback in Years

2.1

Operational CO₂ Savings

1700 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 47% Savings through:

- External Shading Device
- Insulation of Roof and External Walls
- Higher thermal performance glass
- Energy efficient air conditioning with air-cooled screw chiller
- Sensible heat recovery from exhaust air and solar hot water collector
- Energy-Saving Light Bulbs



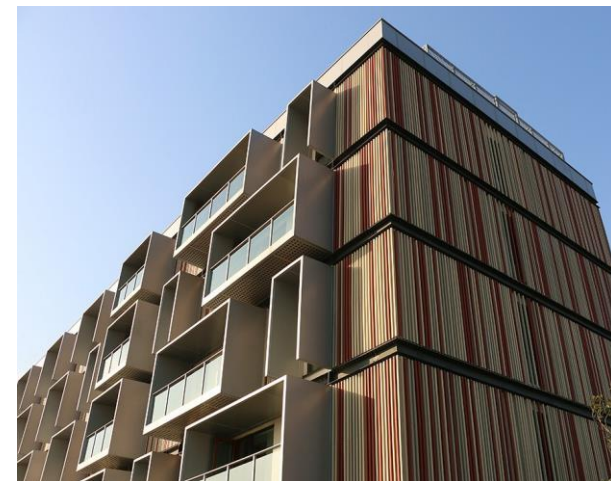
Water – 42% Savings through:

- Low-Flow showerhead and faucet
- Dual Flush Water Closets in all guest rooms
- rainwater harvesting system
- grey water treatment and recycling system.



Materials – 34% Savings through:

- Solid dense concrete blocks for internal and external walls
- laminated wooden flooring
- timber window frames



BRUCK PASSIVE HOUSE HOTEL (CHINA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 23% Savings through:

- External Shading Device
- Air Conditioning Water Cooled Chiller
- Energy Saving Light Bulb



Water – 21% Savings through:

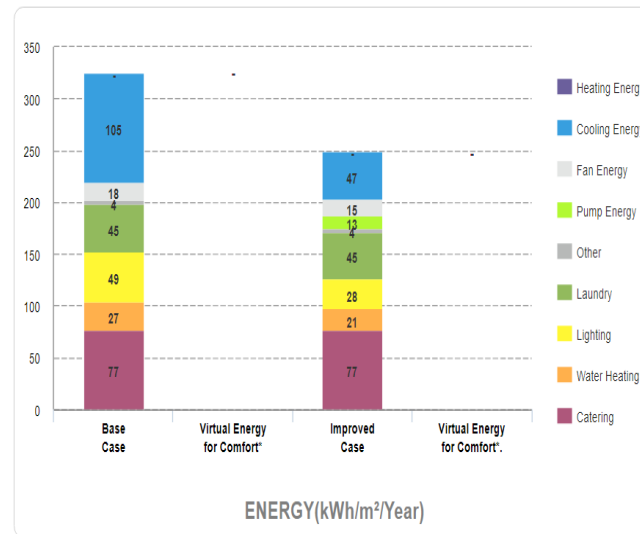
- Low-Flow Showerheads and Faucets Guestrooms
- Water Efficient Urinal
- Aerator and Auto Shut-off Faucet in non-guest area
- Duel Flush Water Closet



Materials – 28% Savings through:

- In-Situ Concrete with >25% GGBS Flooring

23.71% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$180,500

Utility Cost Savings

\$11,735/month

Payback in Years

1.3

Operational CO₂ Savings

1650 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- Reduced Window To Wall Ratio, Low-e Coated Glass
- Reflective Paint For External Walls
- Insulation Of Roof And External Walls
- Natural Ventilation For Corridors
- Energy-saving Lighting Systems
- Occupancy Sensors In Bathrooms
- Solar Photovoltaics.



Water – 35% Savings through:

- Low-flow Faucets In Kitchens And Bathrooms
- Single-flush And Flush Valve For Water Closets
- Water-efficient Urinals, Faucets And Landscaping
- Rainwater Harvesting System.



Materials – 43% Savings through:

- Steel Sheets On Steel Rafters For Roof Construction
- Medium Weight Hollow Concrete Blocks For Internal And External Walls
- Finished Concrete Flooring.



THE 101 YOGYAKARTA TUGU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 23% Savings through:

- External Shading Device
- Variable Refrigerator Flow Cooling System
- Air Conditioning with Water Cooled Chiller
- Energy Saving Light Bulbs for Internal Space



Water – 20% Savings through:

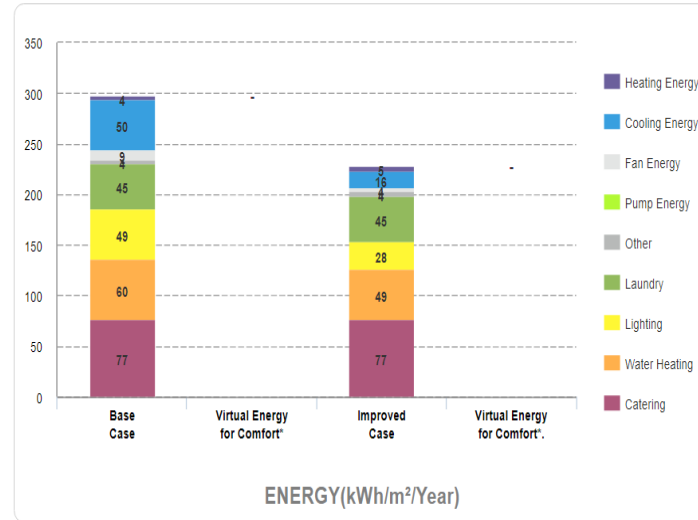
- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush Water Closet
- Water Efficient Urinal



Materials – 33% Savings through:

- Concrete Filler Floor Slabs

23.20% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$159,900

Utility Cost Savings

\$7,900/month

Payback in Years

1.7

Operational CO₂ Savings

763 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window To Wall Ratio, Low-e Coated Glass
- Air Conditioning With Air Cooled Screw Chiller
- Low-e Coated Glass, Variable Speed Drives On The Fans Of Cooling Towers
- Variable Speed Drives Pumps,
- Energy-saving Light Bulbs For Back-of-house And Heat Pumps.



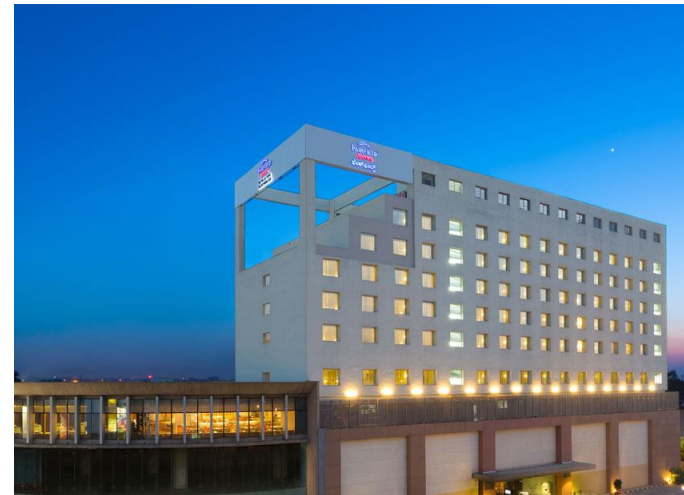
Water – 28% Savings through:

- Black Water Treatment And Recycling System.
- Dual Flush Water Closets In All Bathrooms



Materials – 51% Savings through:

- 150mm In-situ Reinforced Concrete Slab For Floors And Roof
- 200mm Solid Dense Concrete Blocks For Internal And External Walls
- And Laminated Wooden Flooring.



SAMHI – FAIRFIELD BY MARRIOTT (INDIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – COSTA RICA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 20% Savings through:

- External Shading Device
- Energy Saving Lightbulb in Internal and External Area



Water – 37% Savings through:

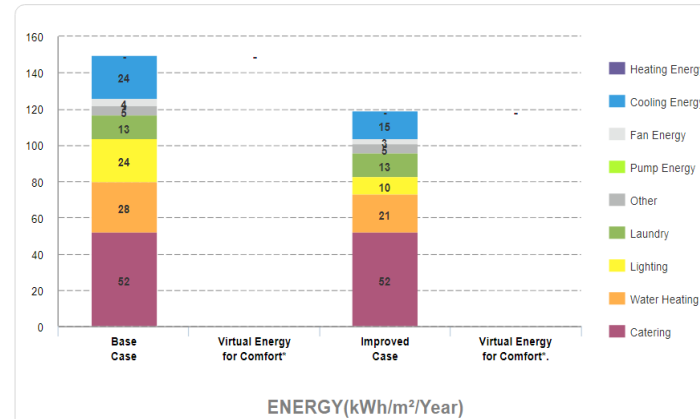
- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush Water Closet
- Water Efficient Washing Machine and Urinal



Materials – 22% Savings through:

- Hollow Core Precast Slab Flooring
- Hollow Concrete Internal Wall Block

20.50% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

73,050,000 CRC

Utility Cost Savings

5,728,000 CRC/month

Payback in Years

1.1

Operational CO₂ Savings

270 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 60% Savings through:

- Reduced Window to Wall Ratio, external shading devices
- variable refrigerant volume cooling system
- heat pump for hot water
- energy-saving lighting in internal and external areas
- solar photovoltaics.



Water – 26% Savings through:

- Low-flow showerheads
- low-flow faucets in guest rooms
- dual flush water closets in all bathrooms
- water-efficient kitchen faucets



Materials – 34% Savings through:

- Cored bricks with internal and external plaster for internal and external walls
- parquet wood flooring.



Eco Green Boutique Hotel (Vietnam)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – MEXICO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 21% Savings through:

- High Thermal Performance Glass
- Energy Saving Light Bulbs
- Preheat Water Using Waste Heat from the Generator



Water – 21% Savings through:

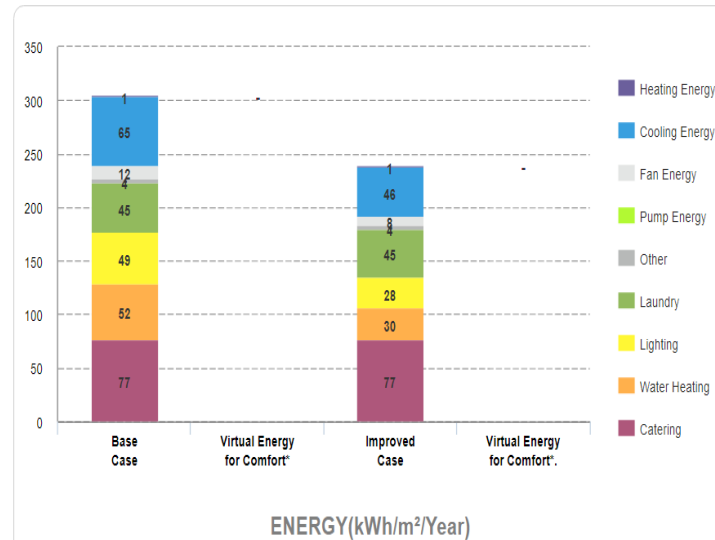
- Duel Flush for Water Closet
- Low Flow Faucet and Showerhead in Guest Rooms
- Aerator and Auto Shut-off Faucet in Other Restroom
- Water Efficient Dishwasher



Materials – 28% Savings through:

- Concrete Filler Slab with Polystyrene Flooring

21.19% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$227,700

Utility Cost Savings

\$7,430/month

Payback in Years

3.1

Operational CO₂ Savings

1645 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window to Wall Ratio, Low-E Coated Glass
- Air Conditioning with Air Cooled Screw Chiller
- Energy Saving Lighting for back-of-house, internal, external spaces



Water – 28% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 51% Savings through:

- Facing Brick and Hollow Concrete Blocks for External Walls



AC HOTEL VERACRUZ (MEXICO)

HOTELS – PERU CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 22% Savings through:

- Variable Refrigerant Flow Cooling System
- Air Conditioning with Air Chilled Screwed
- Energy Saving Light Bulbs Internal Space



Water – 21% Savings through:

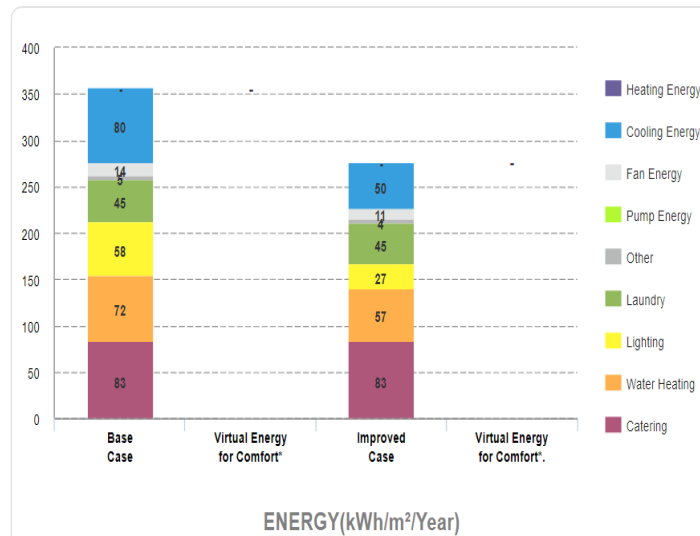
- Low-Flow Showerheads and Faucets Guestrooms
- Water Efficient Urinals and Kitchen Faucet
- Aerator and Auto Shut-off Faucet in public restroom



Materials – 28% Savings through:

- In-Situ Concrete with > 25% GGBS Flooring

22.03% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

175,700 S

Utility Cost Savings

46350 S/month

Payback in Years

0.3

Operational CO₂ Savings

2050 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 51% Savings through:

- Reduced Window To Wall Ratio, Low-e Coated Glass
- Air Conditioning With Water Cooled Chiller
- External Shading Devices, Insulation Of Roof And External Walls
- Energy-efficient Lighting.



Water – 32% Savings through:

- Low-flow Showerheads
- Dual Flush Water Closets
- Water-efficient Urinals



Materials – 44% Savings through:

- Concrete Filler Slab For Floors And Roof
- Medium Weight Hollow Concrete Blocks For Internal Walls
- Finished Concrete Flooring And Upvc Window Frames.



CITY EXPRESS HOTELS – SANTA FE (MEXICO)

In-country certified project to replace related example once an EDGE project is certified.



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN MENA



Creating Markets, Creating Opportunities

HOTELS – EGYPT CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- External Shading Devices - Annual Average Shading Factor
- Insulation of Roof - U Value of 0.44
- Energy-Saving Light Bulbs - Internal Spaces



Water – 22% Savings through:

- Low-Flow Showerheads and Faucets Guestrooms
- Low-Flow Faucets in Guest Rooms
- Dual Flush for Water Closets in Guest Rooms
- Water-Efficient Front Loading Washing Machine
- Water-Efficient Urinals in all Other Bathrooms

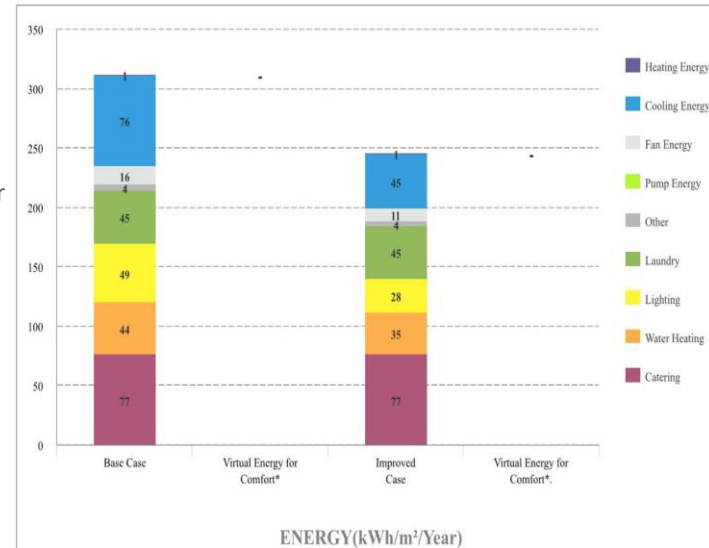


Materials – 37% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 21.17%

ENERGY SAVINGS Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$226,000

Utility Costs Savings
\$ 8,500 / month

Payback in Years
2

Operational CO₂
Savings
\$ 400 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 22% Savings through:

- Reduced window to wall ratio
- Insulation of roof,
- Low-E coated glass
- High-efficiency boiler for hot water
- Air conditioning with air cooled screw chiller, variable speed drives pumps
- Sensible heat recovery from exhaust air



Water – 24% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 22% Savings through:

- Medium-weight hollow concrete blocks for internal and external walls
- Terrazzo tile flooring.



Radisson Blu Hotel – Exchange Complex (Ghana)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – JORDAN CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,000 m ²



Energy Measures – 20% Savings through:

- External Shading Devices - Annual Average Shading Factor
- Insulation of Roof - U Value
- Energy-Saving Light Bulbs - External and Internal Spaces



Water – 22% Savings through:

- Low-Flow Showerheads and Faucets Guestrooms
- Low-Flow Faucets in Guest Rooms
- Dual Flush for Water Closets in Guest Rooms
- Water-Efficient Front Loading Washing Machine
- Water-Efficient Urinals in all Other Bathrooms

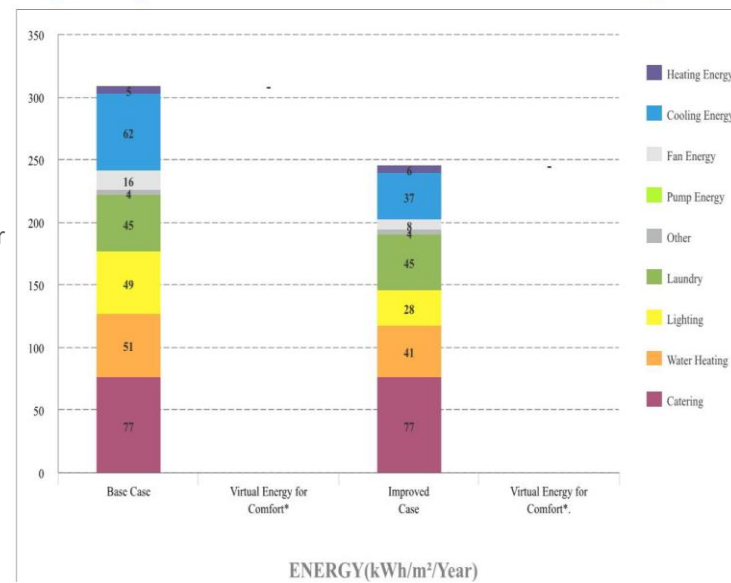


Materials – 37% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 20.28%

ENERGY SAVINGS Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$ 226,500

Utility Costs Savings
\$ 14,300 / month

Payback in Years
1

Operational CO₂
Savings
\$ 570 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced window to wall ratio
- Insulation of external walls
- Low-E coated glass
- High-efficiency boiler for hot water
- Air conditioning with air cooled screw chiller



Water – 28% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 51% Savings through:

- Facing brick and hollow concrete blocks for external walls



AC Hotel by Marriott Veracruz (Mexico)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – MOROCCO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 20% Savings through:

- External Shading Devices - Annual Average Shading Factor
- Energy-Saving Light Bulbs - Internal Spaces



Water – 22% Savings through:

- Low-Flow Showerheads and Faucets Guestrooms
- Low-Flow Faucets in Guest Rooms
- Dual Flush for Water Closets in Guest Rooms
- Water-Efficient Front Loading Washing Machine
- Water-Efficient Urinals in all Other Bathrooms



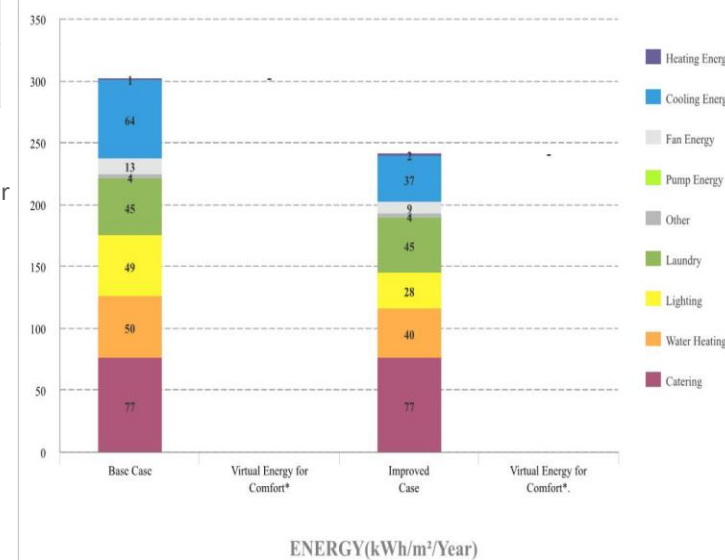
Materials – 37% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 20.20%

ENERGY SAVINGS Meets EDGE Energy Standard

PROJECT METRICS



Incremental Cost
\$ 214,000

Utility Costs Savings
\$ 5,200 / month

Payback in Years
2

Operational CO₂
Savings
\$ 500 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 60% Savings through:

- Reduced window to wall ratio
- External shading devices
- Energy-efficient variable refrigerant volume cooling system
- Heat pump for hot water
- Energy-saving lighting in internal and external areas and solar photovoltaics



Water – 26% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Low-flow showerheads
- Low-flow faucets in guest rooms



Materials – 34% Savings through:

- In-situ reinforced concrete for floors and roof
- Cored bricks with internal & external plaster for internal & external walls



Eco Green Boutique Hotel (Vietnam)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – PAKISTAN CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,600 m ²



Energy Measures – 21% Savings through:

- External Shading Devices - Annual Average Shading Factor
- Insulation of Roof - U Value
- Energy-Saving Light Bulbs - Internal Spaces



Water – 22% Savings through:

- Low-Flow Showerheads and Faucets Guestrooms
- Low-Flow Faucets in Guest Rooms
- Dual Flush for Water Closets in Guest Rooms
- Water-Efficient Front Loading Washing Machine
- Water-Efficient Urinals in all Other Bathrooms

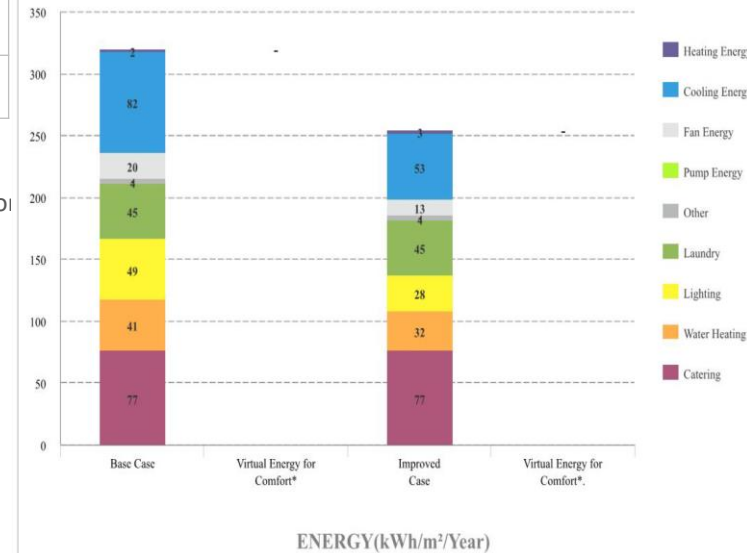


Materials – 37% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 20.40%

ENERGY SAVINGS Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$ 220,000

Utility Costs Savings
\$ 5,100 / month

Payback in Years
3.5

Operational CO₂
Savings
\$ 500 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced window to wall ratio
- External shading devices
- Insulation of roof and external walls
- Natural ventilation in corridors
- Air conditioning with air cooled screw chiller
- Energy-saving light bulbs for internal and external spaces



Water – 21% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms



Materials – 37% Savings through:

- Micro concrete tiles on steel rafters for roof construction
- Stone profile cladding and autoclaved aerated concrete blocks



Springhill Condotel at Jimbaran Hijau (Indonesia)

In-country certified project to replace related example once an EDGE project is certified.



GREEN BUILDINGS RETURN ON INVESTMENT: HOTELS IN EAST EUROPE



Creating Markets, Creating Opportunities

HOTELS – ARMENIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 29% Savings through:

- Air conditioning system
- Energy saving Lightbulbs – Internal Spaces



Water – 27% Savings through:

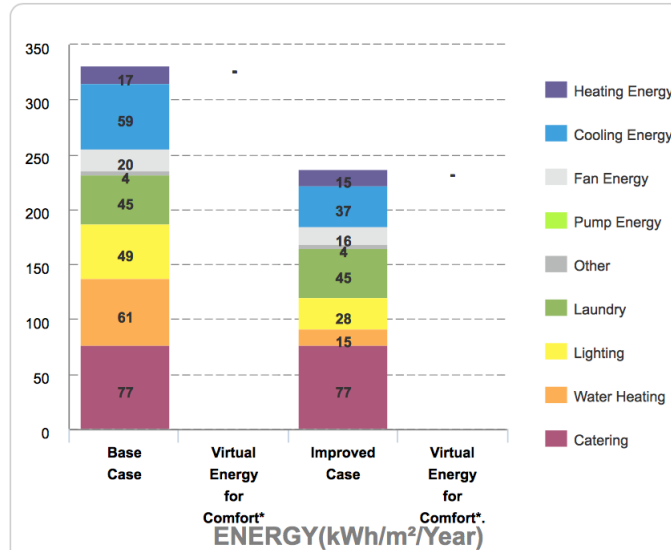
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms and Bathrooms



Materials – 43% Savings through:

- Floor Slabs – In-Situ Trough Concrete Slab

28.74% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$75,978

Utility Costs Savings

\$10,306 / month

Payback in Years

0.6

Operational CO₂

Savings

612 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio and External Shading Devices
- Insulation of Roof and External Walls, Natural Ventilation in Corridors, Air Conditioning with Air Cooled Screw Chiller
- Energy-Saving Light Bulbs and Solar Photovoltaics



Water – 21% Savings through:

- Low-Flow Plumbing Fixtures for Washbasins and Showerheads,
- Dual Flush Water Closets
- Water-Efficient Kitchen Faucets and Landscaping



Materials – 37% Savings through:

- Micro Concrete Tiles on Steel Rafters for Roof, Stone Profile Cladding and Autoclaved Aerated Concrete Block Walls, Wood Block Finish Flooring



SPRINGHILL CONDOTEL AT JIMBARAN JIJAU (BALI)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – POLAND CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 20% Savings through:

- Occupancy Sensors in Bathrooms
- Energy saving Lightbulbs – Internal Spaces



Water – 27% Savings through:

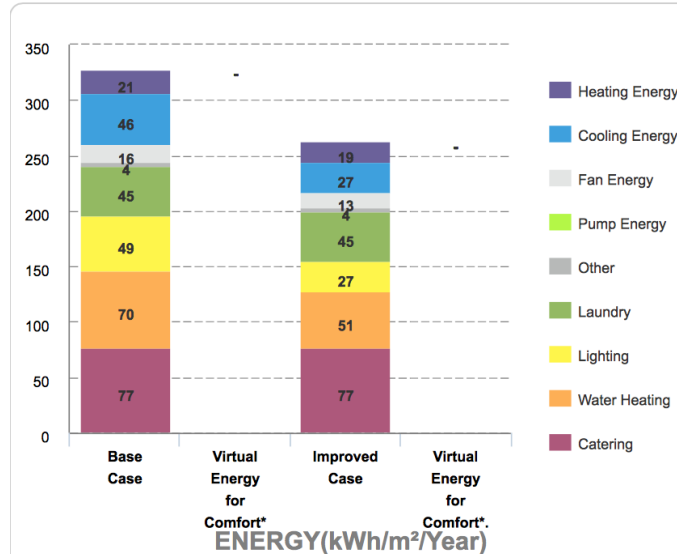
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms and Bathrooms



Materials – 50% Savings through:

- Timber Floor Construction

20.05% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$82,344

Utility Costs Savings

\$15,005 / month

Payback in Years

0.5

Operational CO₂ Savings

776 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 21% Savings through:

- Reduced Window to Wall Ratio Low-E Coated Glass, Variable Speed Drives on the Fans of Cooling Tower
- Air Conditioning with Water Cooled Screw Chiller
- Energy Saving Lighting for Back of House, Heat Pumps



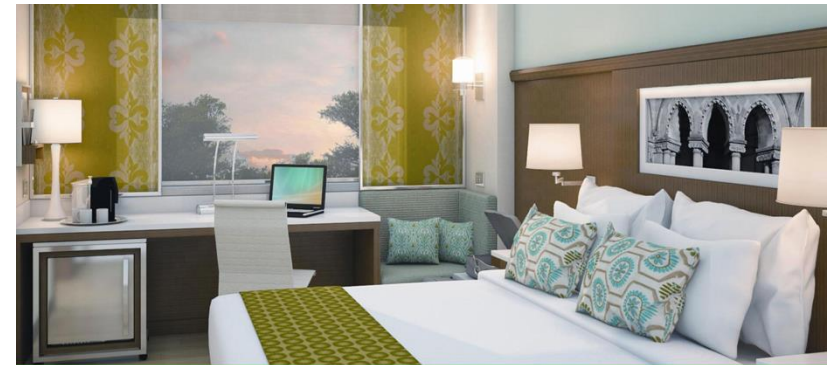
Water – 23% Savings through:

- Dual Flush Water Closets
- Blackwater Treatment and Recovery System



Materials – 30% Savings through:

- 150mm In-Situ Reinforced Concrete Slab for Floors and Roof
- 200mm Solid Dense Concrete Blocks for Internal and External Walls
- Laminated Wooden Flooring



SAMHI- FAIRFIELD BY MARRIOTT (INDIA)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – RUSSIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 27% Savings through:

- Occupancy Sensors in Bathrooms
- Energy saving Lightbulbs – Internal Spaces
- Insulation of External Walls
- Recovery of Waste Heat from the Generator for Space Heating



Water – 24% Savings through:

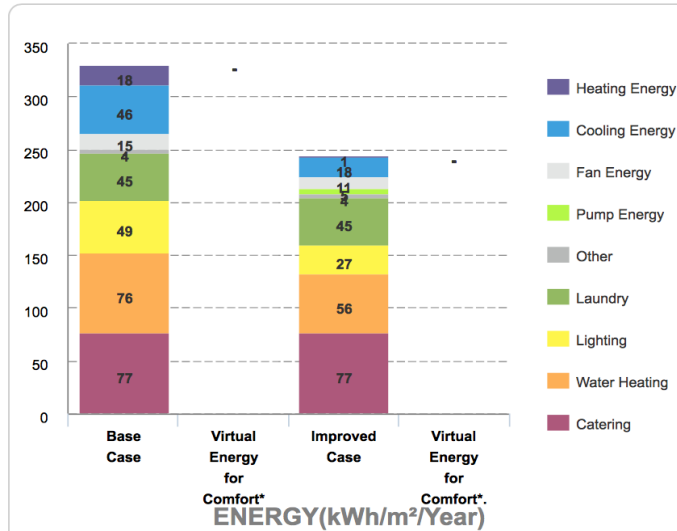
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms



Materials – 43% Savings through:

- Timber Floor Construction

26.49% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$148,167

Utility Costs Savings

\$15,488 / month

Payback in Years

0.8

Operational CO₂

Savings

579 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 47% Savings through:

- External Shading Devices, Insulation of Roof and External Walls
- Higher Thermal Performance Glass, Energy-Efficient Air Conditioning, Energy-Saving Lighting System



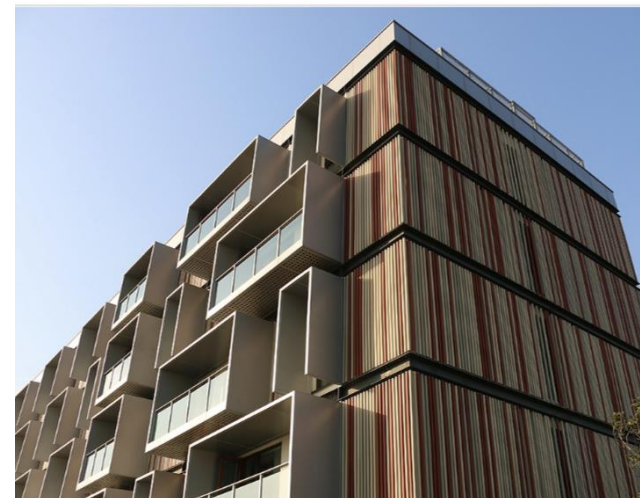
Water – 42% Savings through:

- Low-Flow Showerheads and Faucets, Dual Flush Toilets
- Rainwater Harvesting System
- Gray Water Treatment & Recycling System



Materials – 34% Savings through:

- Solid Dense Concrete Blocks for Internal and External Walls
- Laminated Wooded Floors
- Timber Window Frames



BRUCK PASSIVE HOUSE HOTEL (NANJING)

HOTELS – SERBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 20% Savings through:

- Energy saving Lightbulbs – Internal Spaces
- Ground Source Heat Pump



Water – 27% Savings through:

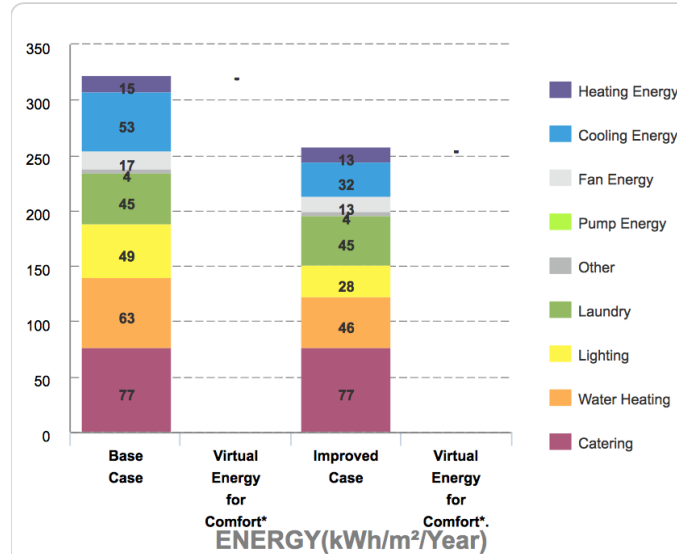
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms and Bathrooms



Materials – 27% Savings through:

- Hollow Core Precast Slab

20.10% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$70,724

Utility Costs Savings

\$15,774 / month

Payback in Years

0.4

Operational CO₂

Savings

815 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 60% Savings through:

- Reduced Window to Wall Ratio
- External shading devices
- Variable refrigerant volume cooling system, heat pump for hot water
- Energy Saving Lighting for internal and external spaces, solar photovoltaics



Water – 26% Savings through:

- Low-Flow shower heads and faucets in guest rooms
- Dual-flush water closets in all bathrooms
- Water-efficient kitchen faucets



Materials – 34% Savings through:

- Cored bricks with plaster for internal and external walls
- Parquet wood flooring



ECO GREEN BOUTIQUE HOTEL (VIETNAM)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – UKRAINE CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 20% Savings through:

- Energy saving Lightbulbs – Internal Spaces
- Ground Source Heat Pump
- Occupancy Sensors in Bathrooms



Water – 27% Savings through:

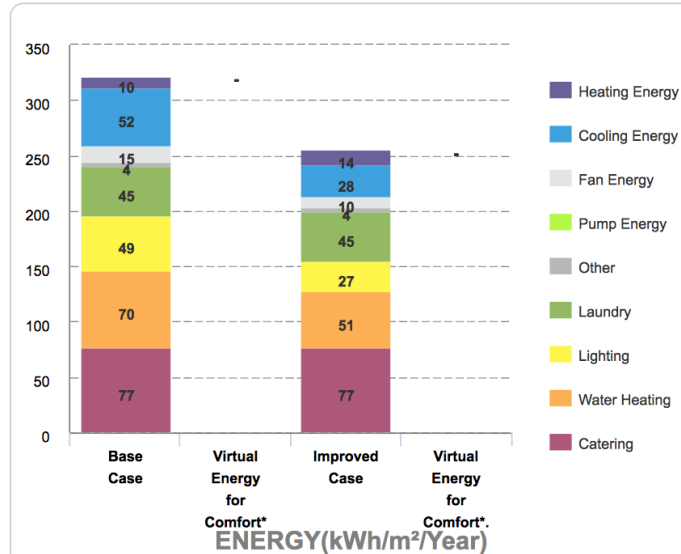
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms



Materials – 27% Savings through:

- Hollow Core Precast Slab

20.46% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$79,534

Utility Costs Savings

\$3,820 / month

Payback in Years

1.7

Operational CO₂

Savings

593 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 51% Savings through:

- Reduced window to wall ratio
- External shading devices
- Air conditioning with water cooled chiller
- Low-E coated glass
- Insulation of roof and external walls, and energy-efficient lighting.



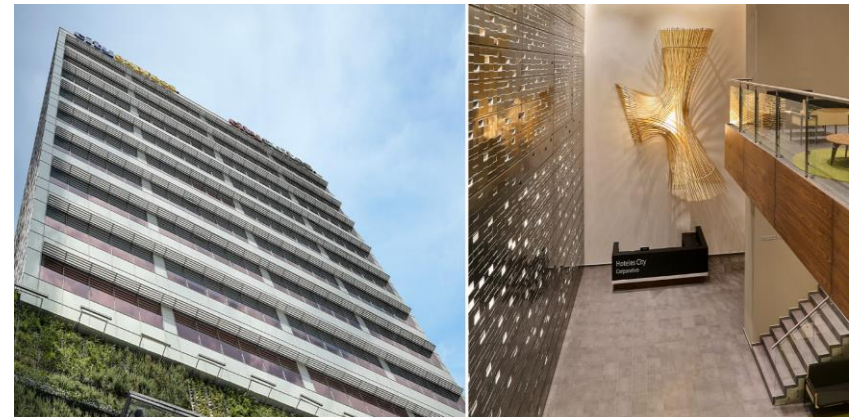
Water – 32% Savings through:

- Low-flow showerheads
- Dual flush water closets
- Water-efficient urinals



Materials – 44% Savings through:

- Concrete filler slab for floors and roof
- Medium weight hollow concrete blocks for internal walls
- Finished concrete flooring



City Express Hotel (Mexico)

In-country certified project to replace related example once an EDGE project is certified.

HOTELS – TURKEY CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Type of Hotel	Floors Above Ground	Total Guest Units	Internal Area
4 Star Hotel	8	200	15,599 m ²



Energy Measures – 21% Savings through:

- Energy saving Lightbulbs – Internal Spaces
- Ground Source Heat Pump
- Occupancy Sensors in Bathrooms



Water – 27% Savings through:

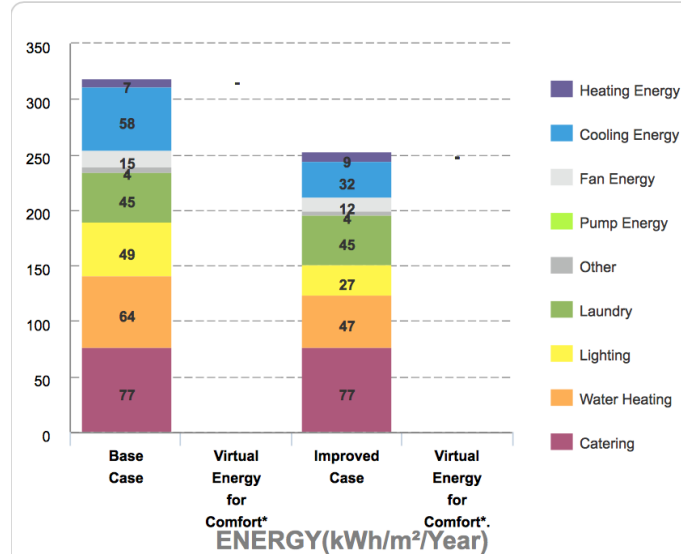
- Low-Flow Showerheads
- Low-Flow Faucets for Guest Rooms
- Single and Dual Flush for Water Closets
- Dual Flush for Water Closets in Guest Rooms



Materials – 27% Savings through:

- Hollow Core Precast Slab

21.03% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$84,986

Utility Costs Savings

\$12,300 / month

Payback in Years

0.6

Operational CO₂

Savings

389 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 63% Savings through:

- Reduced Window to Wall Ratio, External Shading Device
- Low-E Coated Glass, Variable Refrigerant Volume Cooling System
- Heat Pump for Hot Water, Energy Saving Lighting



Water – 22% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Dual Flush Water Closets
- Water-Efficient Urinals, Dishwashers and Landscaping
- Aerators and Auto Shut-off Faucet in Bathrooms



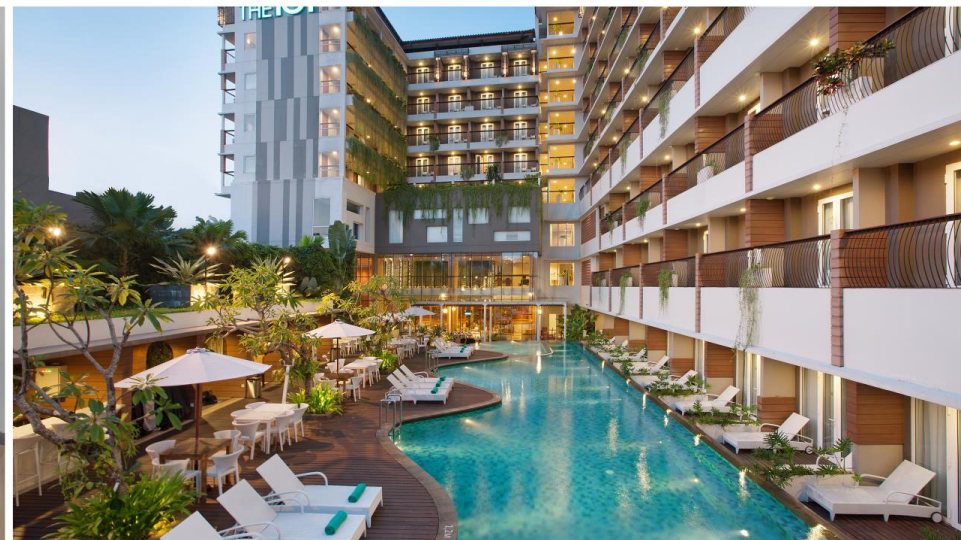
Materials – 44% Savings through:

- Autoclaved Aerators Concrete Blocks for External and Internal Walls
- UPVC Window Frames



THE 101 YOGYAKARTA TUGU (INDONESIA)

In-country certified project to replace related example once an EDGE project is certified.



METHODOLOGY, NOTES, ACKNOWLEDGMENTS



Creating Markets, Creating Opportunities

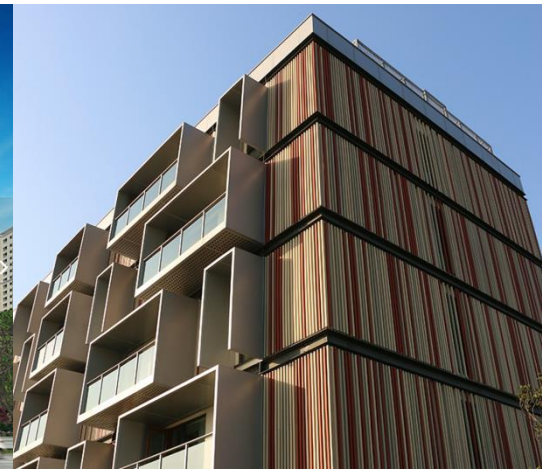
RESEARCH OBJECTIVE: MOST EFFECTIVE INTERVENTIONS TO REACH THE EDGE STANDARD

Reach 20% savings across the Energy, Water, and Materials categories in the most cost effective manner.

Analyzed focus countries in order to understand the environment and geographic impact on interventions.

Analyzed six sectors in each country – Homes, Hospitals, Hotels, Schools, Offices, and Retail – for best interventions unique to the sector and country in question in order to obtain EDGE certification.

By utilizing EDGE, we sought the most effective interventions in the passive building design phase that would in turn lead to the lowest possible payback and lowest cost for investors and builders.



OVERVIEW OF EDGE: A SOFTWARE, STANDARD, AND GREEN BUILDING CERTIFICATION SYSTEM



20%



The EDGE application helps to determine the most cost-effective options for designing green within a local climate context. Free on-line application is available from www.edgebuildings.com.

A building has reached the EDGE standard when it achieves 20% reduction in each of the 3 categories: energy, water, and embedded energy in materials.

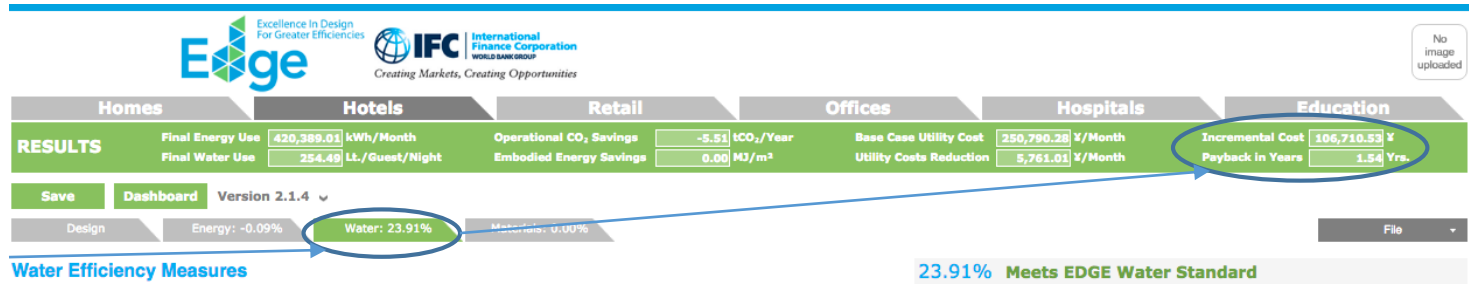
Third party certification verifies the resource efficiency savings so they can be credibly communicated between investors, developers, and buyers.

RESEARCH METHODOLOGY

The most cost effective interventions were determined through an iterative process using the EDGE application.

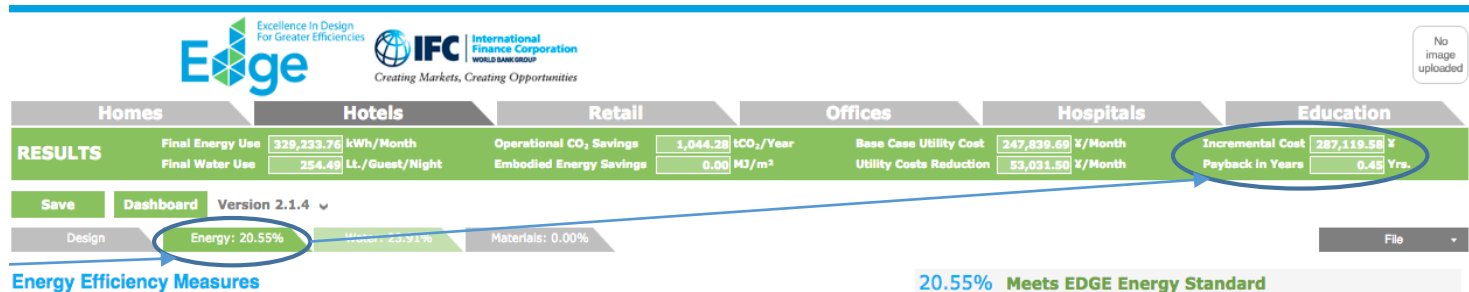
1

Determine top water measures that allow to pass the 20% minimum at the lowest Cost & Payback. Water was chosen first because it is tied to energy savings.



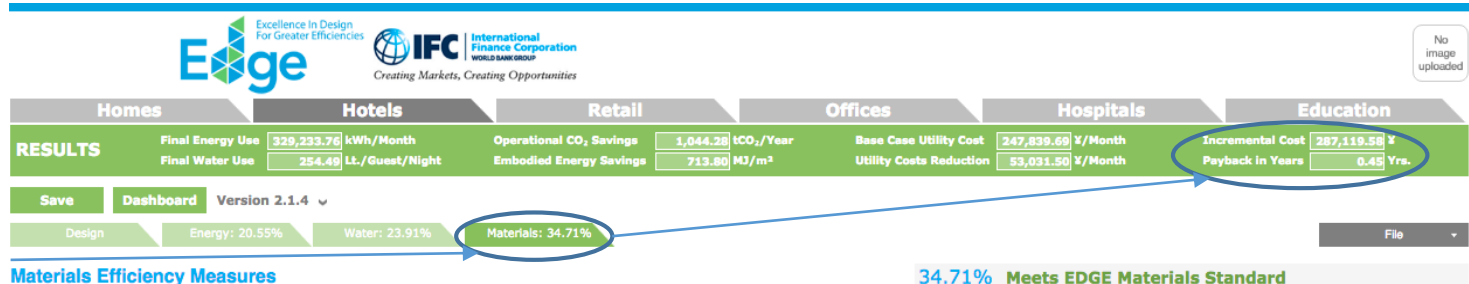
2

Once determined, proceed with next measure (energy) and repeat the process. Note: Water and energy measures may directly impact multiple categories.



3

Proceed to test materials measures and review the final Incremental Cost & Payback in Years.

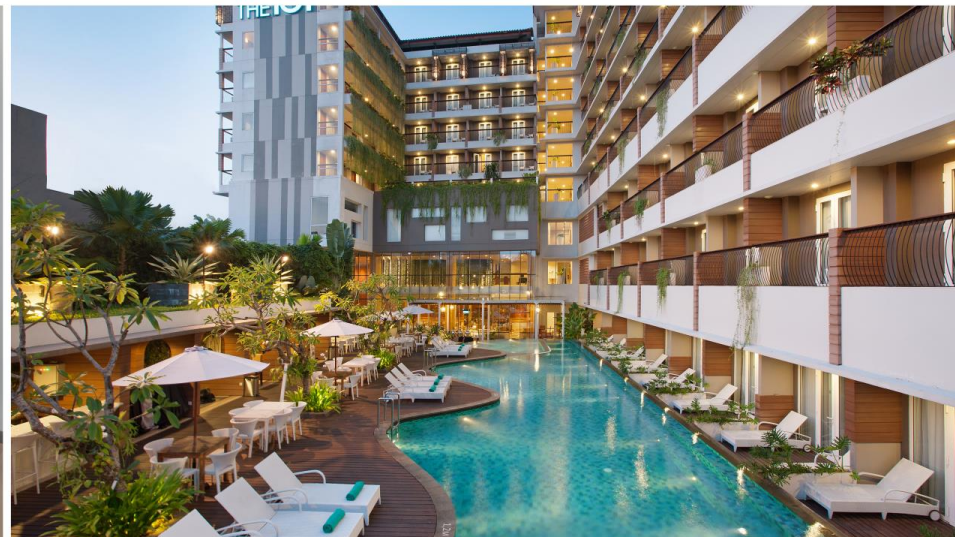


4

Repeat.

NOTES

- Case studies and certified projects are given for **illustrative purposes** only.
- Case studies included several assumptions in the building design, as per EDGE default values.
- Since case studies were chosen for the capital city only, the key takeaways for a country may be different in countries with varying climactic conditions across geographic regions.
- Education and Light Industrial are **new sectors** added to the EDGE application, have few certified buildings.
- Investors and developers of buildings should **use the dynamic EDGE software** with inputs specific to their respective building and climactic conditions, and then choose green interventions that **best address their specific needs**.
- IFC is **collecting additional data**, including operational savings of certified buildings – the operational data will be forthcoming, as will the ROI analysis for other regions.
- This research is part of ongoing series provided by IFC – in-depth country studies are available from: <https://www.edgebuildings.com/marketing/research/>



ACKNOWLEDGEMENTS

DONOR ACKNOWLEDGEMENT

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In addition, IFC thanks contributors to the GEF-IFC Earth Fund Platform, and the Energy Sector Management Assistance Program (ESMAP) of the World Bank whose support helped seed EDGE.

COLLABORATION ACKNOWLEDGEMENT

IFC thanks the Georgetown University McDonough School of Business for collaborating on developing the market intelligence reports.

Visit www.edgebuildings.com for more information