

GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS



Creating Markets, Creating Opportunities

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HOSPITALS IN EAST ASIA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD							
	Incremental Cost	Utility Savings / month	Payback Period in Years				
Cambodia	\$12,000	\$10,000	0.1				
China	450,000 ¥ \$65,000	35,000 ¥ \$5,000	1				
Fiji	\$8,000	\$8,000	0.1				
Indonesia	425,000 Thousand Rp \$28,000	88,000 Thousand Rp \$5,800	0.4				
Philippines	700,000 PhP \$13,000	700,000 PhP \$13,000	0.1				
Thailand	\$2,000	\$2,000	0.1				
Vietnam	125 M VND \$5,300	125 M VND \$5,300	0.08				

0) ENERGY
The	most cost effective interventions include:
	Reduced Window To Wall Ratio
	Energy Saving Light Bulbs
	Absorption Chiller Powered by Waste Heat
	Variable Refrigerant Flow Cooling Systems

Low-E Coated Glass

WATER

The best ROI can be found through these interventions:

- Water-Efficient Dishwashers, Showerheads, and Faucets
- Pre-rinse Valve for Rinsing Operations
- Grey Water Treatment and Recycling System





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



HOSPITALS IN SOUTH ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD								
	Incremental Cost	Payback Period in Years						
Bangladesh	\$16,655 \$1,540 0.9							
India (Delhi)	Rs2,717,545 \$36,700	Rs185,530 \$2,500	1.2					
India (Mumbai)	Rs856,690 \$11,500	Rs255,060 \$3,400	0.3					
Sri Lanka	\$10,800	\$9,200	1					





ENERGY

The most effective measures include:

- External shading
- Insulation of roof and external wall
- Energy saving light bulbs for internal & external space
- Occupancy sensors in bathroom
- · Air economizer except OT and ICU



WATER

The EDGE standard can typically be reached through:

- · Water efficient urinals in all Bathrooms
- Dual-Flush for Water Closets in all Bathrooms
- Water-Efficient Faucets for Kitchen Sinks



MATERIALS

Potential strategies include:

- In-Situ Concrete reinforced
- Aerated Autoclaved Concrete Blocks for internal and external walls



HOSPITALS IN AFRICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD								
	Utility Savings / month							
Angola	\$126,000	\$33,765						
Cote D'Ivoire	\$83,320	1.1	\$6,090					
Ghana	\$83,420	0.2	\$31,620					
Kenya	\$60,570	0.5	\$9,870					
Nigeria \$55,680 1.2 \$3,790								
South Africa	ZAR 64,925 \$4,500	0	ZAR 142,000 \$9,800					



(U)

ENERGY

The most effective measures include:

- Energy Saving Light Bulbs
- Air Economizers
- Energy savings also result from Water interventions



WATER

The EDGE standard can typically be reached with these measures:

- Low-Flow Faucets in Bathrooms
- Dual-Flush for Water Closets in All Bathrooms



MATERIALS

Floor slabs are the biggest efficiency drivers, ranging from 25% - 45% of material costs out of 7 total interventions.



HOSPITALS IN LATIN AMERICA

ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD							
	Incremental Cost	Payback Period in Years					
Argentina	\$452,560	\$5,820	6.5				
Brazil	\$119,000	1.3					
Colombia	\$256,700	\$8,420	2.5				
Costa Rica	196,186,000 CRC \$343,000	6,744,400 CRC \$11,800	2.4				
Mexico \$300,970 \$5,430 4.							
Peru	878,900 S \$266,000	31,900 S \$9,650	2.3				





ENERGY

The most cost effective interventions include:

- Energy Saving Light Bulbs
- Insulation of Roof and External Wall
- Solar Hot Water Collection
- Variable Refrigerant Flow Cooling Systems
- Air Conditioning with Air Cooled Chiller

WATER

The best ROI can be achieved through the following:

- Water-Efficient Dishwashers and Urinals
- Water Efficient Showerhead and Faucets for bathroom
- Duel Flush Water Closet



MATERIALS

 Floor Slabs are the biggest efficiency drivers and contributed to over 40% of all of the material portions.
 Savings can be achieved through reduced concrete usage.



HOSPITALS IN MENA



PAYBACK PERIOD NEEDED TO REACH EDGE STANDARD								
Incremental Cost Utility Savings / Payback Period month in Years								
Egypt	\$160,500	\$7,200	2					
Jordan	\$160,000	\$6,500	2					
Morocco \$170,000 \$8,000 2								
Pakistan	\$88,000	\$3,700	2					





ENERGY

Some potential strategies include:

- Energy-Saving Light Bulbs
- Low-E Coated Glass



WATER

The EDGE Standard can be reached through:

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



MATERIALS

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



HOSPITALS IN EASTERN EUROPE



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD							
	Incremental Cost	Payback Period in Years					
Armenia	\$847,400	\$11,380	6.2				
Poland	\$2,330	\$30,280	0.1				
Russian Federation	\$56,760	\$33,460					
Serbia	\$668,350	\$11,710	4.8				
Ukraine	\$13,080	\$5,380	0.2				
Turkey	\$696,560	\$14,300	4				





ENERGY

Effective measures include:

- Reduced Window To Wall Ratio
- Insulation of Roofs and External Walls
- Absorption Chiller Powered by Waste Heat
- Variable Refrigerant Flow Cooling Systems
- Energy Saving Light Bulbs for Internal & External Spaces
- Solar Hot Water Collectors



WATER

Potential green strategies include:

- Low-Flow Showerheads and Faucets
- Dual Flush for Water Closets
- Water-Efficient Urinals and faucets for Kitchen Sinks



MATERIALS

- Floor slabs are biggest cost drivers averaging 30% of material costs out of 6 total interventions
- Using other materials in these elements of a hospital usually saves over 20%



GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS IN EAST ASIA



Creating Markets, Creating Opportunities

Multi

Specialty

HOSPITALS – CAMBODIA CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS Gross Internal Occupancy 22.46% Meets EDGE Energy Standard Type of Unit Beds Floors Area Rate 400 9,700m² 70% 7 100 350 78 300 Energy Measures – 22% Savings through: 42 44 250 Variable Refrigerant Flow Cooling Systems 13 24 42 Energy Saving Light Bulbs - Internal & External Spaces 200 8 52 Absorption Chiller Powered by Waste Heat 21 150 35 35 Water - 22% Savings through: 100 Variable Refrigerant Flow Cooling Systems 116 116 50 Water-Efficient Dishwashers and Bathroom Faucets Base Virtual Improved Virtua Pre-rinse Valve for Rinsing Operation Case Energy for Energy for Case Comfort Comfort Materials – 32% Savings through: ENERGY (kWh/m²/Year) Timber Floor Construction Floor Slabs **RELEVANT CERTIFIED PROJECT – LEBANON**

PROJECT METRICS

Incremental Cost \$12,000

Utility Cost Savings \$10,000 / month

Payback in Years 0.10

Operational CO₂ Savings 600 tCO₂/Year

Energy Measures – 56% Savings through:

- Reduced Window To Wall Ratio
- Insulation Of Roof And External Walls
- Low E-coated Glass
- Air Conditioning With Air Cooled Chiller
- Energy-saving Lighting Systems For Internal And External Spaces
- Solar Hot Water Collectors
- Solar Photovoltaics



Water – 33% Savings through:

- Low-flow Faucets In Bathrooms And Dual-flush Water Closets
- Materials 42% Savings through:
- Aluminum Sheets On Steel Rafters For Roof Construction
- 3-D Wire Panel With "Shot-crete" On Both Sides For External And Internal Walls
- Ceramic Tile Flooring



Heating Energy

Cooling Energy

Fan Energy

Pump Energy

Hot Wate

Lighting

Catering

Equipment.

Lift STP

Water Pumps

Laundry

KOMFO ANOKYE HOSPITAL (GHANA)

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



HOSPITALS – CHINA CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS Gross Internal Occupancy Type of Unit Floors Beds 21.04% Meets EDGE Energy Standard Area Rate Multi 450 9,700m² 70% 7 100 Specialty 400 350 Energy Measures – 21% Savings through: 300 Absorption Chiller Powered by Waste Heat 42 250 15 **Energy Saving External Light Bulbs** 50 35 200 Recovery of Waste Heat from Generator for Heating 39 34 150 35 35 Water – 22% Savings through: 100 116 116 50 Water-Efficient Dishwashers, Bathroom Faucets, Kitchen Sink, Urinals, and Water Closets n Base Virtua Pre-rinse Valve for Rinsing Operation Case Energy for Comfort Materials - 31% Savings through: Timber Floor Construction Floor Slabs **RELEVANT CERTIFIED PROJECT** Energy Measures – 21% Savings through: Reduced Window to Wall Ratio **Higher Thermal Performance Glass** Wall Insulation

- Air Economizers
- Energy-Efficient Air Conditioning with Air Cooled Chiller
- Sensible Heat Recovery from Exhaust Air

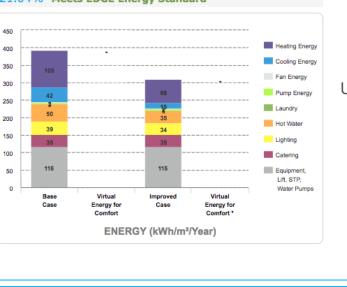
Water – 25% Savings through:

- Low-Flow Faucets and Dual Flush Water Closet in bathrooms
- Water-Efficient Faucets for Kitchen Sinks



Materials – 26% Savings through:

Clay Roofing Tiles on Steel Rafters



PROJECT METRICS

Incremental Cost 450,000 ¥

Utility Cost Savings 37,500 ¥ / month

Payback in Years

Operational CO₂ Savings 950 tCO₂/Year



KESERWAN MEDICAL CENTER (LEBANON)

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



HOSPITALS – FIJI CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

	Type of Unit	Gross Internal	Occupancy	Floors	Beds
		Area	Rate		
	Multi Specialty	9,700m ²	70%	7	100
(Veasures – 25%	0	0	

- Variable Refrigerant Flow Cooling Systems
 Energy Saving Light Bulbs Internal & External Spaces
- Sensible Heat Recovery from Exhaust Air
- External Shading Devices
- Solar Hot Water Collectors



Water – 44% Savings through:

- Variable Refrigerant Flow Cooling Systems
- Water-Efficient Bathroom Faucets and Kitchen Sink
- Materials 32% Savings through:
 - Timber Floor Construction Floor Slabs

RELEVANT CERTIFIED PROJECT

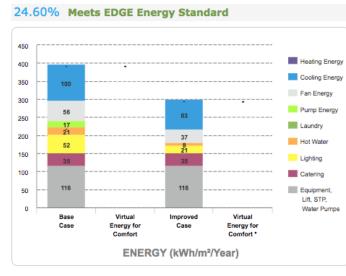
Energy Measures – 32% Savings through:

()

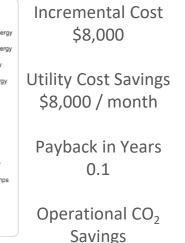
- · Reduced Window To Wall Ratio
- Reflective Paint and Insulation For External Walls
- Natural Ventilation For Corridors
- Energy-Saving Lighting Systems
- Occupancy Sensors In Bathrooms
- Solar Photovoltaics
- Water 35% Savings through:
 - Low-flow Faucets In Kitchens And Bathrooms
 - Single-flush 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



PROJECT METRICS



520 tCO₂/Year



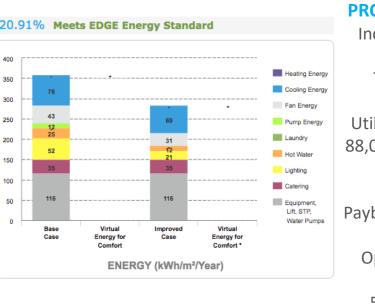
SEDE DE EBAIS (COSTA RICA)

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



HOSPITALS – INDONESIA CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETAI	LS				
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	20.91	% Mee	ts EDG
Multi Specialty	9,700m ²	70%	7	100	400		
 Val Lov Ser Ene Sol Water - Val Materia 	Measures – 21% riable Refrigerant w-E Coated Glass nsible Heat Recove ergy-Saving Light I ar Hot Water Coll - 26% Savings th riable Refrigerant Ils – 32% Savings	Flow Cooling S ery from Exhau Bulbs Internal & ectors rough: Flow Cooling S s through:	ystems Ist Air & External : ystems	Spaces	300 250 150 50 0	76 43 12 25 52 35 116 Base Case	Vir Ener Con
Energy - Rec - Hig - Wa - Air - Ene - Ser Water - - Lov - Wa Materia	ANT CERTIN Measures – 21% duced Window to gher Thermal Performant Economizers ergy-Efficient Air C nsible Heat Recover - 25% Savings th w-Flow Faucets and ater-Efficient Fauce of Savings	Savings thro Wall Ratio ormance Glass Conditioning wi ery from Exhau rough: nd Dual Flush W ets for Kitchen	ugh: ith Air Cool ist Air /ater Close		ooms		
• Cla	y Roofing Tiles on	Steel Rafters					



PROJECT METRICS Incremental Cost 425,000

Thousand Rp

Utility Cost Savings 88,000 Thousand Rp / month

Payback in Years: 0.4

Operational CO₂ Savings 550 tCO₂/Year



KESERWAN MEDICAL CENTER (LEBANON)

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

HOSPITALS – PHILIPPINES CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

	Type of Unit	of Unit Gross Internal Occupancy Area Rate		Floors	Beds
	Multi Specialty	9,700m ² 70%		7	100
$\left(\right)$	Energy I	Measures – 24%	Savings throu	ugh:	
	• Abs	ergy-Saving Light E sorption Chiller Po ernal Shading Dev	owered by Was		l Space
	🕥 Water –	20% Savings th	rough:		
		iter Efficient Dishvucet, and Urinals	vashers, Kitche	n and Bath	nroom
	Materia	ls – 32% Savings	through:		
	• Tim	nber Floor Constru	uction Floor Sla	bs	

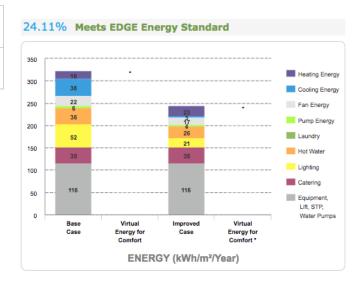
RELEVANT CERTIFIED PROJECT – LEBANON

) Energy Measures – 56% Savings through:

- Reduced Window To Wall Ratio
- Insulation Of Roof And External Walls
- Low E-coated Glass
- Air Conditioning With Air Cooled Chiller
- Energy-saving Lighting Systems For Internal And External Spaces
- Solar Hot Water Collectors
- Solar Photovoltaics



- Water 33% Savings through:
- Low-flow Faucets In Bathrooms And Dual-flush Water Closets
- Materials 42% Savings through:
- Aluminum Sheets On Steel Rafters For Roof Construction
- 3-D Wire Panel With "Shot-crete" On Both Sides For External And Internal Walls
- Ceramic Tile Flooring



PROJECT METRICS

Incremental Cost 700,000 PhP

Utility Cost Savings 700,000 PhP / month

Payback in Years 0.1

Operational CO₂ Savings 350 tCO₂/Year



KOMFO ANOKYE HOSPITAL (GHANA)

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



HOSPITALS – THAILAND CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETA	ILS							
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	20.26%	Meets ED	GE Water St	andard		PROJECT METRICS
Multi Specialty	9,700m ²	70%	7	100	1,200				Showers	Incremental Cost \$2,000
· Vari · Ene · Abs Water – · Wat	Measures – 21% iable Refrigerant irgy Saving Light I orption Chiller Po 20% Savings th ter-Efficient Bath ls – 32% Savings ber Floor Constru	Flow Cooling S Bulbs - Internal owered by Was rough: room Faucets s through:	ystems & Externa ste Heat	al Spaces	800 600 400 200 0	54 122 145 200 60 141 279 36 Base Case	Water (Lts/Pa	54 122 36 120 60 141 194 35 mproved Case atient/day)	Nuchern Water Faucets Water Closets & Urinals Laundry Landscaping Equipment Process HVAC Other	Utility Cost Savings \$2,000 / month Payback in Years 0.1 Operational CO ₂ Savings 400 tCO ₂ /Year
 Energy N Red Higl Wal Air I Ene Sen Water – Low Wat 	ANT CERTIN Measures – 21% luced Window to her Thermal Perfe Il Insulation Economizers rgy-Efficient Air (sible Heat Recove 25% Savings th v-Flow Faucets ar ter-Efficient Fauce	5 Savings thro Wall Ratio ormance Glass Conditioning w ery from Exhau rough: nd Dual Flush W eets for Kitchen	ugh: ith Air Coo ıst Air Vater Close		oms					
<u>ی</u>	ls – 26% Savings / Roofing Tiles on	-					KESER		IEDICAL CEN	TER (LEBANON)

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/



HOSPITALS – VIETNAM CASE STUDY & CERTIFIED PROJECT

96

53

16

54

116

Base

Case

450

400

350

300

250

200

150

100

50

0

27.22% Meets EDGE Energy Standard

Virtual

Energy for

Comfort

73

32

12 19

35

116

Improved

Case

ENERGY (kWh/m²/Year)

Virtua

Energy for



PROJECT METRICS



Utility Cost Savings 125 M VND / month

Payback in Years 0.1

Operational CO₂ Savings 450 tCO₂/Year



Heating Energy

Cooling Energy

Fan Energy

Pump Energy

Laundry

Hot Water

Lighting

Catering

Equipment

Lift, STP.

Water Pumps

SEDE DE EBAIS (COSTA RICA)

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

BUILDING DETAIL



- 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

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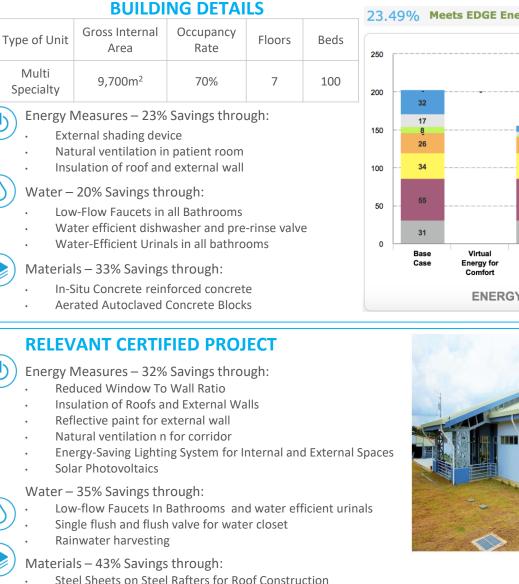
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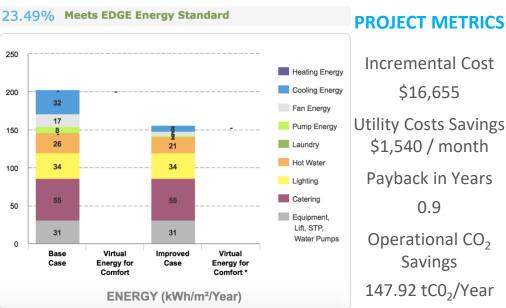
Creating Markets, Creating Opportunities

HOSPITALS – BANGLADESH CASE STUDY & CERTIFIED PROJECT





- Medium weight hollow concrete blocks for External and Internal Walls
- Finished concrete flooring





SEDE de EBAIS de ESCOBAL de BELEN

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

HOSPITALS – INDIA (DELHI) CASE STUDY & CERTIFIED PROJECT

21

11

19

10

53

25

Improved

Case

ENERGY (kWh/m²/Year)

Virtual

Energy for

Comfort

Virtual

Energy for

Comfort



Utility Costs Savings Rs 185,530 / month



1.2

Operational CO₂ Savings 160 tCO₂/Year



Heating Energy

Cooling Energy

Fan Energy

Laundry

Hot Water

Lighting

Catering

Equipment,

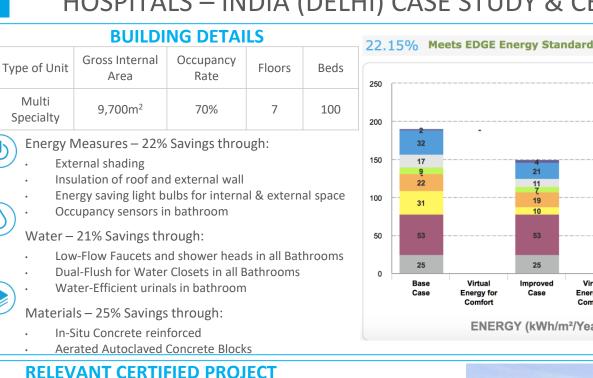
Lift, STP,

Water Pumps

Pump Energy

KESERWAN MEDICAL CENTRE

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



Energy Measures – 21% Savings through: Reduced Window To Wall Ratio and insulation of external wall High performance glass and air economizer

- Air Conditioning with Air Cooled Chiller
- Energy-Saving Lighting System for Internal and External Spaces
- Solar Hot Water Collectors
- Variable frequency drive in AHU and variable speed drives
- Sensible heat recovery from exhaust air

Water – 25% Savings through:

- Low-flow Faucets In Bathrooms and Dual-flush Water Closets
- Water efficient faucets in kitchen sink

Materials - 26% Savings through:

- Clay roofing tiles on Steel Rafters for Roof Construction
- Medium weight hollow concrete blocks for External
- Vinyl flooring and lightweight concrete blocks for internal walls

HOSPITALS - INDIA (MUMBAI) CASE STUDY & CERTIFIED PROJECT



Rs. 856,690

0.3

Savings

163 tCO₂/Year

BUILDING DETAILS 24.50% Meets EDGE Energy Standard **PROJECT METRICS** Gross Internal Occupancy Type of Unit Beds Floors Area Rate 200 Incremental Cost Heating Energy 180 Multi 9,700m² 70% 7 100 27 Cooling Energy Specialty 160 Fan Energy 14 140 Energy Measures – 25% Savings through: 7 **Utility Costs Savings** Pump Energy 120 20 19 Air economizer except for OT and ICU Laundry Rs. 255,050 / month 100 31 31 Water – 20% Savings through: Hot Water 80 **Payback in Years** Lighting Water efficient urinals in all Bathrooms 60 53 53 Dual-Flush for Water Closets in all Bathrooms Catering 40 Water-Efficient Faucets for Kitchen Sinks Equipment, 20 Lift. STP. 25 25 Materials – 33% Savings through: Water Pumps Operational CO₂ 0 Base Virtual Improved Virtual In-Situ Concrete reinforced Case Energy for Case Energy for Comfort Comfort ' Aerated Autoclaved Concrete Blocks ENERGY (kWh/m²/Year) **RELEVANT CERTIFIED PROJECT** Energy Measures – 21% Savings through: Reduced Window To Wall Ratio and insulation of external wall High performance glass and air economizer Air Conditioning with Air Cooled Chiller Energy-Saving Lighting System for Internal and External Spaces Solar Hot Water Collectors Variable frequency drive in AHU and variable speed drives Sensible heat recovery from exhaust air Water – 25% Savings through: Low-flow Faucets In Bathrooms and Dual-flush Water Closets Water efficient faucets in kitchen sink Materials - 26% Savings through: Clay roofing tiles on Steel Rafters for Roof Construction **KESERWAN MEDICAL CENTRE** Medium weight hollow concrete blocks for External Vinyl flooring and lightweight concrete blocks for internal walls In-country certified project to replace related example once an EDGE project is certified.



HOSPITALS – SRI LANKA CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS						Meets E	DGE Energy Standa	rd			
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	400						PROJECT METR
Multi Specialty	9,700m ²	70%	7	100	350	 87				Heating Energy Cooling Energy Fan Energy	Incremental Co \$10,800
· Hig	Measures – 22% gher Thermal Perference ergy Saving Light I	ormance Glass Bulbs - Internal	_	l Spaces	250 200 150	49 14 22 52		61 37 10 15 21		Pump Energy Pump Energy Laundry Hot Water	Utility Costs Savin \$9,200 / montl
 Reduced Window to Wall Ratio Water – 28% Savings through: Low-Flow Faucets in all Bathrooms Dual-Flush for Water Closets in all Bathrooms 						35 		35 116		Lighting Catering Equipment, Lift, STP, Write Demon	Payback in Year 1
• Wa	ater-Efficient Fauc	ets for Kitchen			0	Base Case	Virtual Energy for Comfort	Improved Case	Virtual Energy for Comfort *	Water Pumps	Operational CC Savings
REI EV	ANT CERTI		IFCT					Y (kWh/m²/\	,		827 tC0 ₂ /Year
Energy I - Rec - Ins - Lov - Air - Ene - Sol - Sol - Sol - Sol - Sol - Sol - Lov	Measures – 56% duced Window To ulation of Roofs a w E-Coated Glass Conditioning with ergy-Saving Lightin ar Hot Water Coll ar Photovoltaics - 33% Savings th w-flow Faucets In	5 Savings thro o Wall Ratio nd External Wa h Air Cooled Ch ng System for I ectors rough: Bathrooms An	ugh: alls niller nternal and		-		2 4 4				
• Alu	Ils – 42% Savings Iminum Sheets or Wire Panel with	Steel Rafters			rnal and	Interna	I Walls	KOF	Ο ΑΝΟΚΥ	'E HOSP	ITAL (GHANA)

- 3-D Wire Panel with "Short-Crete" on both sides for External and Internal Walls
- Ceramic Tile Flooring

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

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



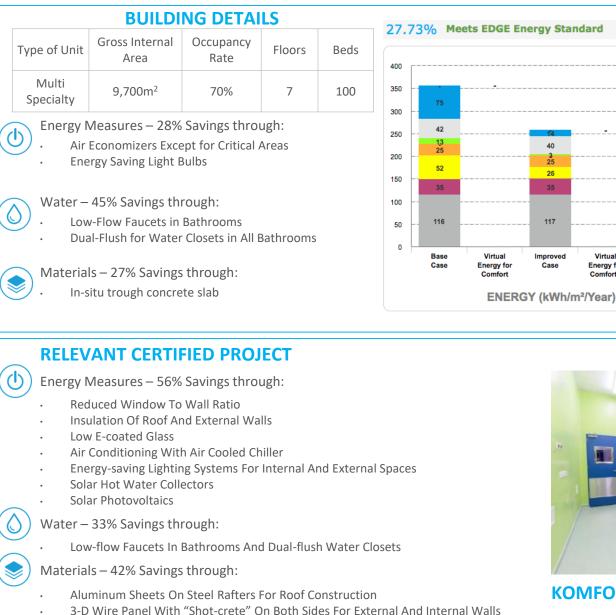
GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS IN AFRICA



Creating Markets, Creating Opportunities

HOSPITALS – ANGOLA CASE STUDY & CERTIFIED PROJECT





PROJECT METRICS

Incremental Cost \$126,000

Utility Costs Savings \$33,765 / month

> Payback in Years 0.3

Operational CO₂ Savings 610 tCO₂/Year



Heating Energy

Cooling Energy

Fan Energy

Laundry

Hot Water

Lighting

Catering

Virtua

Energy for

Comfort

Equipment,

Lift, STP.

Water Pumps

Pump Energy

KOMFO ANOKYE HOSPITAL (GHANA)

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

Ceramic Tile Flooring

HOSPITALS - COTE D'IVOIRE CASE STUDY & CERTIFIED PROJECT

	BUILD	NG DETA	LS						
Type of Ur	it Gross Internal Area	Occupancy Rate	Floors	Beds	28.83%	<mark>⁄o M</mark> e	ets EDGE Er	nergy Stai	ndard
Multi Specialty	, 9,700m ²	70%	7	100	400	67			
Wate	y Measures – 29% Air Economizers Exc Energy Saving Light r – 31% Savings th Low-Flow Faucets in rials – 25% Saving	ept for Critical Bulbs rough: All Bathrooms	Areas		300 250 200 150 50 0	38 11 27 52 35 116 Base Case	Virtual Energy for	12 35 21 26 35 116 Improved Case	Vi
								GY (kWh/r	
Energ	EVANT CERTI y Measures – 37% Reduced Window To V Reflective paint for ext nsulation of roof and Natural ventilation for /ariable Refrigerant V Energy-saving lighting Doccupancy sensors in Solar PVs	Savings throug Vall Ratio Eernal walls external walls corridors olume (VRV) coo systems	gh:						
	r – 39% Savings thr Low-flow faucets In ba Single-flush and flush Water-efficient landsc Rainwater Harvesting rials – 39% Savings	throoms valves for water aping System	closets and	Water-effic	ient urinals				
· ·	Steel sheets on steel ra Medium-weight hollov Finished concrete floo	afters for roof co v concrete block		al, external	walls			-country ce	

PROJECT METRICS



Utility Costs Savings \$6,090 / month

Payback in Years 1.1

Operational CO₂ Savings 467 tCO₂/Year



Heating Energy

Cooling Energy Fan Energy

Pump Energy

Laundry

Hot Water

Lighting

Catering Equipment,

> Lift, STP, Water Pumps

untry certified project to replace related example once an EDGE project is certified.

Health

HOSPITALS – GHANA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILSType of UnitGross Internal
AreaOccupancy
RateFloorsBedsMulti
Specialty9,700m²70%7100

Energy Measures – 24% Savings through:

- Air Economizers Except for Critical Areas
- Energy Saving Light Bulbs

Water – 26% Savings through:

Dual-Flush for Water Closets in All Bathrooms

Materials – 27% Savings through:

In-Situ Trough Concrete Floor Slabs

RELEVANT CERTIFIED PROJECT

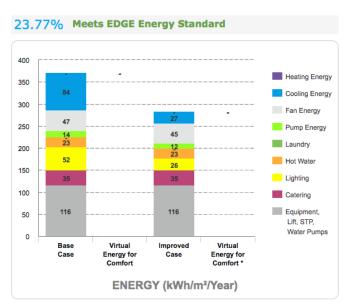
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Energy Measures – 56% Savings through:

- Reduced Window To Wall Ratio
- Insulation Of Roof And External Walls
- Low E-coated Glass
- Air Conditioning With Air Cooled Chiller
- Energy-saving Lighting Systems For Internal And External Spaces
- Solar Hot Water Collectors
- Solar Photovoltaics

Water – 33% Savings through:

- Low-flow Faucets In Bathrooms And Dual-flush Water Closets
- Materials 42% Savings through:
- Aluminum Sheets On Steel Rafters For Roof Construction
- 3-D Wire Panel With "Shot-crete" On Both Sides For External And Internal Walls
- Ceramic Tile Flooring



PROJECT METRICS

*



Utility Costs Savings \$31,620 / month

> Payback in Years 0.2

Operational CO₂ Savings 340 tCO₂/Year



KOMFO ANOKYE HOSPITAL (GHANA)

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

HOSPITALS – KENYA CASE STUDY & CERTIFIED PROJECT

400

350

300

250

200

150

100

50

0



BUILDING DETAILS

Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	
Multi Specialty	9,700m ²	70%	7	100	

Energy Measures – 23% Savings through:

- Air Economizers Except for Critical Areas
- Variable Refrigerant Flow Cooling System
- Recovery of Waste Heat from Generator for Space Heating

Water – 25% Savings through: Low-Flow Faucets in All Bathrooms

Materials - 22% Savings through: In-situ waffle concrete slab

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:

- Reduced window to wall ratio
- 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:

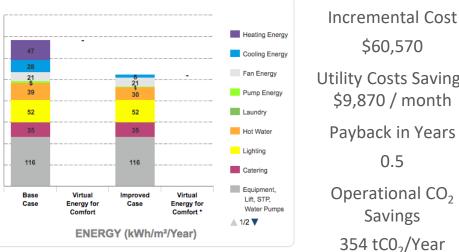
- Low-flow faucets in kitchens and bathrooms
- Single-flush and flush valve for water closets
- Water-efficient urinals, faucets, landscaping
- Rainwater harvesting system

Materials - 43% Savings through:

- Steel sheets on steel rafters for roof construction
- Medium weight hollow concrete blocks for internal, external walls
- Finished concrete flooring

23.41% Meets EDGE Energy Standard

PROJECT METRICS







SEDE DE EBAIS DE ESCOBAL DE BELEN (COSTA RICA)

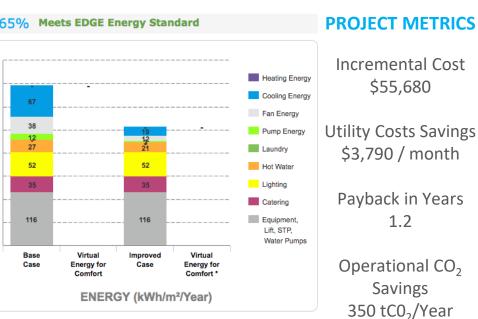
In-country certified project to replace related example once an EDGE project is certified.

Health

HOSPITALS – NIGERIA CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETA	ILS				
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	400	o Mee	ts ED(
Multi Specialty	9,700m ²	70%	7	100	350	67	<u>-</u>
 Air Water - Lo Materia 	Measures – 20% Economizers Exco - 31% Savings th w-Flow Faucets in als – 22% Savings ecast concrete dou	ept for Critical rough: Bathrooms	-			38 12 27 52 35 116 Base Case	Virtu: Energy Comfo
(b) Energy	ANT CERTI	Savings thro					
 Ins Lo[*] Air En So 	duced Window To ulation Of Roof An w E-coated Glass Conditioning Wit ergy-saving Lightin lar Hot Water Coll lar Photovoltaics	nd External Wa h Air Cooled Cl ng Systems For	hiller	nd Externa	l Spaces		
Water -	- 33% Savings th	rough:					
. Lo	w-flow Faucets In	Bathrooms An	d Dual-flus	h Water Cl	osets		
Materia	als – 42% Savings	s through:					
	uminum Sheets Or D Wire Panel With					nternal	Walls

Ceramic Tile Flooring

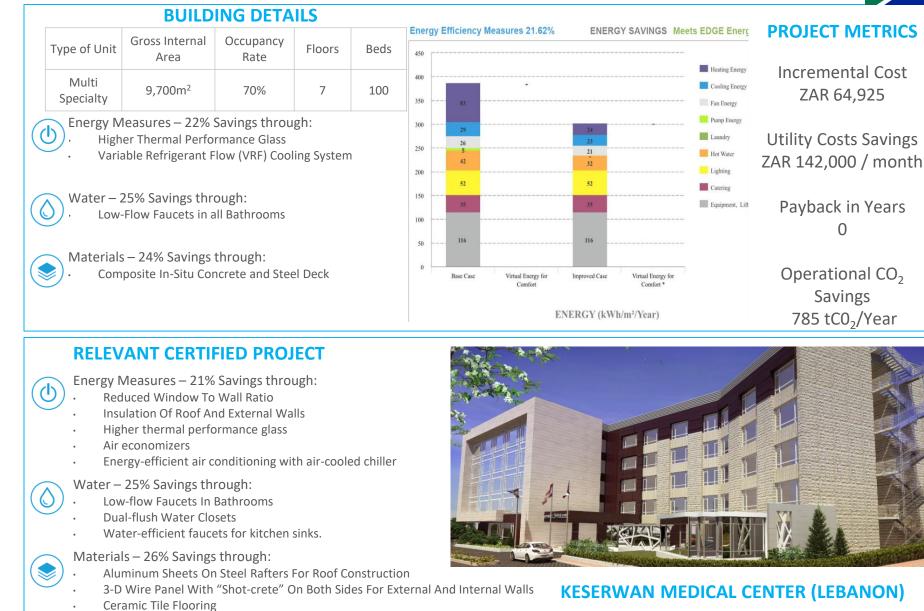




KOMFO ANOKYE HOSPITAL (GHANA)

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

HOSPITALS – SOUTH AFRICA CASE STUDY & CERTIFIED PROJECT



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

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GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS IN LATIN AMERICA



Creating Markets, Creating Opportunities

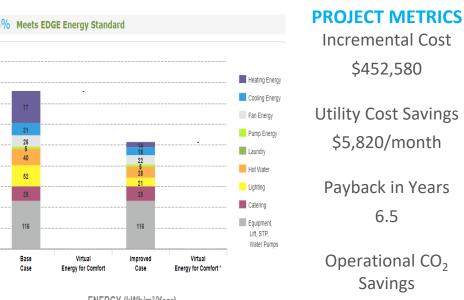
HOSPITALS – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS 32,16% Meets EDGE Energy Standard Gross Internal Occupancy Type of Unit Floors Beds Rate Area 450 Multi 9,700m² 70% 7 100 400 Specialty 350 Energy Measures – 32% Savings through: 300 Variable Refrigerant Flow Cooling Systems 26 250 Energy Saving Light Bulbs - Internal & External Spaces 22 200 Insulation of Roof and External Wall 28 52 21 Air Conditioning with Air and Water Screwed Chiller 150 100 Water – 37% Savings through: 116 116 Low Flow Faucet in Bathroom Duel Flush for Water Closet in all Bathrooms Base Virtual Improved Water Efficient Urinals and Faucet in Kitchen Case Energy for Comfort Case Materials – 27% Savings through: ENERGY (kWh/m²/Year) In-Situ Trough Concrete Floor Slabs **RELEVANT CERTIFIED PROJECT** Energy Measures – 32% Savings through: Reduced window to wall ratio, natural ventilation for corridors reflective paint for external walls, insulation of roof and external walls 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



\$452,580 **Utility Cost Savings** \$5,820/month Payback in Years 6.5 Operational CO₂ Savings 1240 tC0₂/Year

Incremental Cost



Sede de EBAIS de Escobal de Belén(COSTA RICA)

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

Health

HOSPITALS – BRAZIL CASE STUDY & CERTIFIED PROJECT



PROJECT METRICS

Incremental Cost

\$119,000

Utility Cost Savings

\$8,075/month

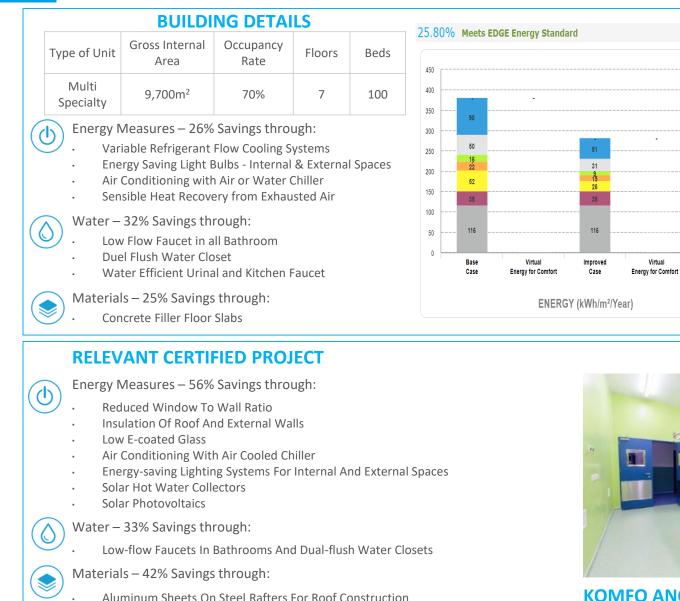
Payback in Years

1.3

Operational CO₂

Savings

1210 tC0₂/Year



KOMFO ANOKYE HOSPITAL (GHANA)

Heating Energy

Cooling Energy

Fan Energy

Pump Energy

Laundry

Hot Water

Lighting

Catering

Equipment

Lift. STP.

Water Pumps

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

3-D Wire Panel With "Shot-crete" On Both Sides For External And Internal Walls

Ceramic Tile Flooring

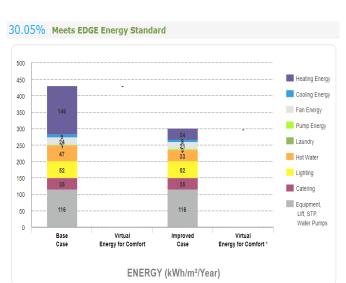
31

HOSPITALS – COLOMBIA CASE STUDY & CERTIFIED PROJECT

		BUILDI	NG DETAI	LS				
	Type of Unit	Gross Internal Area	30.05%	Meets	EDGE Er			
	Multi Specialty	9,700m ²	70%	7	100	500 450 400		
	 Energy N Var Air Insu Water – Low Wateria Cor 	350 300 250 150 50 0	146 9 9 24 47 52 35 116 Base Case	Ene				
((Energy N Rec Insu Air	ANT CERTII Measures – 21% luced Window To Jation Of Roof Ar Economizers ergy-efficient Air C	Savings throu Wall Ratio nd External Wa	ugh: lls And Hig	her Therm	al Perforr		

Drives In Ahus, And Variable Speed Drive Pumps Sensible Heat Recovery From Exhaust Air

- **Energy-saving Lighting**
- Water 25% Savings through:
 - Low-flow Faucets In Bathrooms
 - Dual Flush For Water Closets In Bathrooms
 - Water-efficient Faucets For Kitchen Sinks
- Materials 26% Savings through:
 - Clay Roofing Tiles On Steel Rafters
 - Medium Weight Hollow Concrete Blocks For External Walls
 - Lightweight Concrete Blocks And Drywall System For Internal Walls
 - Vinyl Flooring.



PROJECT METRICS Incremental Cost \$256,700 **Utility Cost Savings** \$8,420/month **Payback in Years** 2.5 Operational CO₂ Savings 645 tCO₂/Year





KESERWAN MEDICAL CENTER (LEBANON)

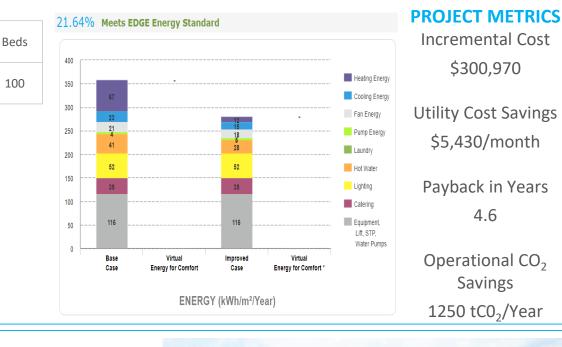
In-country certified project to replace related example once an EDGE project is certified.

HOSPITALS – COSTA RICA CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETAI	LS									PROJECT METRICS
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	22.50	% Meets	EDGE Energ	gy Standard	ł			Incremental Cost
Multi Specialty	9,700m ²	70%	7	100	400	4 84					Heating Energy	196,186,000 CRC
 Energy Measures – 22% Savings through: Variable Refrigerant Flow Cooling System Insulation of Roof and External Wall Variable Frequency Driver on AHUs Variable Speed Drive Pump Energy Saving Light Bulb Internal Space (excluded) 			13/					1 41 25 15 30 		Fan Energy Pump Energy Laundry Hot Water Lighting Catering Equipment	Utility Cost Savings 6,744,000 CRC/mont Payback in Years	
. Low . Due	22% Savings th Flow Showerhea Flush Water Clo ter-Efficient Urina	ads and Faucet	5		50 - 0 -	Base Case		tual or Comfort ENERGY	Improved Case (kWh/m²/Y	Virtual Energy for Comfort * (ear)	Lift, STP, Water Pumps	2.4 Operational CO ₂
	s – 25% Savings crete Filler Floor	0							(,	J	Savings 490 tC0 ₂ /Year
RELEV	ANT CERTI	FIED PROJ	ECT – L	EBAN	ON							
Energy N	/leasures – 56%	Savings thro	ıgh:								Th	
 Insu Low Air Ene Sola 	uced Window To Ilation Of Roof Ar E-coated Glass Conditioning Wit rgy-saving Lightir ar Hot Water Coll ar Photovoltaics	nd External Wa h Air Cooled Ch ng Systems For	iller	nd Extern	al Spac	es						
🚫 Water –	Water – 33% Savings through:											
· Low	-flow Faucets In	Bathrooms And	l Dual-flusl	n Water C	losets				/		A.	
Material	Materials – 42% Savings through:								/			
• 3-D	minum Sheets Or Wire Panel With amic Tile Flooring	"Shot-crete" C				And Inter	nal Wall	S In-cou				SPITAL (GHANA) ample once an EDGE project is certified

HOSPITALS – MEXICO CASE STUDY & CERTIFIED PROJECT





Incremental Cost \$300,970 Utility Cost Savings \$5,430/month **Payback in Years** 4.6

Operational CO₂ Savings 1250 tC0₂/Year



Sede de EBAIS de Escobal de Belén(COSTA RICA)

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

BUILDING DETAILS Gross Internal Occupancy Type of Unit Floors Rate Area Multi 9,700m² 70% 7 Specialty Energy Measures – 22% Savings through: Variable Refrigerant Flow Cooling Systems Insulation of Roof and external Wall Air Conditioning with Aired Cooled Chiller

Water – 35% Savings through:

- Low Flow Faucet and Showerhead
- Dual Flush Water Closet
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

Materials – 30% Savings through:

In-Situ Concrete with > 25% GGBS Floor Slabs

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:

- Reduced window to wall ratio, natural ventilation for corridors
- reflective paint for external walls, insulation of roof and external walls
- 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

HOSPITALS – PERU CASE STUDY & CERTIFIED PROJECT

350

300

250

200

150

100

50

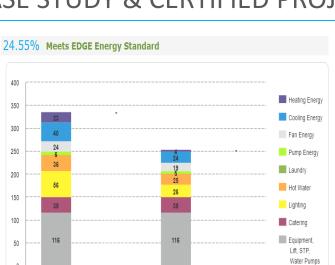
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Base

Case

Virtual

Energy for Comfort



Improved

Case

ENERGY (kWh/m²/Year)

Virtual

Energy for Comfort

Incremental Cost 878,900 S **Utility Cost Savings** 31,900 S/month **Payback in Years** 2.3 Operational CO₂ Savings 1200 tCO₂/Year

PROJECT METRICS



Sede de EBAIS de Escobal de Belén(COSTA RICA)

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

BUILDING DETAILS

	Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds					
	Multi Specialty	9,700m ²	70%	7	100					
 Energy Measures – 25% Savings through: Variable Refrigerant Flow Cooling Systems Insulation of Roof and External Wall Energy Saving Light Bulbs - Internal Spaces 										
(🔨 Water –	39% Savings the	rough:							

Low Flow Showerhead and Faucet

- Duel Flush Water Closet
- Water Efficient Urinals

Materials - 20% Savings through:

In-Situ Concrete with > 25% GGBS Floor Slabs

RELEVANT CERTIFIED PROJECT

- Energy Measures 32% Savings through:
- Reduced window to wall ratio, natural ventilation for corridors
- reflective paint for external walls, insulation of roof and external walls
- 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



GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS IN MENA



Creating Markets, Creating Opportunities

HOSPITALS – EGYPT CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETAI	LS		-						
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	400	Efficiency	Neasures 24.30%	ENER	GY SAVINGS Mee		PROJECT METRIC
Multi Specialty	9,700m ²	70%	7	100	350	43				Cooling Energy	Incremental Cost \$ 160,500
Grief Constraints of the second	Aeasures – 24% th Air Tunnel Syst Cooling/Heating A rgy-Saving Light B 23% Savings the I Flush for Water Flow Faucets in gle Flush/Flush Va s – 28% Savings	rem to Pre-Coo Air Intake Bulbs - Internal rough: Closets in all B all Bathrooms alve	I/Pre-Heat Spaces	Supply	250 200 150 50 0	31 9 35 52 35 116 Base Case	Virtual Energy for Comfort	12 35 22 26 26 35 116 Improved Case	- Virtual Energy for Comfort *	 Pump Energy Laundry Hot Water Lighting Catering Equipment, Lift 	Utility Costs Saving \$ 7,200 / month Payback in Years 2 Operational CO ₂ Savings \$ 370 tCO ₂ /Year
· Con	nposite In-Situ Co	oncrete and Ste	el Deck				I	ENERGY (kW	/h/m²/Year)		
Energy N - Redu - Insu - Low - Air C - Ener	ANT CERTIF leasures – 56% uced Window To lation Of Roof An E-coated Glass Conditioning With rgy-saving Lightin r Hot Water Colle	Savings throu Wall Ratio d External Wal Air Cooled Ch g Systems For	igh: Is iller Internal Ar		I Space	S		A 14 -		No and	
	33% Savings thr	÷						/		all!	
	-flow Faucets In E s – 42% Savings		Dual-flush	n Water C	osets					B	3
\geq	ninum Sheets On	0	or Poof Co	nstructio	n			/			
• 3-D		"Shot-crete" O				Internal V			-		ing Hospital (Gha

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

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HOSPITALS – JORDAN CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETAI	LS		Energ	Efficiency	Measures 2	4.71%	ENERG	Y SAVINGS Mee	ts EDGF Ener	
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	450						Heating Energy	PROJECT METR
Multi Specialty	9,700m ²	70%	7	100	400 -	102					Cooling Energy	Incremental Co \$ 158,700
Ear Air Ene Water – Dua Sing Lov Materia	Measures – 25% cth Air Tunnel Syst Cooling/Heating J ergy-Saving Light I - 26% Savings th al Flush for Water gle Flush/Flush Va w-Flow Faucets in Ils – 28% Savings mposite In-Situ Co	eem to Pre-Coo Air Intake Bulbs - Internal rough: Closets in all B alve all Bathrooms s through:	I/Pre-Heat Spaces Sathrooms	Supply	300 - 250 - 200 - 150 - 100 - 50 - 0 -	33 32 54 35 35 116 Base Case	Virtual En Comf	ort	66 18 19 31 26 35 116 Improved Case	Virtual Energy for Comfort * 1/m²/Year)	Pump Energy Laundry Hot Water Lighting Catering Equipment, Lif	Utility Costs Savi \$ 6,500 / mont Payback in Yea 2 Operational CC Savings \$ 600 tC0 ₂ /Yea
	/ANT CERTI											
 Rec Insi Hig Air Ene Water – Lov Dua Wa 	duced Window To ulation Of Roof Ar gher thermal perfo economizers ergy-efficient air c - 25% Savings th w-flow Faucets In al-flush Water Clo ater-efficient fauce uls – 26% Savings	Wall Ratio and External Wa ormance glass conditioning with rough: Bathrooms sets ets for kitchen	lls th air-coole	d chiller								

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

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HOSPITALS – MOROCCO CASE STUDY & CERTIFIED PROJECT



Medium weight hollow concrete blocks for internal and external walls

Finished concrete flooring

Utility Costs Savings Laundry Hot Water \$ 8.000 / month Lighting Catering Payback in Years Equipment, Lift Operational CO₂ Savings Virtual Energy fo Comfort \$ 400 tC0₂/Year

Heating Energy

Cooling Energy

Fan Energy

Pump Energy

Sede de EBAIS de La Ribera de Belén (Costa Rica)

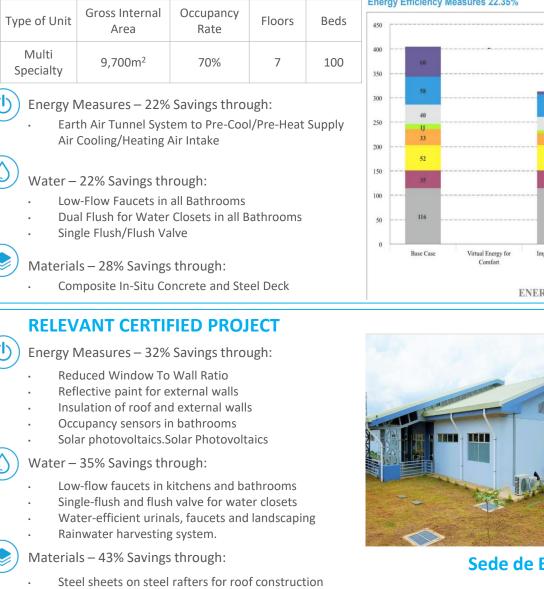
In-country certified project to replace related example once an EDGE project is certified.

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Incremental Cost

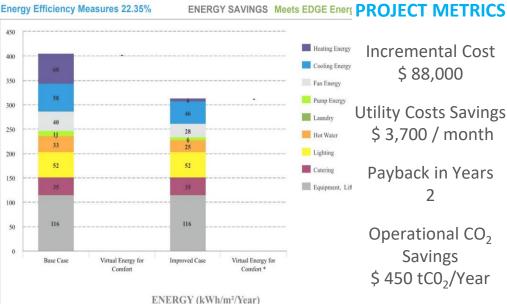
\$ 170,000

HOSPITALS – PAKISTAN CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

Medium weight hollow concrete blocks for internal and external walls





Sede de EBAIS de Escobal de Belén (Costa Rica)

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

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GREEN BUILDINGS RETURN ON INVESTMENT: HOSPITALS IN EASTERN EUROPE



Creating Markets, Creating Opportunities

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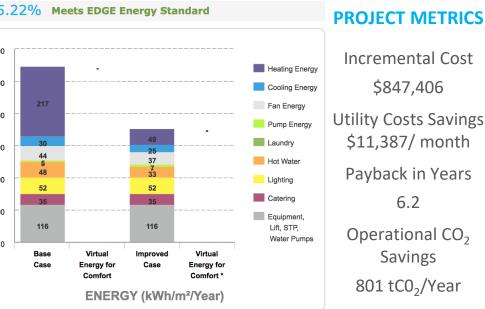
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HOSPITALS – ARMENIA CASE STUDY & CERTIFIED PROJECT

	BUILDI	NG DETAI	LS		35.2	2% м
Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	600	
Multi Specialty	9,700m ²	70%	7	100	500	_
 Re Ins Va Water - Lov Du Wateria 	Measures – 35% duced Window to sulation of Roof an riable Refrigerant - 37% Savings th w-Flow Showerhe al Flush for Water ater-Efficient Urina als – 33% Savings nber Floor Constru	Wall ratios d External Wal Volume Coolin rough: ads and Faucet closets als and faucets s through:	ls g System s for Kitcher	n Sinks	400 300 200 100 0	217 30 44 5 48 52 35 116 Base Case
RELE	ANT CERTI	FIED PROJ	ECT			
b) Energy	Measures – 21%	Savings thro	ugh:			
• Hig • Wa • Air • En	duced Window to gher Thermal Perfo all Insulation • Economizers ergy-Efficient Air C nsible Heat Recove	conditioning w		led Chiller		
🕥 Water -	- 25% Savings th	rough:				
	w-Flow Faucets ar ater-Efficient Fauc			t in bathroo	oms	
🍃 Materia	als – 26% Savings	through:				
· Cla	ay Roofing Tiles on	Steel Rafters				



\$847,406 **Utility Costs Savings** \$11,387/month Payback in Years 6.2

> Operational CO₂ Savings 801 tCO₂/Year



KESERWAN MEDICAL CENTER (LEBANON)

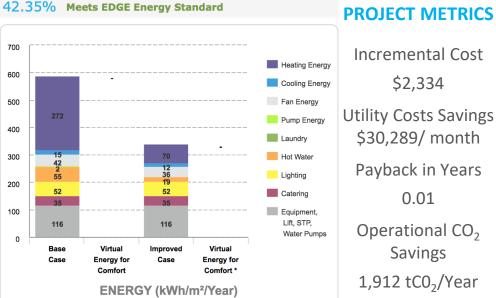
In-country certified project to replace related example once an EDGE project is certified.

HOSPITALS – POLAND CASE STUDY & CERTIFIED PROJECT

		BUILDI	NG DETAI	LS		42.3	5%	1eets ED
	Type of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	700		
	Multi Specialty	9,700m ²	70%	7	100	600		-
	 Rec Insu Var Sola Water – Lov Dua Wateria 	Veasures – 42% Juced Window to ulation of Roof an iable Refrigerant ar Hot Water Coll 36% Savings th v-Flow Showerhea al Flush for Water ter-Efficient Urina ls – 21% Savings aber Floor Constru	Wall ratios d External Wal Volume Coolin ectors rough: ads and Faucet Closets als and faucets s through:	ls g System s for Kitcher	n Sinks	500 400 300 200 100 0	272 42 255 52 35 116 Base Case	Virtu Energy Comf
	Energy N - Red - Ref - Nat - Ene - Occ - Sola Water - - Low - Low - Sing - Wai	ANT CERTIN Measures – 32% luced Window To W lective Paint and Ins ural Ventilation For rgy-Saving Lighting upancy Sensors In B ar Photovoltaics 35% Savings th <i>x</i> -flow Faucets In Kit gle-flush And Flush ter-efficient Urinals water Harvesting S Is – 43% Savings	Savings throu Vall Ratio Sulation For Exter Corridors Systems Bathrooms rough: cchens And Bathro Valve For Water , Faucets And La System	ugh: rnal Walls cooms Closets				
0		el Sheets On Steel R dium Weight Holloy				rnal Walls		

Medium Weight Hollow Concrete Blocks For Internal And External Walls

Finished Concrete Flooring





SEDE DE EBAIS (COSTA RICA)

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

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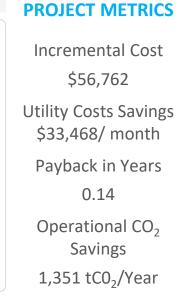
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HOSPITALS – RUSSIA CASE STUDY & CERTIFIED PROJECT

		BUILDI	NG DETAI	LS		45.3	7% Ме	ets EDGE E	nergy Sta	nda
Т	ype of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	800				
	Multi Specialty	9,700m ²	70%	7	100	700				
	 Rec Inst Var Rec Hea Water – Low Dua Wateria 	Measures – 45% duced Window to ulation of Roof an iable Refrigerant covery of Waste H ating 35% Savings th v-Flow Showerher al Flush for Water ter-Efficient Uring Is – 22% Savings	Wall ratios d External Wal Volume Coolin leat from the G rough: ads and Faucet Closets als and faucets s through:	ls g System Generator f s for Kitcher		500 400 300 200 100 0	9 51 4 60 52 35 116 Base Case	Virtual Energy for Comfort ENERC	76 8 50 41 52 35 116 Improved Case	En Co m²/\
	RELEV Energy M · Rec · Hig · Wa	ANT CERTIN ANT CERTIN Measures – 21% duced Window to her Thermal Perfe Il Insulation	FIED PROJ Savings thro Wall Ratio	ECT						
\bigcirc	• Ene • Sen • Water – • Lov	Economizers ergy-Efficient Air (sible Heat Recove 25% Savings th v-Flow Faucets ar ter-Efficient Fauc	ery from Exhau rough: nd Dual Flush W	ist Air /ater Close		oms			4-	
	Materia	ls – 26% Savings	s through:						in Maria	

ergy Standard Heating Energy Cooling Energy Fan Energy Pump Energy Laundry





Hot Water

Lighting Catering

Equipment, Lift, STP,

Water Pumps

KESERWAN MEDICAL CENTER (LEBANON)

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/

Clay Roofing Tiles on Steel Rafters

HOSPITALS – SERBIA CASE STUDY & CERTIFIED PROJECT

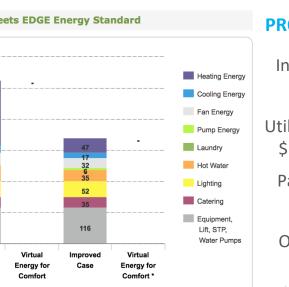


BUILDING DETAILS 35.33% Meets EDGE Energy Standard Gross Internal Occupancy Type of Unit Beds Floors Rate Area 600 Multi 9.700m² 7 100 70% 500 Specialty Energy Measures – 35% Savings through: 400 Reduced Window to Wall ratios Insulation of Roof and External Walls 300 38 3 Variable Refrigerant Volume Cooling System 50 200 52 Water – 38% Savings through: 35 100 Low-Flow Showerheads and Faucets 116 Dual Flush for Water Closets 0 Water-Efficient Urinals and faucets for Kitchen Sinks Base Virtual Case Energy for Comfort Materials – 21% Savings through: ENERGY (kWh/m²/Year) Timber Floor Construction Floor Slabs **RELEVANT CERTIFIED PROJECT – LEBANON** Energy Measures – 56% Savings through: Reduced window to wall ratio Insulation of roof and external walls Low e-coated glass Air conditioning with air cooled chiller Energy-saving lighting systems for internal and external spaces Solar hot water collectors and solar photovoltaics Water - 33% Savings through: Low-flow faucets in bathrooms dual-flush water closets



Materials – 42% Savings through:

- Aluminum sheets on steel rafters for roof construction
- 3-D wire panel with "shot-crete" on both sides for external and internal walls
- Ceramic tile flooring



PROJECT METRICS





MBU at KOMFO ANOKYE HOSPITAL (GHANA)

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

HOSPITALS – UKRAINE CASE STUDY & CERTIFIED PROJECT

Area Rate Multi 9,700m² 70% 7 100 Specialty 9,700m² 70% 7 100 Energy Measures – 39% Savings through: 400 500 246 • Reduced Window to Wall ratios 500 13 70 • Insulation of Roof and External Walls 300 38 12 • Variable Refrigerant Volume Cooling System 35 35 • Solar Hot Water Collectors 200 52 52 Water – 36% Savings through: 116 116 116 • Dual Flush for Water Closets 0 Base Virtual Improved Virtual		BUILDI	NG DETAI	LS		38 7	Q0/2 M	oote EDCE E	inorav Sta	ndard
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Materials – 22% Savings through: ENERGY (kWh/m²/Year)										
Timber Floor Construction Floor Slabs										
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 Timber Floor Construction Floor Slabs RELEVANT CERTIFIED PROJECT Energy Measures – 32% Savings through: Reduced Window To Wall Ratio Reflective Paint and Insulation For External Walls Natural Ventilation For Corridors Energy-Saving Lighting Systems Occupancy Sensors In Bathrooms Solar Photovoltaics 	 Re Ni Er Or Sc Water Lc Si Wateri Ra Materi St 	educed Window To W effective Paint and In- atural Ventilation For hergy-Saving Lighting ccupancy Sensors In R blar Photovoltaics – 35% Savings th ow-flow Faucets In Kin ngle-flush And Flush dater-efficient Urinals ainwater Harvesting S als – 43% Savings	Vall Ratio sulation For Exter Corridors Systems Bathrooms rough: tchens And Bath Valve For Water 5, Faucets And La System 5 through: Rafters For Roof (rnal Walls rooms Closets ndscaping Constructior					SE	DE DE

PROJECT METRICS

Incremental Cost \$13,084 **Utility Costs Savings** \$5,387/ month Payback in Years 0.2 Operational CO₂ Savings 1,258 tCO₂/Year



(COSTA RICA)

example once an EDGE project is certified.

HOSPITALS – TURKEY CASE STUDY & CERTIFIED PROJECT

		BUILDI	NG DETAI	LS		21.10	0/			
Ту	/pe of Unit	Gross Internal Area	Occupancy Rate	Floors	Beds	600	₩0 Me	ets EDGE Er	nergy Sta	nda
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	· Lov	25% Savings th v-Flow Faucets ar	nd Dual Flush W		et in bathroo	ms				
	`	ter-Efficient Fauc ls – 26% Savings		Sinks						
	• Cla	y Roofing Tiles on	Steel Rafters						SERW	
								In country o	artified pre	ind

Standard Heating Energy Cooling Energy Fan Energy Pump Energy Laundry Hot Water Lighting Catering Equipment, Lift, STP, Water Pumps Virtual ved Energy for Comfort *

PROJECT METRICS





RWAN MEDICAL CENTER (LEBANON)

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 <u>lowest possible payback</u> and <u>lowest cost</u> for investors and builders.



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



The EDGE application helps to determine the most costeffective 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.



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: <u>https://www.edgebuildings.com/marketing/research/</u>



ACKNOWLEDGEMENTS

DONOR ACKNOWLEDGEMENT

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Visit <u>www.edgebuildings.com</u> for more information