



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES



Creating Markets, Creating Opportunities

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OFFICES IN EAST ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Bill Savings / Month	Payback Period in Years
Cambodia	\$19,000	\$2,000	0.8
China	90,000 ¥ \$13,000	10,000 ¥ \$1,400	0.8
Fiji	\$45,000	\$5,300	0.7
Indonesia	190,000 Thousand Rp \$12,500	31,000 Thsnd Rp \$2,000	0.5
Philippines	450,000 PhP \$8,400	150,000 PhP \$2,800	0.3
Thailand	\$32,000	\$760	3.5
Vietnam	220 MVnd \$9,400	73 MVnd \$3,000	0.3



ENERGY

The most cost effective measures include:

- Reduced Window To Wall Ratio
- External Shading Device
- Natural Ventilation
- Insulation of Roof and External Walls
- Air Conditioning with Water Cooled Chiller
- Variable Refrigerant Flow System



WATER

Effective measures include:

- Water-Efficient Urinals and Faucets for Kitchen Sinks
- Grey Water Treatment and Recycling System



MATERIALS

- Floor slabs are biggest efficiency drive, ranging from 35% - 40% of material costs out of 7 total interventions



OFFICES IN SOUTH ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Bangladesh	\$20,810	\$1,040	1.7
India (Delhi)	Rs1,659,560	Rs195,830	1.7
India (Mumbai)	Rs1,043,415	Rs208,300	1.9
Sri Lanka	\$25,250	\$1,890	0.8



ENERGY

Potential strategies may include:

- Reflective paint for roof and external wall
- Insulation of roof
- Occupancy sensors for bathroom and open offices
- Energy efficient lighting for internal and external spaces
- Reflective paint for roof and external walls
- Controlled Natural Ventilation

Humid climates may require efficient Air Conditioners and DE-Humidifiers



<https://www.edgebuildings.com/projects/centro-nacional-de-congresos-y-convenciones>



WATER

The EDGE standard can be reached through:

- Gray water treatment and recycling system
- Dual flush for water closets in bathrooms
- Water efficient urinals in all bathrooms



MATERIALS

Green measures may include:

- Ceramic tiles
- In-Situ Concrete >30% PFA for roof.
- Common brick wall for internal and external walls.
- Aluminum window frames.



OFFICES IN AFRICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Angola	\$46,700	\$5,145	0.8
Cote D'Ivoire	\$26,400	\$1,170	1.9
Ghana	\$40,815	\$5,620	0.7
Kenya	\$18,820	\$1,860	0.8
Nigeria	\$26,550	\$830	2.7
South Africa	ZAR 213,600 \$14,840	ZAR 13,930 \$1,000	1.2



Image sourced from: <https://www.edgebuildings.com/projects/centro-nacional-de-congresos-y-convenciones/>



ENERGY

The most cost effective interventions include:

- Occupancy Sensors in Open Offices
- Insulation of Roof
- Reflective Paint/Tiles for Roof
- Variable Refrigerant Flow Cooling System
- Daylight Photoelectric Sensors



WATER

The best ROI is from these green measures:

- Dual Flush for Water Closets in Bathrooms
- Water Efficient Urinals and Faucets
- Low-Flow Faucets



MATERIALS

- Floor slabs are the biggest efficiency drivers, ranging from 30% - 46% of material costs out of 7 total interventions.



OFFICES IN LATIN AMERICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Argentina	\$57,100	\$1,330	3.6
Brazil	\$50,900	\$1,870	2.3
Colombia	\$29,880	\$830	3
Costa Rica	15,500,000 CRC	1,125,000 CRC	1.2
Mexico	\$52,420	\$1,250	3.5
Peru	68,200 S \$20,600	6,670 S \$2,000	1

External Shading



Image sourced from: www.pinterest.com.au/pin/321725967116931350/



ENERGY

The best ROI is available through these measures:

- Reduced Window To Wall Ratio
- External Shading Device
- Energy Saving Light Bulbs
- Occupancy Sensors
- Air Conditioning with Water Cooled Chiller
- Variable Refrigerant Flow Cooling System



WATER

The most effective measures include:

- Dual Flush for Water Closet
- Water-Efficient Urinals and Faucets for Kitchen Sinks
- Aerator and Auto Shut-off Faucets



MATERIALS

- Floor slabs are biggest efficiency drive, ranging from 35% - 40% of material options out of 7 total interventions.



OFFICES IN MENA

ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Egypt	\$211,000	\$26,500	0.6
Jordan	\$44,000	\$8,000	0.5
Morocco	\$34,000	\$1,400	2
Pakistan	\$39,000	\$750	4



ENERGY

The most effective strategies include:

- Reduced Window To Wall Ratio
- External Shading Devices
- Natural Ventilation with Operable Windows
- Low-E Coated Glass - U-Value of 3 W/m² K and SHGC
- Energy-Saving Light Bulbs
- Reflective Paint for External Walls -Solar Reflectivity

Natural Ventilation Diagram



Image sourced from: <http://2030palette.org/shading-devices/>



WATER

Best ROI can be reached through:

- Low-Flow Faucets in Bathrooms
- Dual flush for water closets in bathrooms
- Single Flush/Flush Valve



MATERIALS

- Floor slabs are biggest efficiency drivers averaging 30% of material costs out of 7 total interventions
- Using materials other than the base case usually saves over 20%



OFFICES IN EASTERN EUROPE



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Armenia	\$27,840	\$1,630	1.4
Poland	\$25,730	\$3,800	0.6
Russian Federation	\$25,100	\$2,480	0.8
Serbia	\$5,330	\$555	0.8
Ukraine	\$7,460	\$560	1.2
Turkey	\$12,180	\$560	0.5



ENERGY

The EDGE standard can typically be reached through:

- Reduced Window To Wall Ratio
- Energy Saving Light Bulbs
- Air Conditioning with Water Cooled Chiller
- Variable Refrigerant Flow System
- Ground Source Heat Pump



WATER

Effective measures include:

- Water-efficient bathroom urinals
- Efficient faucets for kitchen sinks
- Dual flush for water closets in bathrooms



MATERIALS

- Floor slabs are biggest efficiency drive, ranging from 20%-35% of material costs out of 6 total interventions
- Using other materials usually saves over 30%





GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN EAST ASIA



Creating Markets, Creating Opportunities

OFFICES – CAMBODIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 20% Savings through:

- Natural ventilation with operable windows and no A/C
- Variable refrigerant flow system



Water – 56% Savings through:

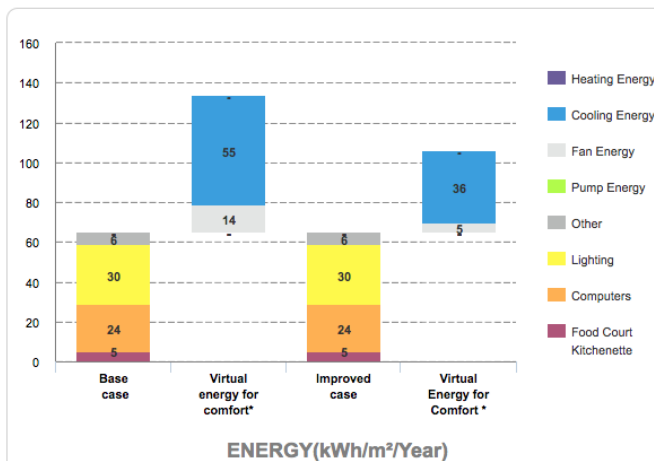
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 35% Savings through:

- Timber Floor Construction Floor Slabs

20.50% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$19,000

Utility Bill Savings
\$2,000 / month

Payback in Years
0.8

Operational CO₂
Savings
10 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 30% Savings through:

- Reflective Paint, Tiles, and Insulation for Roof
- Low E-Coated Glass
- Variable Refrigerant Volume Cooling System
- Sensible Heat Recovery from Exhaust Air
- Energy-Saving Light Bulbs for Internal and External Spaces



Water – 70% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- Grey Water Treatment and Recycling System



Materials – 45% Savings through:

- Curtain Walling for External Walls



DAAN MOGOT BARU OFFICE PARK (INDONESIA)

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



OFFICES – CHINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 24% Savings through:

- External Shading Devices
- Recovery Waste Heat from the Generator for Space Heating
- Air conditioning with air air cooled screw chiller



Water – 49% Savings through:

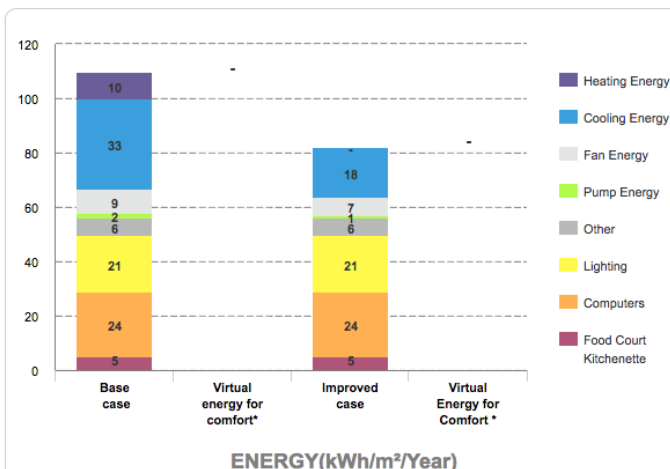
- Black water treatment and recycling system



Materials – 34% Savings through:

- Timber Floor Construction Floor Slabs

24.44% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
90,000 ¥

Utility Bill Savings
10,000 ¥ / month

Payback in Years
0.8

Operational CO₂
Savings
105 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 45% Savings through:

- Reduced Window to Wall Ratio
- Insulation of Roof and External Walls
- Higher Thermal Performance Glass
- Energy-Efficient Air Conditioning with Water-Cooled Chiller
- Sensible Heat Recovery from Exhaust Air



Water – 42% Savings through:

- Low-Flow Plumbing Fixtures and Dual-Flush Water Closets
- Grey Water Treatment and Recycling System



Materials – 21% Savings through:

- In-situ Concrete with Pulverized Fly Ash for Floor Slabs and Roof Construction



JOHNSON CONTROLS HQ (SHANGHAI)



OFFICES – FIJI CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 27% Savings through:

- Variable Refrigerant Flow System
- Energy Saving Light Bulbs for Internal Spaces



Water – 21% Savings through:

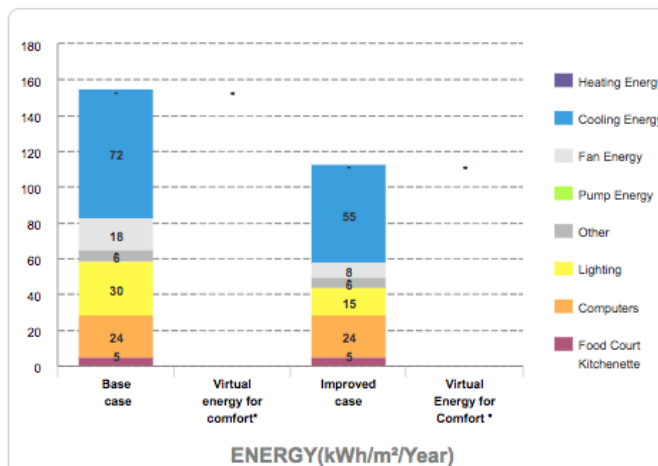
- Low-Flow Faucets in Bathrooms and Kitchen Sinks
- Water-Efficient Urinals in all Bathrooms



Materials – 35% Savings through:

- Timber Floor Construction Floor Slabs

27.10% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$45,000

Utility Bills Savings
\$5,300 / month

Payback in Years
0.70

Operational CO₂
Savings
110 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 38% Savings through:

- Reduced Window To Wall Ratio
- Reflective Paint for Roof and Walls
- Roof and Wall Insulation
- Energy-Saving Lightning for Internal and External Spaces



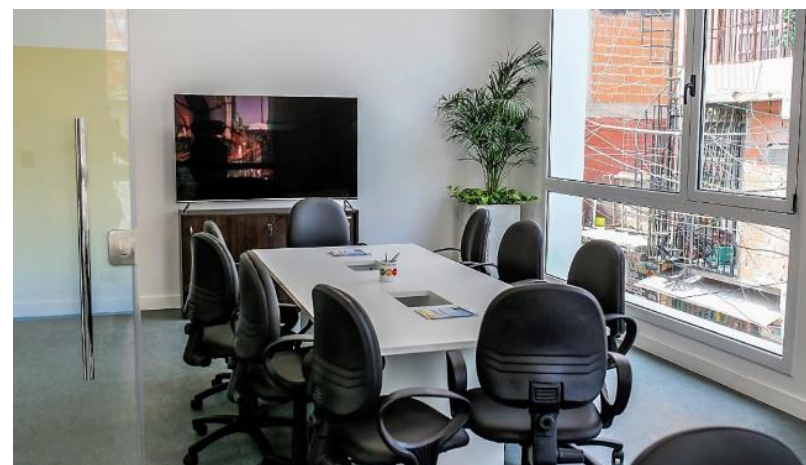
Water – 23% Savings through:

- Rainwater Harvesting System
- Low-Flow Plumbing Fixtures for Kitchen Sinks, Washbasins, Water Closets and Shower Heads



Materials – 63% Savings through:

- Reuse of Existing Floor Slabs and External Walls With Steel Profile Cladding, Plasterboards on Metal Studs for Internal Walls, Steel Sheets on Steel Rafters for the Roof and Ceramic Tile



CeDEL (ARGENTINA)

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



OFFICES – INDONESIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 29% Savings through:

- External Shading Devices
- Insulation of Roof and External Walls
- Energy-Saving Light Bulbs



Water – 50% Savings through:

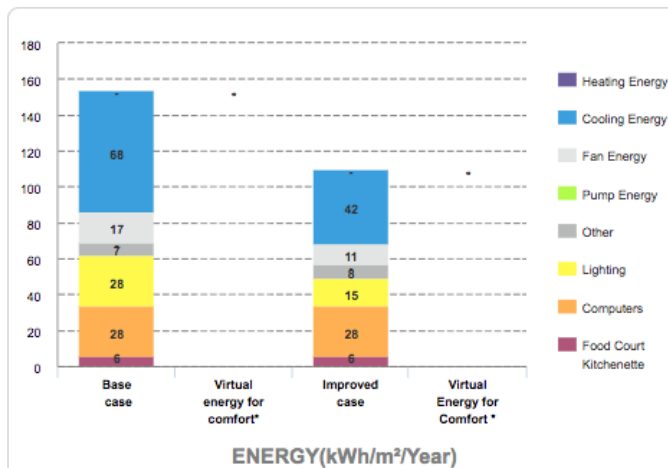
- Black Water Treatment and Recycling System



Materials – 35% Savings through:

- Timber Floor Construction Floor Slabs

28.64% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
190,000
Thousand Rp

Utility Bills Savings
31,000 Thousand Rp /
month

Payback in Years
0.5

Operational CO₂ Savings
150 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 27% Savings through:

- High Performance Glass
- Reduced Window To Wall Ratio
- Energy-Saving Lighting
- Efficient Cooling Systems



Water – 65% Savings through:

- Low-Flow Faucets For Washbasins
- Dual Flush For Water Closets
- Water-efficient Urinals



Materials – 37% Savings through:

- Gypsum Walls And Stone Tile Floors For The Retail Space
- Steel Profile Cladding and Finished Concrete Floors



CITRA TOWERS KEMAYORAN (JAKARTA)

OFFICES – PHILIPPINES CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 24% Savings through:

- Air conditioning with water cooled chiller
- Air economizer during favorable outdoor conditions



Water – 50% Savings through:

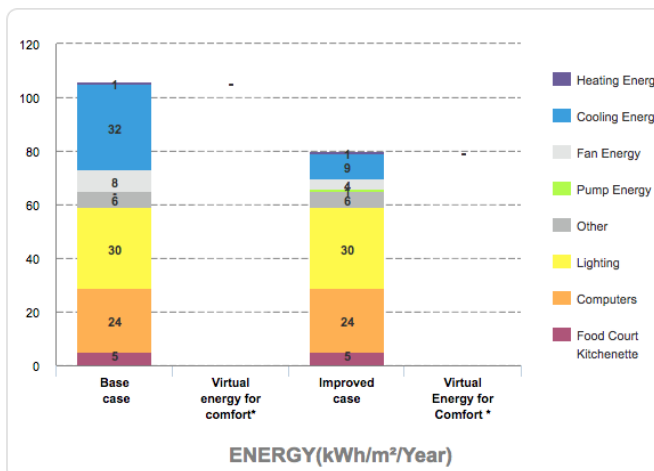
- Black water treatment and recycling system



Materials – 35% Savings through:

- Timber Floor Construction Floor Slabs

24.30% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
450,000 PhP

Utility Bills Savings
150,000 / month

Payback in Years
0.3

Operational CO₂
Savings
60 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 68% Savings through:

- Reduced Window To Wall Ratio
- Reflective Paint and Insulation
- Higher Thermal Performance Glass;
- Variable Refrigerant Volume (VRV) Cooling System
- Sensible Heat Recovery From Exhaust Air
- Energy-Saving Light Bulbs For Internal Spaces
- Lighting Controls For Corridors And Staircases
- Solar Photovoltaics



Water – 83% Savings through:

- Low-flow Plumbing Fixtures For Washbasins And Kitchens
- Rainwater Harvesting System
- Black Water Treatment And Recycling System



Materials – 28% Savings through:

- Stone And Ceramic Tiles For Floors; UPVC Window Frames; Polystyrene Roof Insulation; And Autoclaved Aerated Concrete Blocks For External Walls



ABHIKALPAN OFFICE (INDIA)

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



OFFICES – THAILAND CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 32% Savings through:

- Air conditioning with water cooled chiller



Water – 20% Savings through:

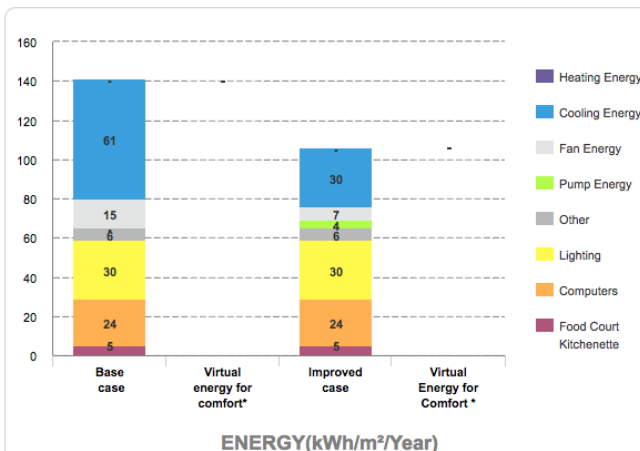
- Black water treatment and recycling system



Materials – 29% Savings through:

- Timber Floor Construction Floor Slabs

23.78% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$32,000

Utility Bills Savings
\$760 / month

Payback in Years
3.5

Operational CO₂
Savings
84 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 33% Savings through:

- Reduced Window To Wall Ratio
- Higher Thermal Performance Glass
- Variable Refrigerant Volume (VRV) Cooling System
- Sensible Heat Recovery From Exhaust Air
- Energy Saving Light-Bulbs In Internal And External Spaces



Water – 68% Savings through:

- Low-Flow Plumbing Fixtures
- Dual-flush Water Closets
- Black Water Treatment And Recycling System



Materials – 32% Savings through:

- Honeycomb Clay Blocks For External Walls And UPVC Window Frames



QUASITUM INTELISOFT (INDIA)

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



OFFICES – VIETNAM CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 23% Savings through:

- Energy Saving Light Bulbs – Internal & External
- Reflective Paint/Tiles for Roof and Walls
- Insulation of Roof and External Walls



Water – 43% Savings through:

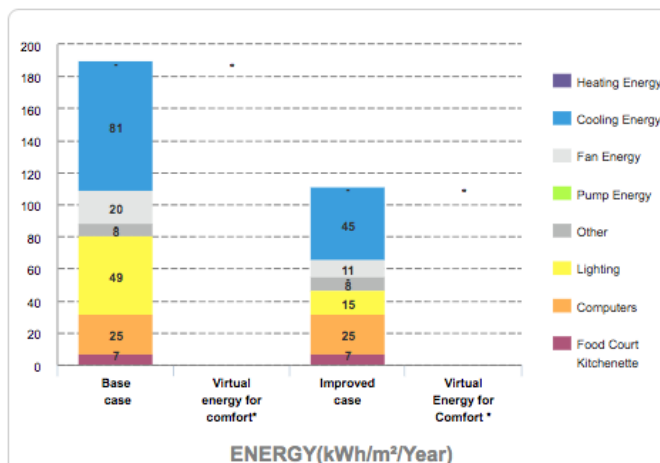
- Black water treatment and recycling system



Materials – 35% Savings through:

- Timber Floor Construction Floor Slabs

41.31% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
220 mVND

Utility Bills Savings
73 mVND / month

Payback in Years
0.3

Operational CO₂
Savings
160 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- External Shading
- Roof Insulation
- Variable Refrigerant Volume Cooling System
- Energy-saving Lighting System
- Solar Photovoltaics



Water – 54% Savings through:

- Low-flow Faucets, Dual Flush Water Closets And Water-efficient Urinals



Materials – 38% Savings through:

- Concrete Filler Slabs For Floors
- Solid Dense Concrete Blocks For External Walls



DIPOA (COSTA RICA)

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



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN SOUTH ASIA



Creating Markets, Creating Opportunities

OFFICES – BANGLADESH CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m

Energy Measures – 21% Savings through:

- Reflective paint for roof and external wall.
- Low E-Coated Glass.
- Variant Refrigerant Flow (VRF) System..

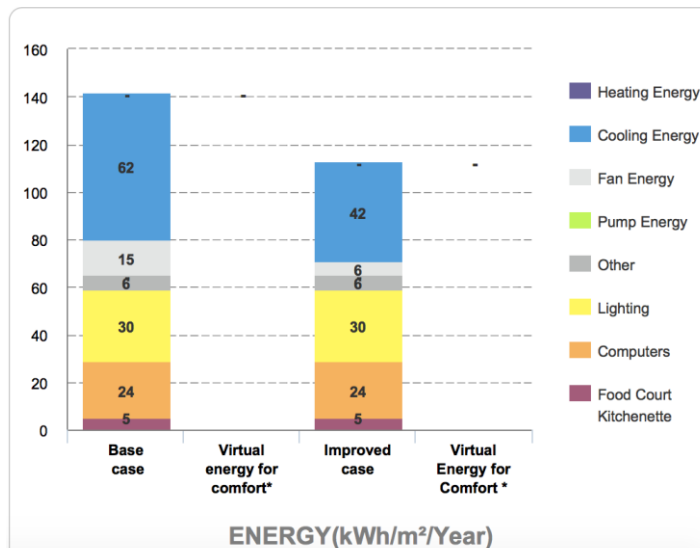
Water – 21% Savings through:

- Water efficient urinals in all bathroom
- Water efficient faucets for all kitchen sink
- Gray water treatment and recycling system

Materials – 22% Savings through:

- Ceramic tiles
- In-Situ Concrete >30% PFA for roof.
- Common brick wall for internal and external walls.
- Aluminum window frames.

20.50% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$20,860

Payback in Years
1.7

Utility cost saving
\$1,040/Month

Operational CO₂
Savings
91 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 30% Savings through:

- Occupancy sensors in bathrooms
- Low E-Coated glass
- Variable refrigerant volume (VRV) cooling system.
- Sensible heat recovery from exhaust air
- Energy saving lighting
- Daylight photoelectric sensors for internal space

Water – 70% Savings through:

- Low-flow faucets in kitchen and bathroom.
- Dual-flush water closets.
- Gray water treatment and recycling system.
- Water efficient urinals and rain water harvesting

Materials – 45% Savings through:

- Autoclaved Aerated Concrete blocks for internal walls
- Curtain walling for external walls



DAAN MOGOT BARU OFFICE PARK (INDONESIA)

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



OFFICES – INDIA (DELHI) CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m

Energy Measures – 20% Savings through:

- Insulation on roof.
- Low E-Coating glass.
- Energy efficient light bulbs for internal space.

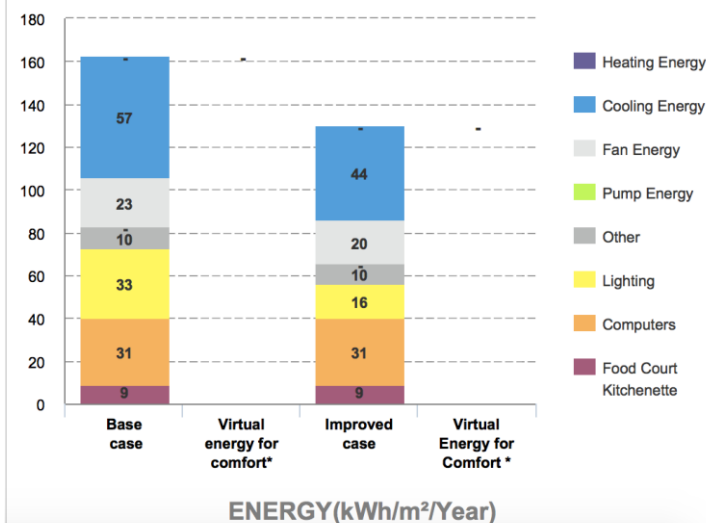
Water – 28% Savings through:

- Low-Flow Faucets in Bathrooms - 2 lt./min
- Dual flush for water closets in bathrooms

Materials – 26% Savings through:

- Ceramic tiles.
- In-Site Concrete<30% PFA for roof.
- Common brick wall
- Aluminum window frames.

20.17% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
Rs 1,659,550

Payback in Years
0.7

Utility cost saving
Rs 195,830/Month

Operational CO₂
Savings
119 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 68% Savings through:

- Reduced window to wall ratio.
- Higher thermal performance glass
- Reflective paint and insulation of the roof.
- Variable refrigerant volume (VRV) cooling system.
- Sensible heat recovery from exhaust air
- Energy saving lighting and solar photovoltaic

Water – 83% Savings through:

- Low-flow plumbing fixtures.
- Rain water harvesting.
- Black water treatment and recycling system.

Materials – 28% Savings through:

- Stone and ceramic tiles for floors
- UPVC window frames.
- Polystyrene roof insulation and AAC blocks for external walls



ABHIKALPAN OFFICE (INDIA)

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

OFFICES – INDIA (MUMBAI) CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m

Energy Measures – 21% Savings through:

- Reflective paint for roof and external wall.
- Insulation of roof.
- Energy saving lights for internal and external spaces.

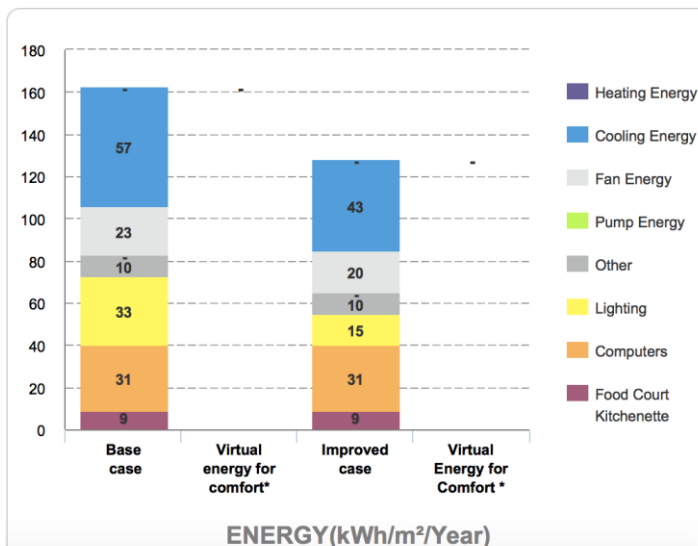
Water – 29% Savings through:

- Gray water treatment and recycling system
- Dual flush for water closets in bathrooms

Materials – 21% Savings through:

- Ceramic tiles.
- In-Site concrete<30% PFA, for roof.
- Aerated Autoclaved Concrete blocks
- Aluminum window frames

21.48% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
Rs 1,043,415

Payback in Years
0.4

Utility cost saving
Rs 208,310/Month

Operational CO₂
Savings
126 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 27% Savings through:

- Reduced window to wall ratio.
- Higher thermal performance glass..
- Energy saving lighting
- Efficient cooling system

Water – 65% Savings through:

- Low-flow faucet wash basin.
- Dual-flush water closets.
- Water efficient urinals.

Materials – 37% Savings through:

- Gypsum walls and stone tiled floor for retail space
- Steel profile cladding
- Finish concrete floor for office towers.



CITRA TOWERS KEMAYORAN

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

OFFICES – SRI LANKA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m

Energy Measures – 29% Savings through:

- Occupancy Sensors in Bathrooms, Conference Rooms.
- Variable refrigerant flow system.
- Occupancy Sensors in Open Offices.
- Air Conditioning with Air Cooled Screw Chiller.

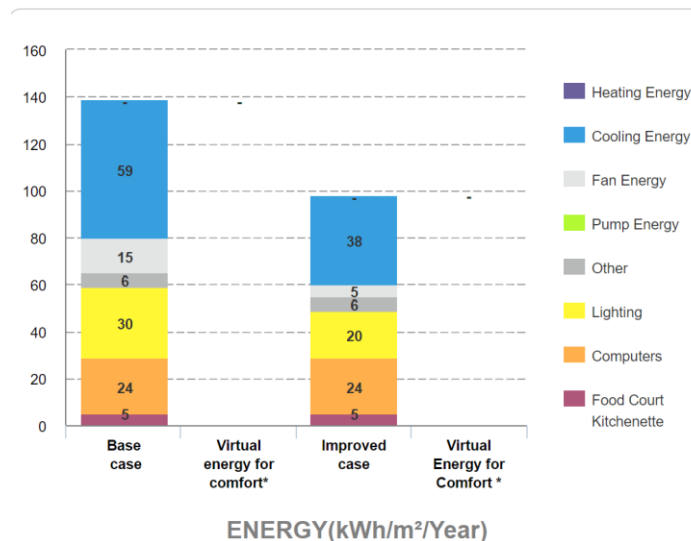
Water – 23% Savings through:

- Low-Flow Faucets in Bathrooms - 2 lt./min
- Dual flush for water closets in bathrooms

Materials – 75% Savings through:

- Timber Floor Construction.
- Concrete Filler Slab with Polystyrene Blocks.
- Stone Blocks – Hand Cut.
- Cork Tiles Flooring and Timber Window Frames.

28.80% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$25,250

Payback in Years
0.8

Utility Costs Savings
\$1,890/ month

Operational CO₂
Savings
143 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 33% Savings through:

- Reduced window to wall ratio.
- Higher thermal performance glass.
- Variable refrigerant volume (VRV) cooling system.
- Sensible heat recovery from exhaust air and energy saving light-bulbs.

Water – 68% Savings through:

- Low-flow plumbing fixtures.
- Dual-flush water closets.
- Black water treatment and recycling system.

Materials – 32% Savings through:

- Honeycomb clay blocks for external walls
- UPVC window frames.



Quasitum Intelisoft India Pvt. Ltd.

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



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN AFRICA



Creating Markets, Creating Opportunities

OFFICES – ANGOLA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 23% Savings through:

- External Shading Devices
- Insulation of Roof
- Occupancy Sensors in Open Offices
- Daylight Photoelectric Sensors



Water – 23% Savings through:

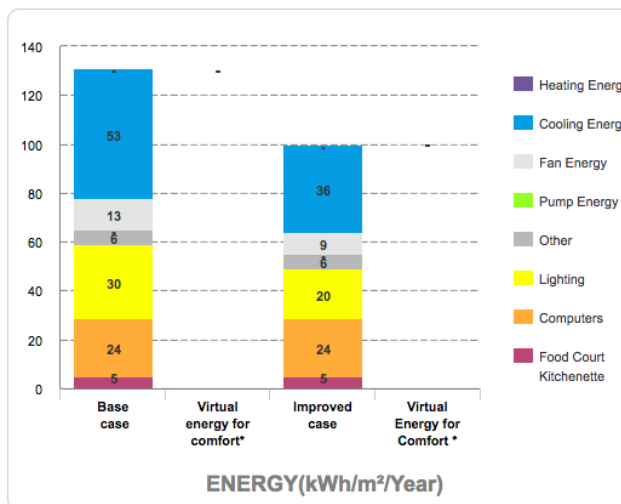
- Dual flush for water closets in Bathrooms
- Low-Flow Faucets in Bathrooms
- Water-Efficient Urinals in All Bathrooms



Materials – 27% Savings through:

- Concrete filler slab

23.29% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$46,700

Utility Costs Savings
\$5,145 / month

Payback in Years
0.75

Operational CO₂
Savings
93 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 41% Savings through:

- Reduced window to wall ratio
- External Shading
- Air conditioning with air-cooled chiller and high COP
- Variable speed drives pumps
- Energy-efficient lighting system



Water – 29% Savings through:

- Low-Flow Faucets
- Dual-flush water closets



Materials – 34% Savings through:

- Concrete filler slabs for floors
- Solid dense concrete blocks for walls



TOHME RIZK (LEBANON)

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

OFFICES – COTE D'IVOIRE CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 25% Savings through:

- Reflective Paint/Tiles for Roof
- Variable Refrigerant Flow System
- Occupancy Sensors in Open Offices
- Daylight Photoelectric Sensors



Water – 23% Savings through:

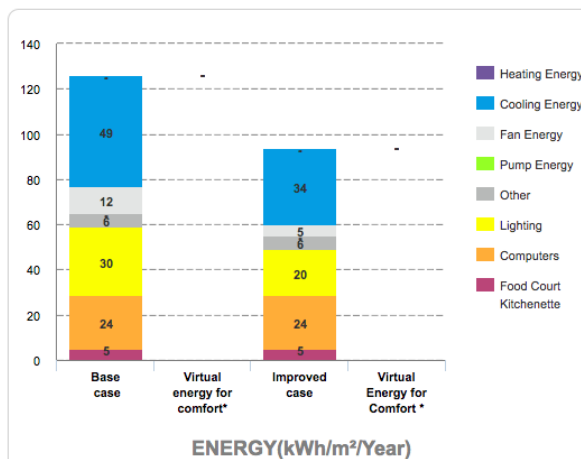
- Dual flush for water closets in Bathrooms
- Low Flow Faucets
- Water-Efficient Urinals in All Bathrooms



Materials – 27% Savings through:

- Concrete filler slab

25.17% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$26,400

Utility Costs Savings
\$1,170 / month

Payback in Years
1.88

Operational CO₂
Savings
74 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- External Shading
- Roof insulation
- Variable Refrigerant Volume Cooling System
- Energy-saving lighting system
- Solar PVs



Water – 54% Savings through:

- Low-Flow Faucets
- Dual flush water closets
- Water-efficient urinals



Materials – 38% Savings through:

- Concrete filler slabs for floors
- Solid dense concrete blocks for external walls



DIPOA (COSTA RICA)

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

OFFICES – GHANA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 23% Savings through:

- Insulation of Roof
- Energy-Saving Lightbulbs
- Daylight Photoelectric Sensors



Water – 20% Savings through:

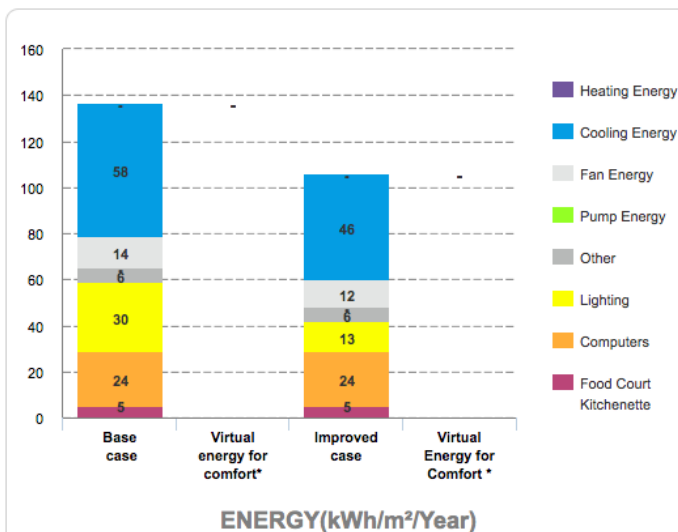
- Dual flush for Water Closets in Bathrooms
- Water-Efficient Urinals in All Bathrooms



Materials – 26% Savings through:

- Thin precast concrete deck and composite in-situ slab

22.66% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$40,815

Utility Costs Savings

\$5,620 / month

Payback in Years

0.7

Operational CO₂ Savings

59 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- Reduced window to wall ratio
- Reflective paint and tiles for roof
- Reflective paint for external walls
- External shading devices
- Insulation of roof
- Energy-saving lighting system for internal spaces



Water – 24% Savings through:

- Low-Flow faucets in kitchens and bathrooms
- Dual-flush water closets



Materials – 43% Savings through:

- Aluminum-clad sandwich panel for roof construction
- In-situ reinforced wall and honeycomb clay blocks with internal + external plaster for external walls
- Honeycomb clay blocks with plaster on both sides + plasterboard on metal studs for internal walls
- Ceramic tile flooring
- Aluminum window frames



ALTURIA (COLOMBIA)

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

OFFICES – KENYA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 26% Savings through:

- Reflective Paint/Tiles for Roof
- Air Economizers During Favorable Weather
- Daylight Photoelectric Sensors



Water – 23% Savings through:

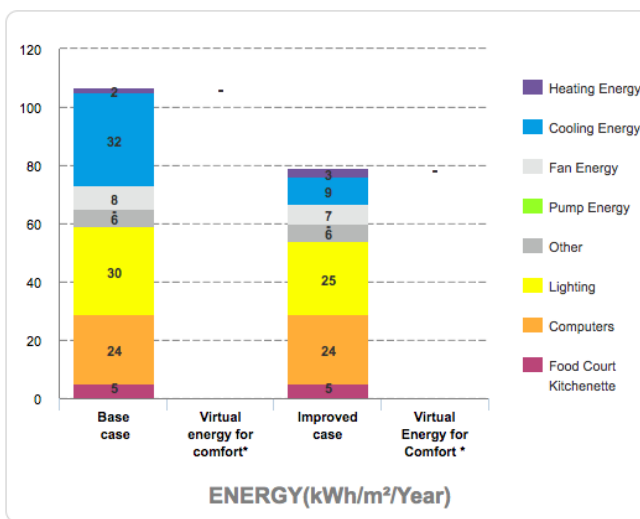
- Dual flush for water closets in Bathrooms
- Low Flow Faucets
- Water-Efficient Urinals in All Bathrooms



Materials – 23% Savings through:

- In-situ waffle concrete slab

26.35% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$18,820

Utility Costs Savings
\$1,860 / month

Payback in Years
0.8

Operational CO₂
Savings
62 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 33% Savings through:

- Reduced window to wall ratio
- Higher thermal performance glass
- Variable Refrigerant Volume cooling system
- Sensible heat recovery from exhaust air
- Energy-saving light bulbs for internal and external spaces



Water – 68% Savings through:

- Low-flow plumbing fixtures
- Dual flush water closets
- Black Water Treatment and Recycling System



Materials – 32% Savings through:

- Honeycomb clay blocks for external walls
- uPVC window frames



QUASITUM INTELISOFT INDIA (INDIA)

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

OFFICES – NIGERIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 22% Savings through:

- Variable Refrigerant Flow System
- Occupancy Sensors in Open Offices
- Daylight Photoelectric Sensors



Water – 29% Savings through:

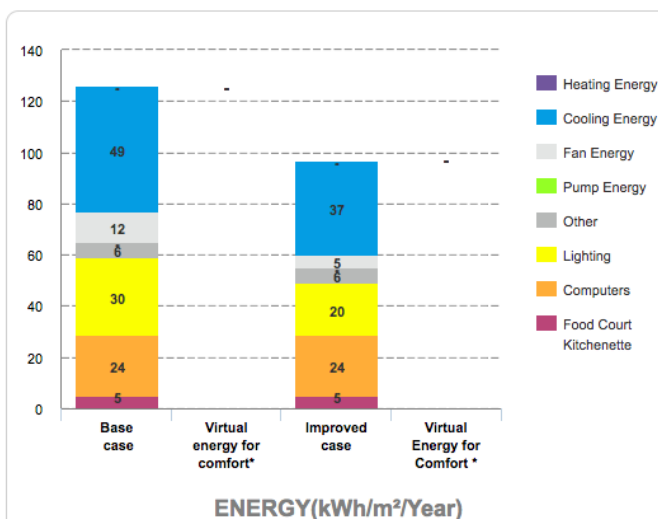
- Dual flush for water closets in Bathrooms
- Water-Efficient Faucets for Kitchen Sinks
- Water-Efficient Urinals in All Bathrooms



Materials – 23% Savings through:

- In-situ waffle concrete slab

22.46% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$26,550

Utility Costs Savings
\$830 / month

Payback in Years
2.7

Operational CO₂
Savings
55 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 38% Savings through:

- Reduced widow to wall ratio
- Reflective paint for roof and walls
- Roof and wall insulation
- Energy-saving lighting for internal, external spaces



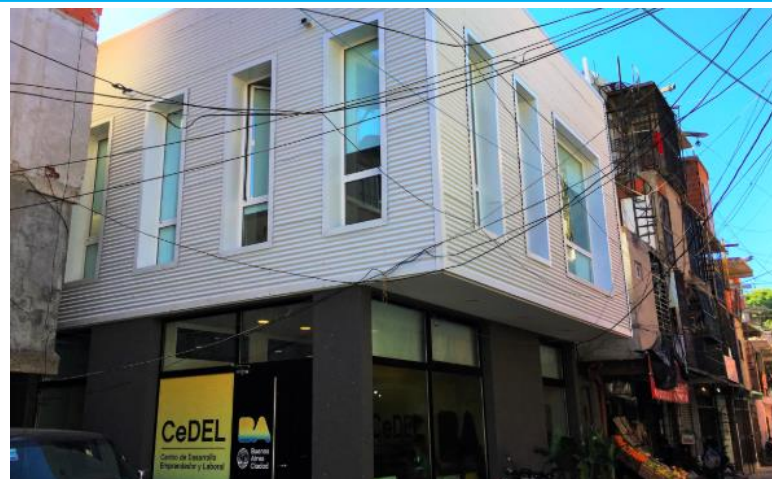
Water – 23% Savings through:

- Rainwater harvesting system
- Low-Flow plumbing fixtures for kitchen sinks, washbasins, water closets, and showerheads



Materials – 63% Savings through:

- Reuse of existing floor slabs
- External walls with steel profile cladding
- Plasterboards on metal studs for internal walls
- Steel sheets on steel rafters for the roof
- Ceramic tile



CENTRO DE DESARROLLO EMPRENDEDOR Y LABORAL (ARGENTINA)

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

OFFICES – SOUTH AFRICA CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 25% Savings through:

- Natural ventilation with operable windows and no A/C
- Energy-Saving Light Bulbs



Water – 23% Savings through:

- Dual Flush for Water Closets in Bathrooms
- Single Flush/Flush Valve
- Low-Flow Faucets in Bathrooms

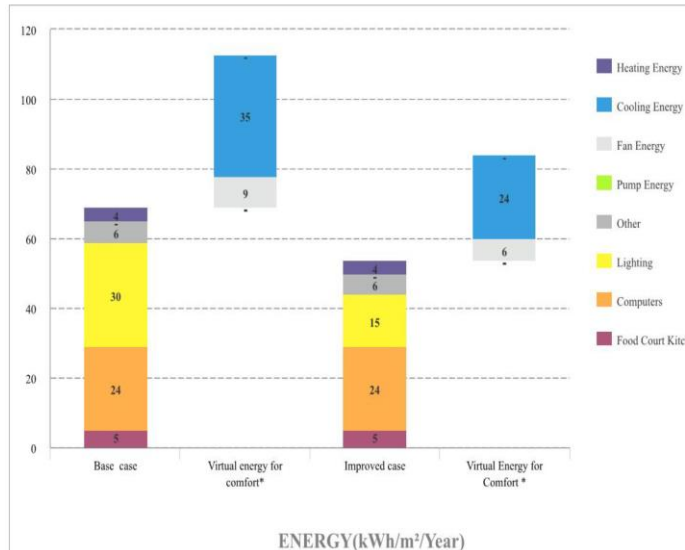


Materials – 30% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 24.55%

ENERGY SAVINGS Meets EDGE Energy Star



PROJECT METRICS

Incremental Cost
ZAR 213,600

Utility Costs Savings
ZAR 13,930 / month

Payback in Years
1.2

Operational CO₂
Savings
68 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 68% Savings through:

- Reflective Paint, Tiles, and Insulation for Roof
- Low E-Coated Glass
- Higher thermal performance glass
- Variable refrigerant volume (VRV) cooling system; sensible exhaust air



Water – 83% Savings through:

- Low-flow plumbing fixtures for washbasins and kitchens
- Rainwater harvesting system
- Black water treatment and recycling system



Materials – 28% Savings through:

- Autoclaved aerated concrete blocks for external walls
- Stone and ceramic tiles for floors
- UPVC window frames; polystyrene roof insulation



ABHIKALPAN OFFICE (INDIA)

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



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN LATIN AMERICA



BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 33% Savings through:

- Variable Refrigerant Flow System
- Air Conditioning with Water Screwed Chiller
- Energy Saving Lightbulb



Water – 20% Savings through:

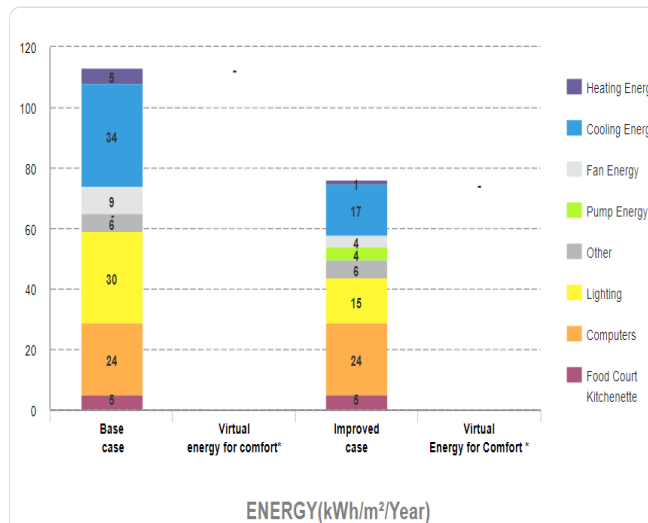
- Water-efficient bathroom urinals
- Dual flush for water closets in bathrooms
- Low Flow Faucet in bathroom
- Water Efficient Faucet in Kitchen



Materials – 27% Savings through:

- Concrete Filler Floor Slabs

33.39% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$57,100

Utility Cost Savings

\$1,330/month

Payback in Years

3.6

Operational CO₂ Savings

180 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 38% Savings through:

- Reduced Window to Wall Ratio
- Reflective paint for roof and walls
- Roof and wall insulation
- Energy-Saving Light Bulbs for Internal and External Spaces



Water – 23% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- Rainwater Harvesting System



Materials – 63% Savings through:

- Reuse of existing floor slabs and external walls with steel profile cladding
- Plasterboards on metal studs for internal walls,
- Steel sheets on steel rafters for the roof, and ceramic tile.



Centro de Desarrollo Emprendedor y Laboral (CeDEL)

OFFICES – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 24% Savings through:

- Air Conditioning With Water Cooled Chiller
- Variable Refrigerant Flow Cooling System



Water – 22% Savings through:

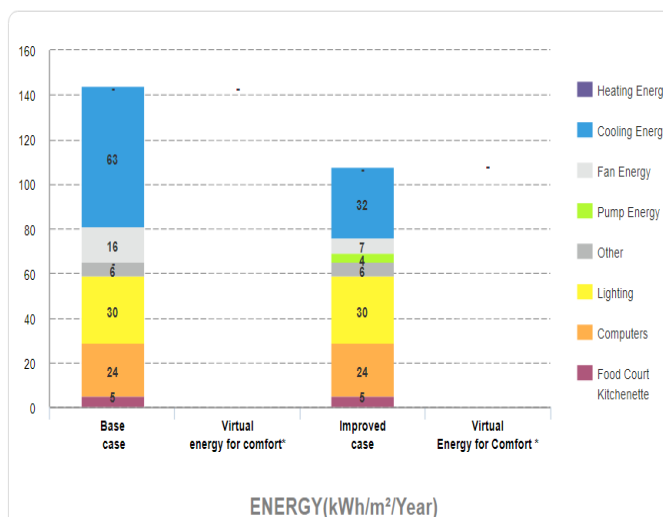
- Grey Water Treatment and Recycle System
- Rainwater Harvesting System on 50% of Roof Area
- Water-Efficient Bathroom Urinals and Faucets for Kitchen Sinks
- Dual Flush for Water Closets in Bathrooms
- Low Flow Water Faucet in Bathroom



Materials – 35% Savings through:

- In-Situ Concrete with >25% GGBS Floor Slabs

24.38% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$50,900

Utility Cost Savings

\$1,870/month

Payback in Years

2.3

Operational CO₂

Savings

230 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- Reduced window to wall ratio
- reflective paint and tiles for roof and external walls
- external shading devices
- insulation of roof
- energy-saving lighting system for internal spaces.



Water – 24% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- dual-flush water closets



Materials – 43% Savings through:

- Aluminum-clad sandwich panel for roof construction
- in-situ reinforced wall and honeycomb clay blocks with internal and external plaster for external walls
- honeycomb clay blocks with plaster on both sides and plasterboards on metal studs for internal walls
- ceramic tile flooring
- aluminium window frames.



ALTURIA (COLOMBIA)

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



OFFICES – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 21% Savings through:

- Air Conditioning with Water Chiller
- Variable Refrigerant Flow Cooling System
- Occupancy Sensor



Water – 35% Savings through:

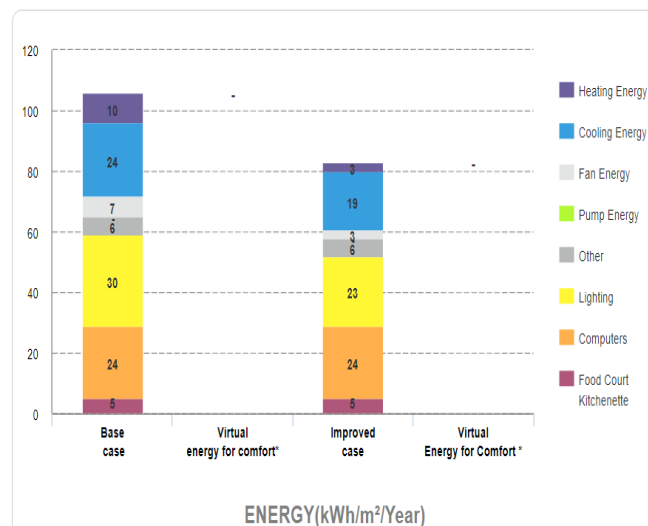
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms
- Low Flow Bathroom Faucet



Materials – 22% Savings through:

- In-Situ Concrete with > 25% GGBS Floor Slabs

21.28% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$29,880

Utility Cost Savings

\$830/month

Payback in Years

3

Operational CO₂ Savings

88.5 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- Reduced window to wall ratio
- reflective paint and tiles for roof and external walls
- external shading devices
- insulation of roof
- energy-saving lighting system for internal spaces.



Water – 24% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- dual-flush water closets



Materials – 43% Savings through:

- Aluminum-clad sandwich panel for roof construction
- in-situ reinforced wall and honeycomb clay blocks with internal and external plaster for external walls
- honeycomb clay blocks with plaster on both sides and plasterboards on metal studs for internal walls
- ceramic tile flooring
- aluminium window frames.



ALTURIA (COLOMBIA)

OFFICES – COSTA RICA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 25% Savings through:

- Energy Saving Light Bulbs for Internal Space
- Natural Ventilation with Operable Window
- Air Conditioning: COP of 3.5*



Water – 47% Savings through:

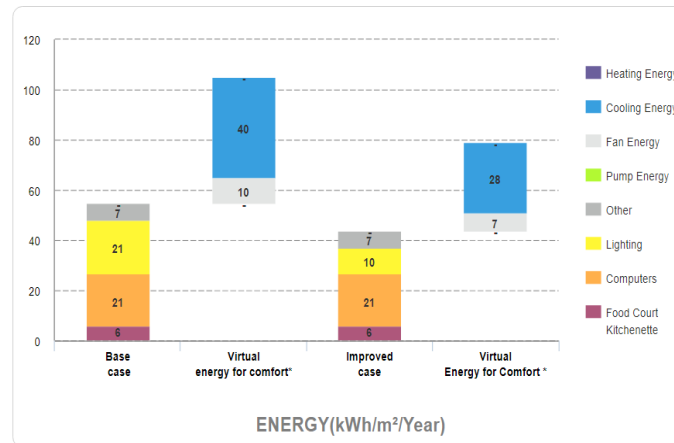
- Grey Water Treatment and Recycling System
- Rainwater Harvesting System 50% of Roof Area
- Water-efficient Urinals and Kitchen Faucet
- Dual flush for water closets in bathrooms
- Low Flow Faucet in Bathroom



Materials – 20% Savings through:

- Hollow Core Precast Floor Slabs
- Finished Concrete Flooring

25.07% Meets EDGE Energy Standard



*NOT PART OF ENERGY SAVING

Assumed Air Conditioning Installation in the Future

PROJECT METRICS

Incremental Cost

15,500,000 CRC

Utility Cost Savings

1,125,000 CRC/month

Payback in Years

1.2

Operational CO₂

Savings

70 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 22% Savings through:

- Reduced Window To Wall Ratio
- Energy-saving Lighting Systems In Internal And External Areas
- Occupancy Sensors In Bathrooms, Conference Rooms And Offices



Water – 27% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets



Materials – 27% Savings through:

- Steel Sheets On Steel Rafters For Roof Construction
- Cement Fiber Boards On Metal Studs For External Walls
- Finished Concrete Flooring



Offices At Santa Verde (Costa Rica)

OFFICES – MEXICO CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 31% Savings through:

- Air Conditioning with Air Cooled Screw
- Energy Saving Light Bulbs
- Variable Refrigerant Flow Cooling System



Water – 21% Savings through:

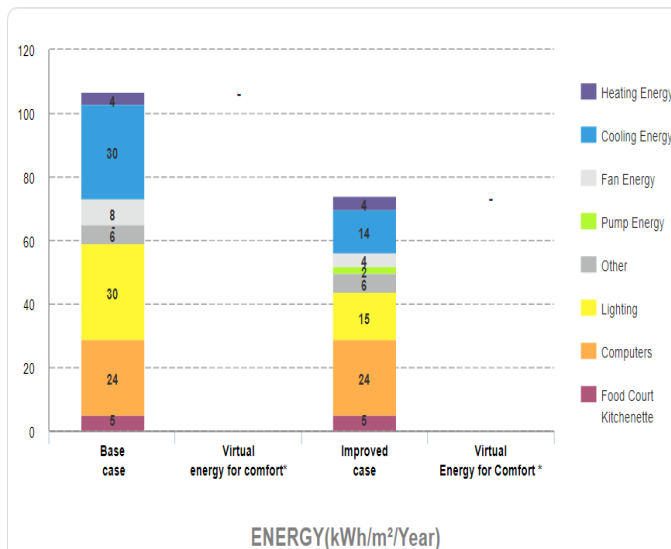
- Dual flush for water closets in bathrooms
- Low Flow Faucet
- Water-efficient urinals and faucets for kitchen sinks



Materials – 22% Savings through:

- In-Situ Concrete with > 25% GGBS Floor Slabs

30.89% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$52,420

Utility Cost Savings

\$1,250/month

Payback in Years

3.5

Operational CO₂ Savings

160 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 33% Savings through:

- Reduced Window To Wall Ratio
- Reflective Paint For Roof And External Walls And Low-e Coated Glass
- Air Conditioning With Water-cooled Chiller
- Variable Frequency Drives In AHUs and Pumps With Variable Speed Drives
- Occupancy Sensors
- Energy-saving Light Bulbs For Internal And External Spaces



Water – 38% Savings through:

- Low-flow Plumbing Fixtures For Washbasins And Kitchens
- Rainwater Harvesting System.



Materials – 21% Savings through:

- Hollow-core Precast Floor Slabs, Steel Sheets For Roof
- Polymeric Render On Concrete Blocks For External Walls
- Plasterboards On Metal Studs With Insulation For Internal Walls And Flooring
- Nylon Carpets; And Finished Concrete Flooring



CENTRO NACIONAL DE CONGRESOS Y CONVENCIONES (COSTA RACA)

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



OFFICES – PERU CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 22% Savings through:

- Variable refrigerant flow system
- Air Conditioning with Air Cooled Screw Chiller



Water – 45% Savings through:

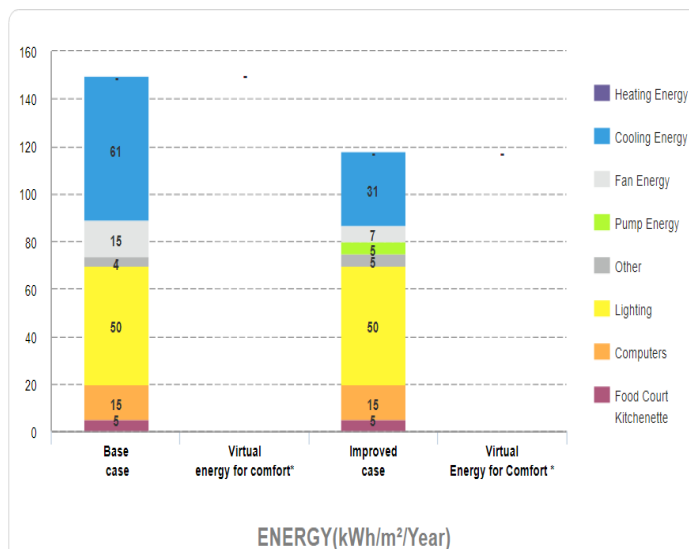
- Black Water Treatment and Recycling
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms
- Low Flow Faucets in Bathroom



Materials – 35% Savings through:

- In-Situ Concrete with > 25% GGBS Floor Slabs

21.91% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

68,200 S

Utility Cost Savings

6,660 S/month

Payback in Years

1

Operational CO₂ Savings

280 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- External shading, roof insulation
- variable refrigerant volume cooling system
- energy-saving lighting system
- solar photovoltaics



Water – 54% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- dual flush water closets



Materials – 38% Savings through:

- Concrete Filler Slabs For Floors
- Solid Dense Concrete Blocks For External Walls



DIPOA (COSTA RICA)

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



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN MENA



Creating Markets, Creating Opportunities

OFFICES – EGYPT CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 25% Savings through:

- Low-E Coated Glass - U-Value of 3 W/m² K and SHGC
- Reduced Window To Wall Ratio
- Energy-Saving Light Bulbs - Internal Spaces



Water – 23% Savings through:

- Low-Flow Faucets in Bathrooms - 2 lt./min
- Dual flush for water closets in bathrooms
- Single Flush/Flush Valve

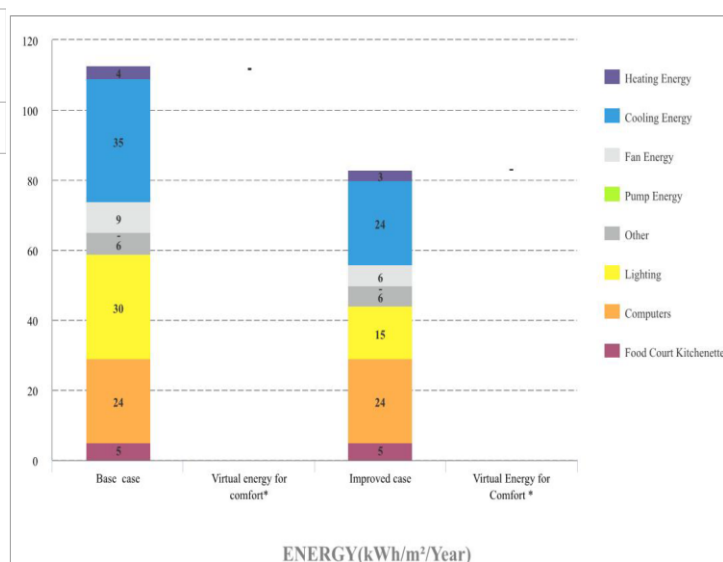


Materials – 30% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 25.38%

ENERGY SAVINGS Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost
\$211,000

Utility Costs Savings
\$26,500 / month

Payback in Years
0.6

Operational CO₂
Savings
\$ 130 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 30% Savings through:

- Reflective paint and tiles for roof.
- Insulation of roof, low-E coated glass.
- Variable refrigerant volume cooling system.
- Energy-saving light bulbs for internal and external spaces.



Water – 70% Savings through:

- Low-flow faucets in kitchens and bathrooms.
- Dual-flush water closets.
- Rainwater harvesting system, and grey water treatment.



Materials – 45% Savings through:

- Curtain walling for external walls, autoclaved aerated concrete blocks for internal walls, and finished concrete floor with a small percentage of stone tiles.



Daan Mogot Baru Office Park

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



BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 20% Savings through:

- Reflective Paint for External Walls -Solar Reflectivity
- External Shading Devices - Annual Average Shading
- Insulation of Roof
- Insulation of External Walls
- Natural Ventilation with Operable Windows and No



Water – 23% Savings through:

- Low-Flow Faucets in Bathrooms
- Dual flush for water closets in bathrooms
- Single Flush/Flush Valve

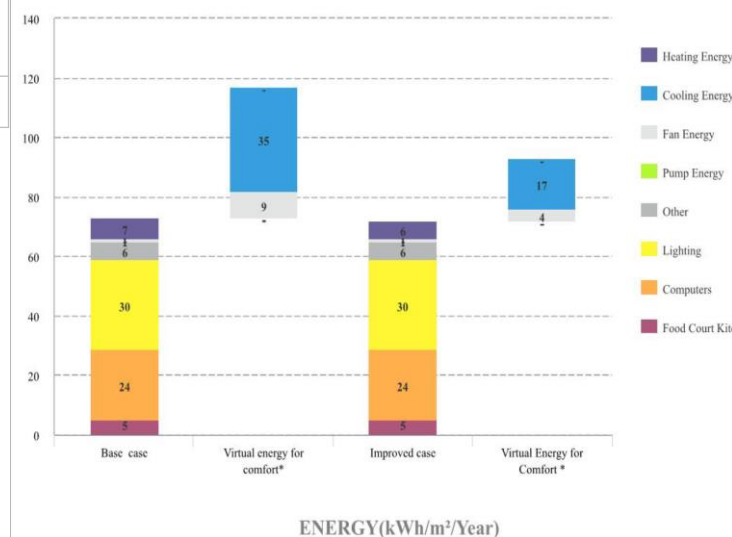


Materials – 30% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 20.44%

ENERGY SAVINGS Meets EDGE Energy Star **PROJECT METRICS**



Incremental Cost
\$ 44,100

Utility Costs Savings
\$ 780 / month

Payback in Years
5

Operational CO₂
Savings
\$ 110 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 41% Savings through:

- Reduced window to wall ratio
- External shading
- Air conditioning with air-cooled chiller and a high COP
- Variable speed drives pumps
- Energy-efficient lighting system.



Water – 29% Savings through:

- Low-flow faucets
- Dual flush water closets.



Materials – 34% Savings through:

- Concrete filler slabs for floors
- Solid dense concrete blocks for walls



Tohme Rizk Office Building (Lebanon)

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

OFFICES – MOROCCO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 22% Savings through:

- Reflective Paint for External Walls -Solar Reflectivity
- External Shading Devices - Annual Average Shading Factor
- Reduced Window To Wall Ratio
- Variable Refrigerant Flow (VRF) System



Water – 23% Savings through:

- Low-Flow Faucets in Bathrooms
- Dual flush for water closets in bathrooms



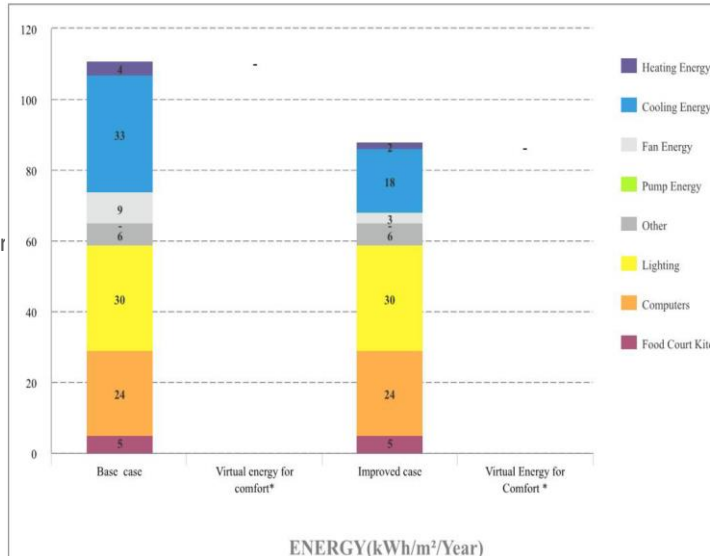
Materials – 30% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 21.59%

ENERGY SAVINGS Meets EDGE Energy Sta

PROJECT METRICS



Incremental Cost
\$ 34,300

Utility Costs Savings
\$ 1,400 / month

Payback in Years
2

Operational CO₂
Savings
\$ 70 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 32% Savings through:

- External shading
- Roof insulation
- Variable refrigerant volume cooling system
- Energy-saving lighting system
- Solar photovoltaics



Water – 54% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets



Materials – 38% Savings through:

- Concrete filler slabs for floors
- Solid dense concrete blocks for external walls.



DIPOA (Costa Rica)

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

OFFICES – PAKISTAN CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 23% Savings through:

- Variable Refrigerant Flow (VRF) System
- Reduced Window To Wall Ratio
- External Shading Devices - Annual Average Shading Factor
- Reflective Paint/Tiles for Roof -Solar Reflectivity



Water – 23% Savings through:

- Low-Flow Faucets in Bathrooms
- Dual flush for water closets in bathrooms



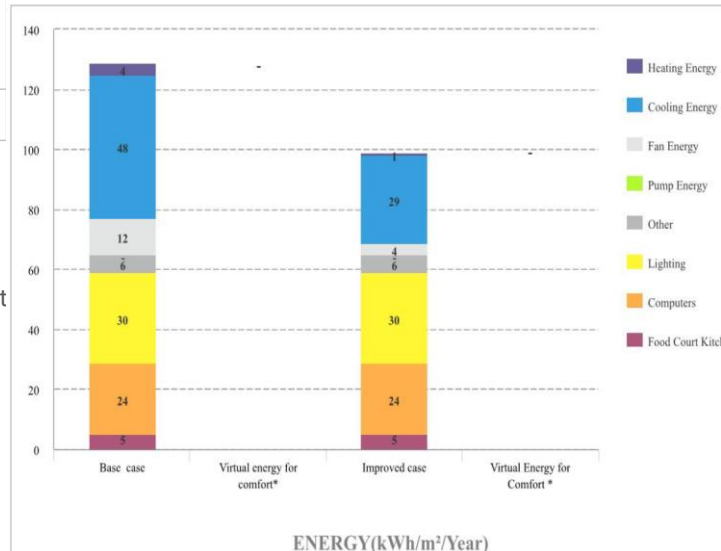
Materials – 30% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency Measures 22.59%

ENERGY SAVINGS Meets EDGE Energy Star

PROJECT METRICS



Incremental Cost
\$ 40,000

Utility Costs Savings
\$ 750 / month

Payback in Years
4.5

Operational CO₂
Savings
\$ 70 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 33% Savings through:

- Reduced window to wall ratio
- Higher thermal performance glass
- Variable refrigerant volume (VRV) cooling system
- Sensible heat recovery from exhaust air
- Energy saving light-bulbs in internal and external spaces.



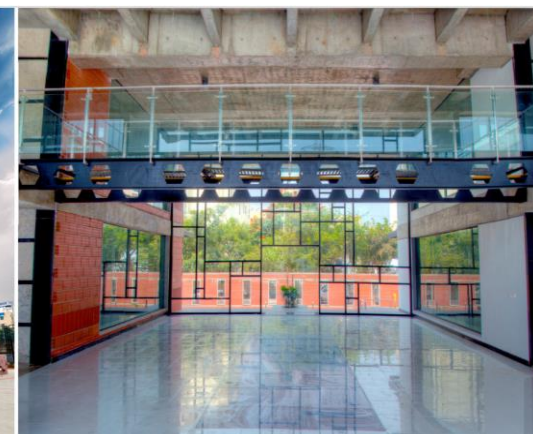
Water – 68% Savings through:

- Low-flow plumbing fixtures
- Dual-flush water closets
- Black water treatment and recycling system.



Materials – 32% Savings through:

- Honeycomb clay blocks for external walls
- uPVC window frames



Quasitum Intelisoft India Pvt. Ltd. (India)

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



GREEN BUILDINGS RETURN ON INVESTMENT: OFFICES IN EASTERN EUROPE



Creating Markets, Creating Opportunities



OFFICES – ARMENIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 35% Savings through:

- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Energy Saving Light Bulbs



Water – 35% Savings through:

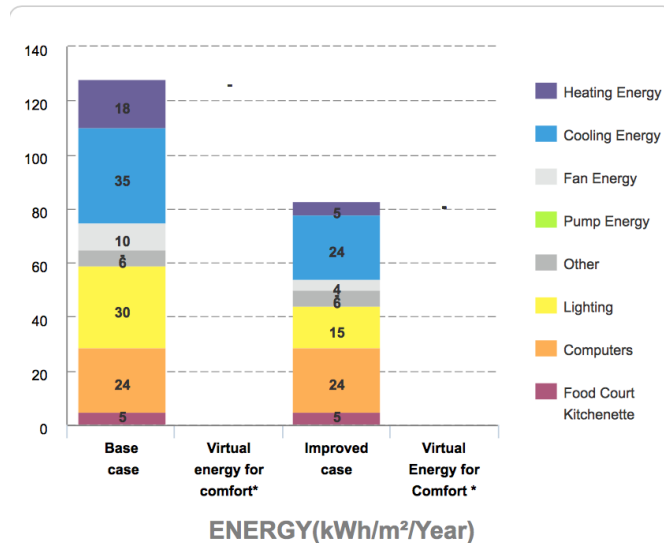
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 35% Savings through:

- Floor Slabs: In-Situ Concrete with >30% PFA

35.21% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$27,842

Utility Costs Savings

\$1,639/ month

Payback in Years

1.42

Operational CO₂

Savings

93 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 27% Savings through:

- High Performance Glass
- Reduced Window To Wall Ratio
- Energy-Saving Lighting
- Efficient Cooling Systems



Water – 65% Savings through:

- Low-Flow Faucets For Washbasins
- Dual Flush For Water Closets
- Water-efficient Urinals



Materials – 37% Savings through:

- Gypsum Walls And Stone Tile Floors For The Retail Space
- Steel Profile Cladding and Finished Concrete Floors



CITRA TOWERS KEMAYORAN (JAKARTA)

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

OFFICES – POLAND CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 35% Savings through:

- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Energy Saving Light Bulbs



Water – 35% Savings through:

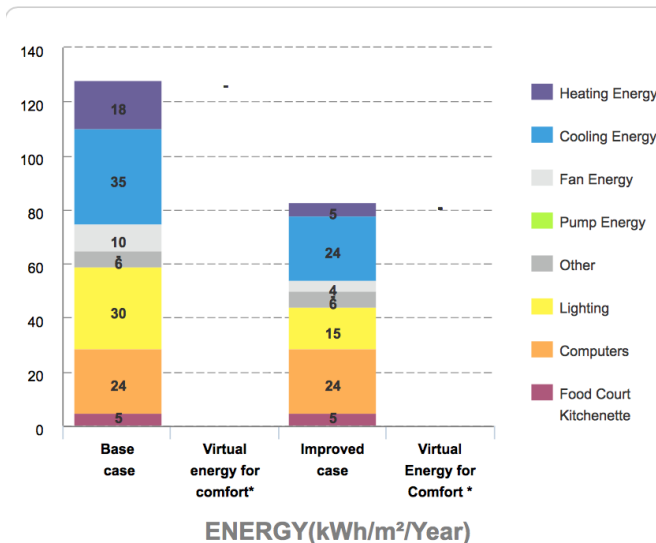
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 35% Savings through:

- Floor Slabs: In-Situ Concrete with >30% PFA

35.21% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$25,735

Utility Costs Savings

\$3,800/ month

Payback in Years

0.56

Operational CO₂ Savings

185 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 45% Savings through:

- Reduced Window to Wall Ratio
- Insulation of Roof and External Walls
- Higher Thermal Performance Glass
- Energy-Efficient Air Conditioning with Water-Cooled Chiller
- Sensible Heat Recovery from Exhaust Air



Water – 42% Savings through:

- Low-Flow Plumbing Fixtures and Dual-Flush Water Closets
- Grey Water Treatment and Recycling System



Materials – 21% Savings through:

- In-situ Concrete with Pulverized Fly Ash for Floor Slabs and Roof Construction



JOHNSON CONTROLS HQ (SHANGHAI)

OFFICES – RUSSIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 36% Savings through:

- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Energy Saving Light Bulbs



Water – 35% Savings through:

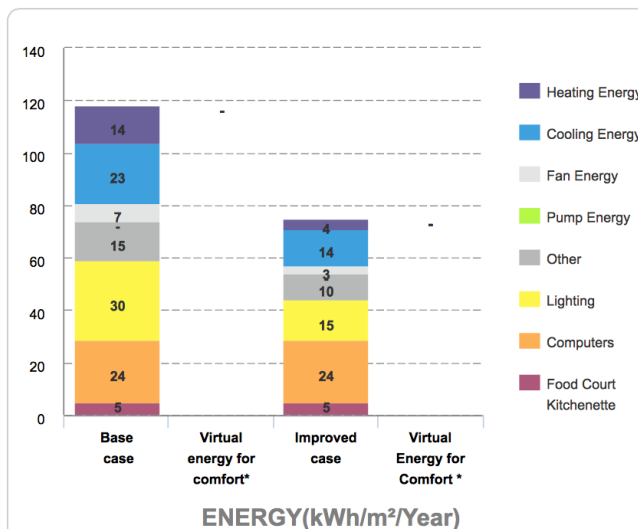
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 23% Savings through:

- Floor Slabs: In-Situ Concrete with >30% PFA

36.49% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$25,101

Utility Costs Savings

\$2,489/ month

Payback in Years

0.84

Operational CO₂ Savings

91 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 25% Savings through:

- Low E-Coated Glass
- Variable Refrigerant Volume Cooling System
- Sensible Heat Recovery from Exhaust Air
- Energy-Saving Light Bulbs for Internal and External Spaces
- Occupancy sensors for bathrooms and offices



Water – 57% Savings through:

- Low-Flow faucets in bathrooms
- Water-Efficient Urinals and kitchen faucets
- Dual-flush water closets



Materials – 32% Savings through:

- In-situ reinforced concrete for floors and roofs
- Autoclaved aerated concrete blocks in internal and external walls



M-BUILDING COMMERCIAL OFFICE TOWER (VIETNAM)

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

OFFICES – SERBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

22.50% Meets EDGE Energy Standard

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 23% Savings through:

- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Ground source heat pump



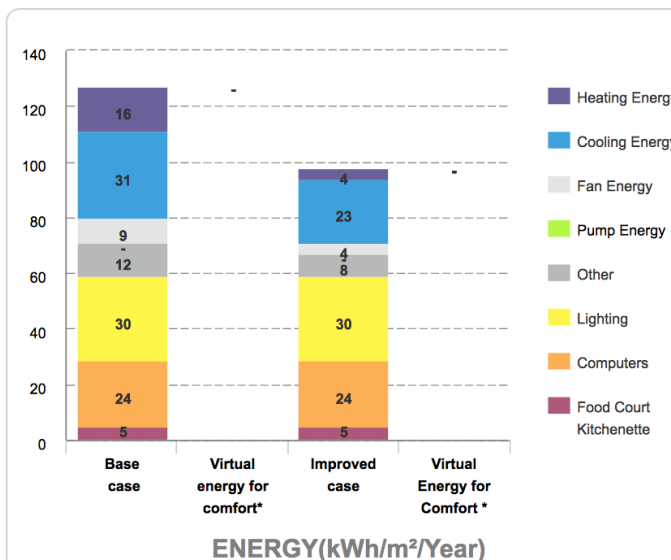
Water – 35% Savings through:

- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 23% Savings through:

- Floor Slabs: In-Situ Concrete with >25% GGBS



PROJECT METRICS

Incremental Cost
\$5,339

Utility Costs Savings
\$555/ month

Payback in Years
0.8

Operational CO₂ Savings
115 tCO₂/Year



RELEVANT CERTIFIED PROJECT

Energy Measures – 27% Savings through:

- Reduced window to wall ratio
- Reflective paint and tiles for the roof and external walls
- Energy-Saving lighting for internal and external spaces



Water – 26% Savings through:

- Low-flow showerheads
- Low-flow faucets in kitchens and bathrooms
- Water-efficient water closets



Materials – 53% Savings through:

- Plasterboards on metal studs for internal walls



ALEGRA CONJUNTO CERRADO (COLOMBIA)

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

OFFICES – UKRAINE CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 22% Savings through:

- Occupancy Sensors in conference rooms and cabins
- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Ground source heat pump



Water – 35% Savings through:

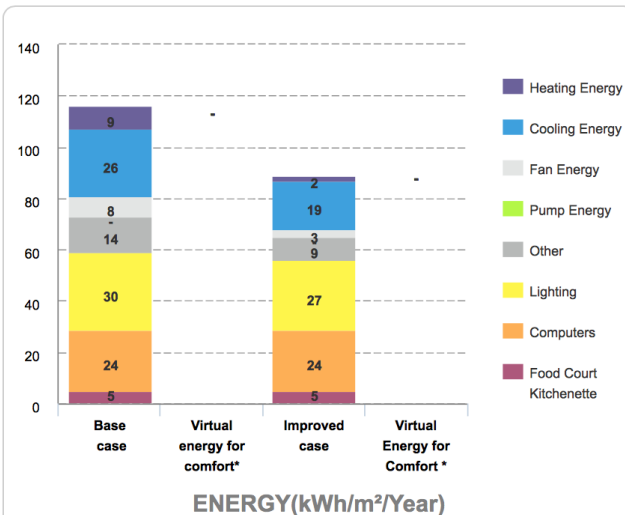
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 22% Savings through:

- Floor Slabs: In-Situ Concrete with >25% GGBS

21.83% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$7,460

Utility Costs Savings

\$563/ month

Payback in Years

1.25

Operational CO₂ Savings

72 tCO₂/Year

RELEVANT CERTIFIED 35PROJECT



Energy Measures – 30% Savings through:

- Reflective Paint, Tiles, and Insulation for Roof
- Low E-Coated Glass
- Variable Refrigerant Volume Cooling System
- Sensible Heat Recovery from Exhaust Air
- Energy-Saving Light Bulbs for Internal and External Spaces



Water – 70% Savings through:

- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- Grey Water Treatment and Recycling System



Materials – 45% Savings through:

- Curtain Walling for External Walls



DAAN MOGOT BARU OFFICE PARK (INDONESIA)

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

BUILDING DETAILS

Gross Internal Area	Floors Above Grade	Floors Below Grade	Floor-to-Floor Height
5000m ²	3	2	3.5m



Energy Measures – 26% Savings through:

- Occupancy Sensors in Open Offices
- Air Conditioning with Air Cooled Screw Chiller
- Variable refrigerant flow system
- Ground source heat pump



Water – 35% Savings through:

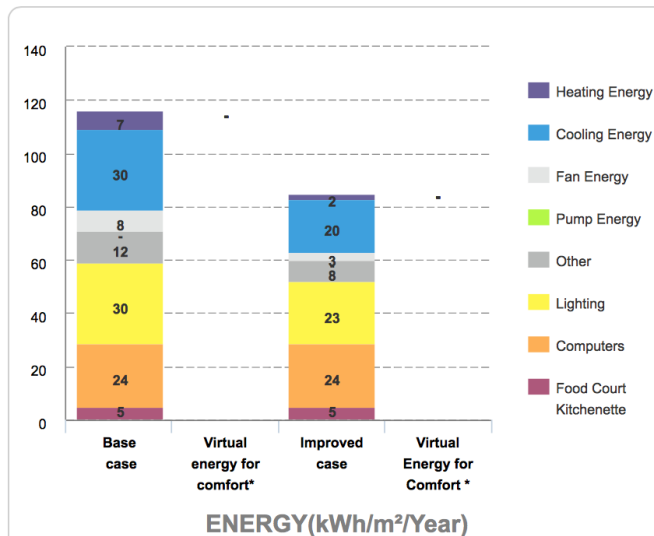
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms



Materials – 22% Savings through:

- Floor Slabs: In-Situ Concrete with >25% GGBS

25.81% Meets EDGE Energy Standard



PROJECT METRICS

Incremental Cost

\$12,181

Utility Costs Savings

\$563/ month

Payback in Years

0.5

Operational CO₂ Savings

55 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 68% Savings through:

- Reduced Window To Wall Ratio
- Reflective Paint and Insulation
- Higher Thermal Performance Glass;
- Variable Refrigerant Volume (VRV) Cooling System
- Sensible Heat Recovery From Exhaust Air
- Energy-Saving Light Bulbs For Internal Spaces
- Lighting Controls For Corridors And Staircases
- Solar Photovoltaics



Water – 83% Savings through:

- Low-flow Plumbing Fixtures For Washbasins And Kitchens
- Rainwater Harvesting System
- Black Water Treatment And Recycling System



Materials – 28% Savings through:

- Stone And Ceramic Tiles For Floors; UPVC Window Frames; Polystyrene Roof Insulation; And Autoclaved Aerated Concrete Blocks For External Walls



ABHIKALPAN OFFICE (INDIA)

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



METHODOLOGY, NOTES, ACKNOWLEDGMENTS



Creating Markets, Creating Opportunities

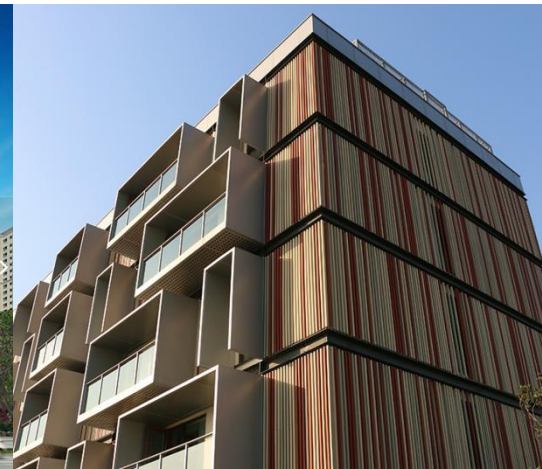
RESEARCH OBJECTIVE: MOST EFFECTIVE INTERVENTIONS TO REACH THE EDGE STANDARD

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.

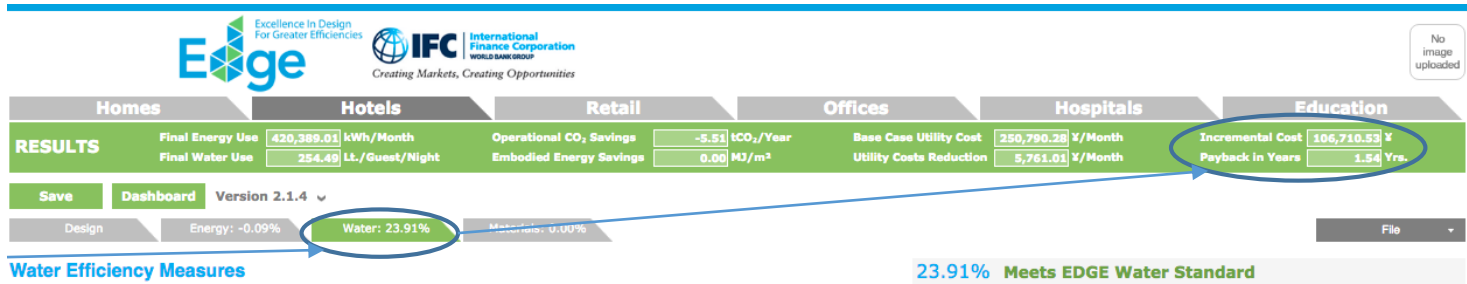
Third party certification verifies the resource efficiency savings so they can be credibly communicated between investors, developers, and buyers.

RESEARCH METHODOLOGY

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

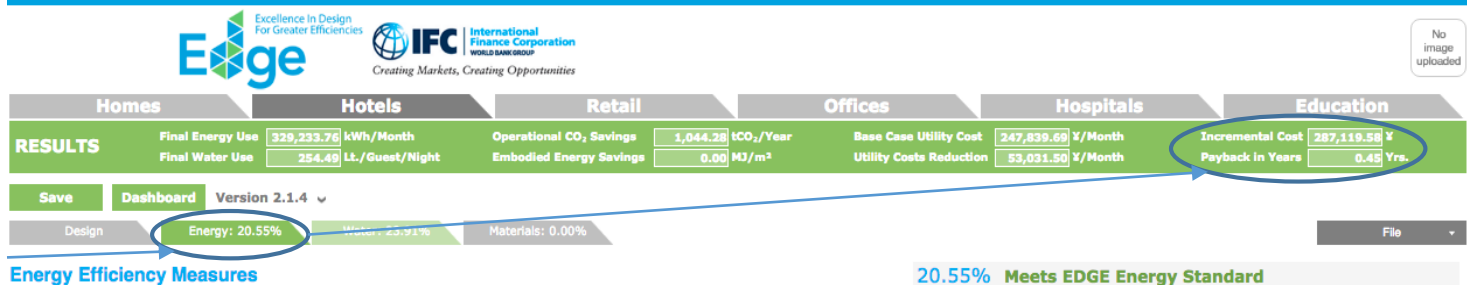
1

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.



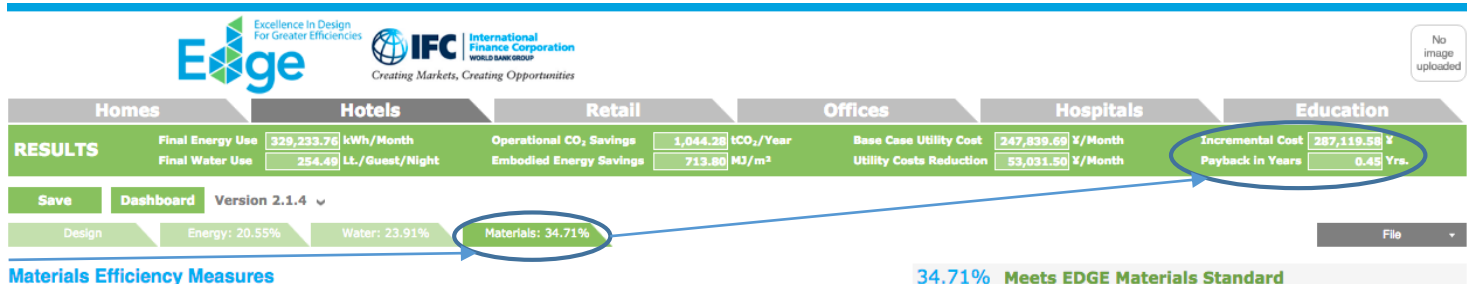
2

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

IFC thanks the following national donors for their generous support of the EDGE program: the State Secretariat for Economic Affairs of Switzerland (SECO); the European Union; the Ministry of Finance of Japan; the Hungarian Export Import Bank; the Canada Climate Change Program and the Department of Foreign Affairs, Trade and Development Canada; the Royal Ministry of Foreign Affairs of Denmark and the Danish Green Growth Fund; the Federal Ministry of Finance of Austria; and the Ministry of Foreign Affairs of Finland.

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